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Gastroenterology services in the UK. The burden of disease, and the organisation and delivery of services for gastrointestinal and liver disorders: a review of the evidence

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SUPPLEMENT

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1. EXECUTIVE SUMMARY

Purpose of report

This document has been commissioned by the British Society of Gastroenterology. It is intended to draw together the evidence needed to fill the void created by the absence of a national framework or guidance for service provision for the management of patients with gastrointestinal and hepatic disorders. It sets out the service, economic and personal burden of such disorders in the UK, describes current service provision, and draws conclusions about the effectiveness of current models, based on available evidence. It does not seek to replicate existing guidance, which has been produced for upper and lower gastrointestinal cancers, hepatobiliary and pancreatic disorders, and many chronic disorders of the gut. It does, however, draw on evidence contained in these documents. It is intended to be of value to patient groups, clinicians, managers, civil servants, and politicians, particularly those responsible for developing or delivering services for patients with gastrointestinal disorders.

Methods used

A systematic review of the literature was undertaken to document the burden of disease and to identify new methods of service delivery in gastroenterology. This systematic review was supplemented by additional papers, identified when the literature on incidence, mortality, morbidity, and costs was assessed.

Routine data sources were interrogated to obtain additional data on burden of disease, the activity of the NHS, and costs, in relation to gastrointestinal disorders.

The views of users of the service were sought, through discussions with the voluntary sector and through a workshop held at the Royal College of Physicians in December 2004.

The views of professionals were obtained by wide dissemination of the document in a draft form, seeking feedback on the content and additional material.

Main findings

The burden of gastrointestinal and liver disease is heavy for patients, the NHS, and the economy, with gastrointestinal disease the third most common cause of death, the leading cause of cancer death, and the most common cause of hospital admission. There have been increases in the incidence of most gastrointestinal diseases which have major implications for future healthcare needs. These diseases include hepatitis C infections, acute and chronic pancreatitis, alcoholic liver disease, gallstone disease, upper gastrointestinal haemorrhage, diverticular disease, Barrett's oesophagus, and oesophageal and colorectal cancers. Socioeconomic deprivation is linked to a number of gastrointestinal diseases, such as gastric and oesophageal cancers, hepatitis B and C infections, peptic ulcer, upper gastrointestinal haemorrhage, as well as poorer prognosis for colorectal, gastric, and oesophageal cancers.

The burden on patients' health related quality of life has been found to be substantial for symptoms, activities of daily living, and employment, with conditions with a high level of disruption to sufferers' lives found to include: gastro-oesophageal reflux disease, dyspepsia, irritable bowel syndrome, anorectal disorders, gastrointestinal cancers, and chronic liver disease. However, impact on patients is neither fully nor accurately reflected in routine mortality and activity statistics and although overall, the burden of gastrointestinal disease on health related quality of life in the general population appears to be high, the burden is neither systematically nor comprehensively described.

An overwhelming finding concerning evidence related to service delivery is the lack of high quality health technology assessment and evaluation. In particular, evidence of cost effectiveness from multicentre studies is lacking, with more research needed to establish a robust evidence base for models of service delivery.

Waiting times form the bulk of patients' concerns, with great difficulty in meeting government standards for referral and treatment. An extensive and systematic study of the problem of access for the delivery of gastrointestinal services has yet to be carried out and significant publications reporting inequalities in the delivery of gastrointestinal services are lacking. There is also a need to increase awareness and the implementation of initiatives aimed at improving the information flow between patients and practitioners.

Strong evidence exists, however, for a shift in care towards greater patient self management for chronic disease. The development of general practitioners with a special interest in gastroenterology is supported in primary care, but their clinical and cost effectiveness need to be researched. Indeed, emphasis needs to be given to developing interventions to increase preventative activities in primary care, and more research is

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required to determine their effectiveness and cost effectiveness.

Despite strong support for the development and use of widespread screening programmes for a wide variety of gastrointestinal diseases, there is a lack of evidence about how they are managed, their effectiveness, and their cost effectiveness. In contrast, a strong body of evidence exists on diagnostic services, and the need to develop and implement appropriate training and stringent assessment to ensure patient safety. There is also a substantial amount of work detailing guidelines for care.

In hospital, patients with gastrointestinal disorders should be looked after by those with specialist training, and more diagnostic endoscopies could be undertaken by trained nurses. Importantly, for service reconfiguration, there is currently insufficient evidence to support greater concentration of specialists in tertiary centres. More research is needed especially on the impact on secondary services before further changes are implemented.

Consultant gastroenterologist numbers need to increase to meet a rising burden of gastrointestinal disease. Gastroenterology teams should be led by consultants, but include appropriate non-consultant career grade staff, specialist nurses, and other staff with integrated specialist training, where appropriate.

More research is needed into the delivery and organisation of services for patients with gastrointestinal and liver disorders, in particular to assess the clinical and cost effectiveness of general practitioners with a special interest in gastroenterology and endoscopy; the clinical and cost effectiveness of undertaking endoscopy or minor gastrointestinal surgery in diagnosis and treatment centres; and the reconfiguration of specialist services and the potential impact on secondary and primary care and on patients.

2. INTRODUCTION

2.0 Background including policy drivers

This document has been commissioned by the British Society of Gastroenterology. It is intended to draw together the evidence needed to fill the void created by the absence of a national framework or guidance for service provision for the management of patients with gastrointestinal (GI) and hepatic disorders. It sets out the service, economic and personal burden of such disorders in the UK, describes current service provision, and draws conclusions about the effectiveness of current models, based on the presently available evidence. It does not seek to replicate existing guidance, which has been produced for upper and lower gastrointestinal cancers, hepatobiliary and pancreatic disorders, and many chronic disorders of the gut. It does, however, draw on evidence contained in these documents.

The document takes into account recent strategies for the NHS in the UK, and recommendations for quality and service improvement, new information strategies in England and Wales. In particular, it builds on the recommendations of three reports from Derek Wanless, which have significantly influenced the strategic direction of the NHS.

In July 2000 the Government published the NHS plan which set out the core principles for the NHS and a framework for delivering these principles over the next decade. Following on from this the Chancellor of the Exchequer commissioned the first Wanless Report[1] to examine future health trends and resources required over the next two decades. The report welcomed the Government's intention to extend the National Service Framework (NSF) approach to other disease areas and recommended that the NSFs and their equivalents in the developed administrations are rolled out in a similar way to the diseases already covered. It also recommended that a more effective partnership between health professionals and the public should be facilitated in a number of ways. These include setting standards for the service to help give people a clearer understanding of what the health service will and will not provide for them. Other factors include improving health information, reducing key health risk factors, and reinforcing patient involvement in NHS activities.

These recommendations were repeated and reinforced in a report on the NHS in Wales advised by Sir Derek Wanless.[2] The report re-emphasised the need for sustainable change: a shift in delivery from secondary care towards greater care in the community and more self management by patients; and significant investment in improving information and information technology. The report also emphasised the importance of change based on evidence. The third Wanless report[3] emphasised the need for improvements in public health and the need for greater investment in prevention and risk reduction.

2.1 Aims and objectives

This review aims at describing how best to provide services for patients with gastrointestinal disorders from a professional and patient perspective, based on available evidence on disease burden and service provision.

Its objectives are to:

1. Review and synthesise published research evidence and routine data concerning the burden of GI diseases on
   - Patients—their mortality, morbidity, and quality of life
   - The NHS—its volume and cost
   - The economy of the UK.
2. Systematically review and synthesise research findings concerning the effectiveness of models of service provision for GI diseases and the cost effectiveness of GI services.
3. Describe the patients perspective on emerging issues of service delivery highlighted through the literature review as undergoing change.
4. Draw conclusions about optimal service provision based on evidence of burden and effectiveness, patients' view and in the current policy and service context.

The report covers the broad spectrum of GI and liver conditions. It does not examine disorders of nutrition, both malnutrition and obesity, as these have been dealt with in detail elsewhere.[4–6]

2.2 Overview of methods

Four methods were used in the generation of this document:

- A systematic review of the literature was undertaken to identify research papers concerning the effectiveness of methods of service delivery in gastroenterology. This systematic review was supplemented by additional papers identified when the publications on incidence, mortality, morbidity, service activity, and costs were assessed. Some further papers were identified and included from consultation feedback.
- Routine data sources were interrogated to identify additional data on burden of disease and the activity of the NHS in relation to GI disorders.
- The views of users of the service were sought, through discussions with the voluntary sector and through a workshop held at the Royal College of Physicians in December 2004.
- The views of professionals were obtained by wide dissemination of the document in a draft form, seeking feedback on

the content and additional material. The full draft report was presented at the BSG annual conference in March 2005, alongside a strategy document outlined by the BSG president, based on the review findings. After this meeting, comments were invited, and the online report was made available to the BSG membership through a web link. In addition, patient representative groups and other GI specialist organisations were contacted to gain feedback. Comments were received over a 6 month period after release of the first draft, and these were incorporated where they were supported by evidence from well designed and reported research studies. Table A.13 summarises and appraises these papers.

More detail of the methods used is given in the appropriate sections of the document.

3. BURDEN OF GASTROINTESTINAL AND LIVER DISEASE IN THE UK

3.0 Methods and data limitations

Gastrointestinal and liver disorders affect people of all ages. Some disorders are acute and life threatening, others are more chronic, less dangerous to life, but severely debilitating. Gastrointestinal cancers are common—some are curable, others are almost invariably fatal. Bowel problems cause considerable distress in the elderly. The care and management of such diverse problems requires contributions from a wide variety of professions.

The main methods used in this chapter involved extensive and comprehensive searches of the literature on incidence, prevalence, mortality, and patients' quality of life for the various gastrointestinal diseases in the UK and, for comparative purposes, for those in other European or Western countries. Part of the literature had been already compiled through reviews undertaken during the course of previous studies of the incidence and mortality of gastrointestinal diseases such as inflammatory bowel disease, liver cirrhosis, and acute pancreatitis.

The literature searches were primarily undertaken on the Medline and Embase databases with ''incidence'', ''prevalence'', ''case fatality'', ''mortality'', ''quality of life'', ''death rate'', ''hospital'', ''admission'', ''gastrointestinal'', ''review'', ''epidemiology'', ''aetiology'', ''trend'', ''population'', ''rate'', ''100 000'', ''10 000'', ''million'', ''UK'', ''England'', ''Scotland'', ''Wales'', other countries, and the various gastrointestinal diseases as the main search terms.

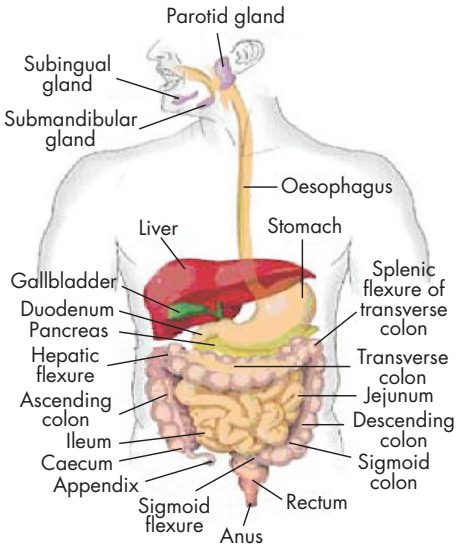


Figure 1 The digestive system. Source: Department of Gastroenterology, University of Miami, 2005.[7]

The literature reviews were supplemented with extensive searches of routine data sources in the UK to provide additional information on the burden of gastrointestinal disease in the UK. The main routine data sources used in this chapter were: firstly, the cancer surveillance and registry units in England, Wales, Scotland, and northern Ireland for publications and data on the incidence, mortality, survival, and socioeconomic aspects of gastrointestinal cancers. Secondly, data and reports published by the Office of National Statistics (ONS) and its predecessor, the Office of Population Censuses and Surveys (OPCS), were obtained for information on the causes of gastrointestinal and other mortality in England and Wales. Thirdly, information on hepatitis B and C infections was obtained from publications involving communicable disease surveillance units in the UK.

The main categories of gastrointestinal disease with corresponding ICD-9 and ICD-10 codes used are as follows: diseases of the digestive system (ICD-9 = 520–579; ICD-10 = K00-K93), malignant neoplasms of the digestive system (150–159; K15-K26), benign and other neoplasms of the digestive system (210, 211, 230, 235.2–235.5; D00, D01, D12, D13, D37), intestinal infectious diseases (001–009; A00-A09), and viral hepatitis (070; B15-B19).

Some of the main limitations of available data in the UK for investigating the burden of gastrointestinal diseases are: firstly, that incidence and prevalence data are routinely compiled for gastrointestinal cancers and communicable diseases only. Fairly complete incidence data for a few acute gastrointestinal disorders such as acute pancreatitis and acute appendicitis can be traced from hospital admissions, although there have been major concerns about the accuracy of routine hospital data.[8–11] Secondly, different criteria for measuring incidence, case mix variation, and different methods used for age standardising population based incidence and mortality rates can also affect comparability across studies; while case fatality from follow-up studies is affected by factors such as the length of follow-up and the inclusion of deaths after discharge with in-hospital deaths, as well as case mix. Trends in hospital admissions for many gastrointestinal disorders, such as gallstone operations and liver replacements, are also strongly affected by factors such as the availability of hospital facilities, as well as the prevailing clinical practice at the time.

People with other gastrointestinal diseases such as functional disorders are mainly managed in primary care; and so incidence or prevalence data for these diseases can usually only be determined through national primary care surveys, costly databases compiled by pharmaceutical companies, or through intensive local or regional surveys of general practices.

For other gastrointestinal disorders, many people remain undiagnosed. Incidence or prevalence data for some of these diseases, such as gastro-oesophageal reflux disease, irritable bowel syndrome, and dyspepsia, can often be obtained at a regional level only, through diagnostic questionnaires or interviews; while differences in diagnostic criteria often affect comparability across studies.

For some gastrointestinal disorders, it is not possible to distinguish functional disorders from more serious diseases without the use of special investigation or tests. The growing sophistication of gastrointestinal diagnostic methods has probably resulted in increased diagnosis of milder forms of what would have been traditionally regarded as serious digestive diseases, and caution is therefore required when making comparisons longitudinally over time.[12] In other words,

increases in reported incidence over time may be attributable to improvements in diagnostic methods rather than real increases.

Routine mortality data are usually available for underlying cause of death only, while patterns of certification of the underlying cause of death vary according to the type of disease or condition. People who die soon after a hospital admission for myocardial infarction, stroke or lung cancer are almost always certified with these diseases as their underlying cause of death. In contrast, the certified underlying causes of death for those who die soon after admission for most gastrointestinal disorders are typically much less likely to be these gastrointestinal diseases.[13] Therefore, mortality statistics, based on underlying cause of death often underreport true mortality from gastrointestinal diseases.

In summary, for many gastrointestinal diseases, other than cancers, burden of disease data are often patchy, collected at a local or regional level, have variation in case ascertainment and in comparability between studies and longitudinally over time, and can underreport the true burden of disease. Even for cancers that have been allocated specialist surveillance and registration units, despite improvements over time, there are sometimes differences between cancer registries in case ascertainment and completeness of registrations, so that some degree of caution is required when making comparisons longitudinally and between registry regions.

3.1 Spectrum of gastrointestinal disorders

Gastrointestinal disorders cover disease of the alimentary canal (from oesophagus to anus) and its associated organs (liver, gallbladder, and pancreas). They affect a significant proportion of the population. Of the cancers, those of the gastrointestinal tract are among the most common, with colorectal cancer being the second most common cancer in England and Wales as measured by incidence and mortality when both sexes are included.[14] It includes very common conditions such as gastro-oesophageal reflux disease, non-ulcer dyspepsia, and functional bowel disease, which although a significant proportion of the population probably self treat at some stage in their life, have a huge impact on primary and secondary care. Other common conditions include inflammatory bowel disease, coeliac and diverticular disease. Alcoholic liver disease remains a significant problem but with increasing obesity and lifestyle trends chronic liver disease due to non-alcoholic fatty liver disease and hepatitis C is being increasingly seen. The wide spectrum of disorders requires a range of treatment involving self care, primary care through to secondary care, and highly specialised tertiary referral centres.

3.2 Incidence of gastrointestinal diseases

Gastrointestinal symptoms and complaints are common among the general population. About one in six admissions to hospital are for a primary diagnosis of gastrointestinal disease, and about one in six of the main surgical procedures in general hospitals are performed on the digestive tract. The following sections outline patterns of incidence and prevalence for some of the main gastrointestinal disorders in anatomical sequence: diseases of the oesophagus, followed by diseases of the stomach and duodenum, the small bowel and colon, the liver, pancreas and gastrointestinal cancers.

Incidence of diseases of the oesophagus

Gastro-oesophageal reflux disease

Gastro-oesophageal reflux disease (GORD or GERD when oesophagus is spelt as esophagus) occurs when reflux of stomach acid into the oesophagus is severe or frequent enough to impact the patient's life or damage the oesophagus, or both. It is the most common disorder of the gastrointestinal tract, resulting from failure of the gastro-oesophageal sphincter. GORD is a chronic condition that, in most cases, returns shortly after discontinuing treatment.

Risk factors for GORD include hiatus hernia, certain foods, heavy alcohol use, smoking, and pregnancy. There is also a strong genetic component in the incidence of GORD: a first degree relative of a patient is four times more likely to be afflicted, while a recent study estimated that 50% of the risk of GORD is genetic.[15] Other possible risk factors include concomitant drugs for treatment of hypertension, angina, and arthritis,[16] and obesity.[17]

The risk of GORD increases with age, rising sharply above the age of 40. More than 50% of those afflicted are between the ages of 45 and 64. Incidence varies geographically, it is slightly higher in women than in men, and it is higher among white people than among Asian and Afro-Caribbean ethnic groups.[18 19]

In Western countries, 10–40% of the adult population experience heartburn, which is the main symptom of GORD, although estimates vary according to the diagnostic criteria used.[18 20 21] In the UK, a recent community based study reported a prevalence of 28.7% for GORD symptoms.[22] Subjects with chronic GORD are at risk of developing Barrett's oesophagus (see below). About 10–15% of subjects who undergo endoscopy for GORD evaluation are found to have Barrett's oesophagus,[16 23] while other complications of GORD include erosive oesophagitis, ulceration, strictures, and gastrointestinal bleeding.[24]

Barrett's oesophagus

Severe, longstanding gastro-oesophageal reflux disease can damage the oesophagus and lead to a condition known as Barrett's oesophagus. This refers to an abnormal change or metaplasia in the cells of the lower end of the oesophagus. Barrett's oesophagus, or columnar-lined oesophagus (CLO), occurs in about one in 400 of the general population, or about 15% of patients with reflux oesophagitis. It is a rare diagnosis in people aged under 40 years, but its prevalence increases sharply with age and with obesity. It is much more common in white people than in Asian and Afro-Caribbean ethnic groups,[18] among men than women, and among people in higher socioeconomic groups.[25]

Barrett's oesophagus is a major risk factor,[16 23 24] and the only known precursor,[26–28] for oesophageal adenocarcinoma, although the degree of risk is not very clearly defined as many people with Barrett's oesophagus remain undiagnosed. The diagnosed incidence of Barrett's oesophagus has been increasing sharply over time in the UK,[29 30] indicating real increases in its prevalence.

Oesophagitis

Oesophagitis refers to the inflammation of the lower end of the oesophageal lining, arising mainly through the chronic reflux of stomach acid and digestive enzymes into the oesophagus. When the inflammation is severe, oesophageal ulcers may develop. Around 50% of people with GORD also have oesophagitis.[31] Other, less common causes of oesophagitis include hiatus hernia, certain fungal infections such as monila and candida, viruses, irradiation, and caustic substances such as lye. The prevalence of oesophagitis increases with age and obesity, and it is also more common in men than in women, and among white people than in Asian and black ethnic groups.[32 33]

Oesophagitis is present in about 20% of patients at endoscopy,[34] although case series from endoscopy units suggest that the diagnosis of oesophagitis is increasing over time. For example, one recent British study reported a diagnostic rate of 32%.[35] It is likely that this reflects a true increase in the

Table 3.2.1 Prevalence rates (% of population) of dyspepsia, as reported from various regional studies in the UK and in other Western countries

Country	Region	Year of study*	Study size	Prevalence (% of population)‡	Authors and reference
UK studies:					
UK	Scotland	1967	1 487 men	29.0	Weir RD and Backett BM, 1968[41]
UK	Hampshire	1988	2 066	38.0	Jones RH and Lydeard SE, 1989[39]
UK	England and Scotland - 5 centres	1989	7 428	41.0	Jones RH *et al*, 1990[38]
UK	150 Centres	1994	2 112	40.3	Penston JG and Pounder RE, 1996[36]
UK	north of England	1997	3 179	25.7	Kennedy TM *et al*, 1998[40]
UK	Glasgow	1998	1 611	12.0	Woodward M *et al*, 1999[42]
UK	Leeds	1999	8 407	37.8	Moayyedi P *et al*, 2000[37]
Foreign studies:					
Norway		1979–1980	14 390	20	Johnsen R *et al*, 1988[51]
Norway	Sørreisa,	1987	1 802	27.5	Bernersen B *et al*, 1996[52]
USA	Olmsted County	1988–1991	835	25.8	Talley NJ *et al*, 1992[53]
Denmark		1993	3 619	14–51	Kay L and Jorgensen T, 1994[54]
Germany	Essen	1993	180	24.4	Holtmann G *et al*, 1994[55]
Netherlands		1994	500	17	Schlemper RJ *et al*, 1995[56]
Japan		1994	231	32	Schlemper RJ *et al*, 1995[56]
USA	Olmsted County	1996	2 200	19.8	Locke GR *et al*, 1997[57]
Australia	Sydney	1997	592	13.2	Nandurkar *et al*, 1998[58]
Germany	Ludwigshafen	1997	4 054	20.4	Zober A *et al*, 1998[59]
Spain		1998	264	23.9	Caballero-Plasencia AM *et al*, 1999[60]
New Zealand	Wellington	1999	817	34.2	Haque M *et al*, 2000[61]
Sweden	Uppsala	1999	1 422	14.5	Agreus L *et al*, 2000[62]
Netherlands	Utrecht	2000	500	13.8	Boekema PJ *et al*, 2001[63]
Iceland		2000	2 000	17.8	Olafsdottir LB *et al*, 2005[64]
Australia	New South Wales	2001	2 300	11.4–36	Westbrook JJ and Talley NJ, 2002[65]

*The year before the year of publication is given, where the study period was not specified; ‡ranges of prevalence refer to prevalence rates obtained using different criteria for diagnosing dyspepsia.

prevalence of oesophagitis, but the magnitude of the increase may not be entirely accurate owing to effective treatments for the condition, such as the advent of proton pump inhibitors.[21]

Dyspepsia

Functional gastrointestinal disorders are defined by symptoms in the absence of any structural abnormalities, and affect all areas of the GI tract, ranging from globus (feeling of a lump in the throat), non-cardiac chest pain, functional dyspepsia in the upper GI tract, and irritable bowel syndrome (IBS) in the lower GI tract. Functional gastrointestinal disorders are characterised by poorly understood abnormalities of gut motility and sensory perception. These and rare motility disorders occur owing to dysfunctional interactions between the brain/central nervous system and the gut/enteric nervous system. Biological triggers underlying functional gastrointestinal disorders are being identified, leading to research aimed at providing effective treatments.

Dyspepsia describes pain or discomfort in the upper abdomen, rather than a defined condition, and it is a chronic, relapsing, and remitting symptom. Causes of dyspepsia include peptic ulcers, acid reflux disease, oesophagitis, anti-inflammatory drugs, gastritis and duodenitis, hiatus hernia, gastric motility disorder, oesophageal or gastric cancers, although in many cases there is no underlying disease.

Dyspepsia has been defined in different ways by a number of expert groups. For example, the 1988 Working Party classification states that symptoms need to be referable to the upper GI tract, and need to be present for the past four weeks. The less inclusive Rome II criteria later stated that patients need to have predominant pain or discomfort centred in the upper abdomen for at least 12 weeks of the past year, and excluded patients with heartburn or acid reflux as their only symptoms. More recently, the BSG have defined dyspepsia as any group of symptoms that alert doctors to consider diseases of the upper GI tract.

Dyspepsia symptoms typically affect between 20 and 40% of the UK population, depending on the diagnostic criteria used.[21] Most recent British studies have used the BSG definition and have typically reported dyspepsia prevalence rates of about 40% (table 3.2.1),[36–39] although lower rates of 26%,[40] 29%,[41] and 12%,[42] have also been reported. Prevalence rates in the UK have often been higher than those reported for populations in other Western countries (table 3.2.1).

Dyspepsia also accounts for between 1.2 and 4% of all consultations in primary care in the UK.[34 43] Half of these consultations are for functional dyspepsia. Non-cardiac chest pain may be of gastrointestinal origin but sufferers often persist in the belief that they have heart disease, resulting in severe morbidity. Fifty per cent of patients consulting their GP for chest pain,[44] and a similar proportion seen in rapid access chest pain clinics,[45] have no cardiac cause of their symptoms. Although mortality in people with functional gastrointestinal disorders is not raised compared with the general population, these disorders have a significant impact on quality of life. For example, two studies reported that 75% of people with non-cardiac chest pain suffered persistent symptoms and impaired quality of life over periods of 10 years or more; 30–50% never returned to work and were unable to carry out household tasks.[44 46]

Peptic ulcers have been thought to account for a quarter of all cases of dyspepsia.[47] Several British studies from the 1940s to the 1980s reported that 18%,[48] 26%,[41] and 31% [39] of people referred with dyspepsia were found to have peptic ulcers, although more recently this percentage has fallen to around 10–15%.[34 39 49 50]

Incidence of diseases of the stomach and duodenum

Peptic ulcer

Peptic ulcer is the collective term that includes ulcers of the stomach and the duodenum. About 90–95% of duodenal ulcers and 70–80% of gastric ulcers are caused by the *Helicobacter pylori*

infection. Other risk factors include non-steroidal anti-inflammatory drugs (NSAIDs) and corticosteroids, increased gastric acid secretion, blood group ''O'', smoking, and heavy alcohol use.

Duodenal and gastric ulcer differ in their incidence by age and sex. The incidence of duodenal ulcer peaks at age 45–64 years, and is twice as common in men than in women, whereas gastric ulcer is more common in the elderly and more equally found in men and women.

The incidence of peptic ulcer in the UK increased during the first half of the 20th century. Since the 1950s, however, hospital admission rates for peptic ulcer have fallen among most age groups.[66–70] Since the early 1980s, this is largely because of a reduction in recurrent ulcer disease consequent upon the identification and eradication of *Helicobacter pylori* infection in patients presenting with peptic ulcer. For example, admission rates for duodenal ulcer in Scotland fell by 38% from 157 to 98 per 100 000 population between 1975 and 1990,[69] and the prevalence of peptic ulcer in primary care in England and Wales fell by 50% from 1994 to 1998.[71] Hospital admissions for perforated peptic ulcer have also fallen over time in the UK; for example, by 26% in Oxford between 1976 and 1982,[72] and by 44% in Scotland for perforated duodenal ulcer between 1975 and 1990.[69]

However, in contrast with this downward trend, hospital admissions for perforated peptic ulcer increased among elderly women in the UK during the 1970s and 1980s,[69 73 74] and perforated duodenal but not gastric ulcer, and haemorrhagic peptic ulcers, increased among elderly people in England during the 1990s.[75] These increases have been linked to the use of NSAIDs, which have been shown to cause both gastric and duodenal ulceration, including ulcer perforation and haemorrhage.[76 77] Patients taking NSAIDs have been reported to be at 4.7 times greater risk of haemorrhagic peptic ulcer, with an increasing risk with age up to 13.2 in people aged over 60.[21] Recent small reductions in the incidence of peptic ulcer among elderly women since the mid-1980s, indicates increased awareness of the side effects of NSAIDs, and more selective prescribing of these drugs.[12 70]

Helicobacter pylori infection

Helicobacter pylori is a bacterial infection that was discovered in 1982 and is the causal agent in 90–95% of duodenal ulcers and 70–80% of gastric ulcers. It is also linked to other gastrointestinal diseases such as gastritis and dyspepsia,[34 49] and it is estimated to be the cause of 73% of all gastric cancers.[78 79] *Helicobacter pylori* has been listed as a grade I carcinogen because gastric cancer can occur after *Helicobacter pylori* gastritis leads to atrophy and metaplasia.[80]

Risk of infection is strongly linked to social deprivation in childhood, and it is much higher in unsanitary or overcrowded living conditions with no fixed hot water supply.[80] It is thought that the crowded living conditions of the expanding cities at the beginning of the industrial revolution led to a decline in hygiene and the spread of the infection early in life.[12 81]

The prevalence of the *Helicobacter pylori* infection in the UK has declined in recent decades, as the infection is progressively eradicated from patients presenting with peptic ulcer and also because of a declining incidence as conditions improved over time. Successive birth cohorts have had a lower risk of childhood infection: the prevalence of *Helicobacter pylori* in 20–30 year olds is 10–20%, rising with age to 50–60% in 70 year olds.

Up to half of the world's population is infected with *Helicobacter pylori*.[80] Prevalence varies between about 80% for adults in developing countries, Japan, and South America, around 40% in the UK, and 20% in Scandinavia. Local differences in prevalence exist where there has been substantial immigration from countries with a higher prevalence of infection.

About 15% of people infected with *Helicobacter pylori* will develop peptic ulcer or gastric cancer as a long term consequence of the infection. Infection in infancy is thought to lead to pangastritis, which predisposes to gastric ulcer and

Table 3.2.2 Hospital admission rates (per 100 000 adult population) for upper gastrointestinal haemorrhage as reported from various regional studies in the UK and in other countries

Country	City/region	Study period	No of cases	Hospital admission rate per 100 000 adult population	Authors and reference
UK studies:					
UK	Oxford	1953–1967	2149	47*†	Schiller KF *et al*, 1970[84]
UK	Oxford	1981–1982	125	56*†	Berry AR *et al*, 1984[85]
UK	NE Scotland	1967–1968	817	116	Johnston SJ *et al*, 1973[86]
UK	Newport, Gwent	1980–1981	330	52*†	Madden MV and Griffith GH, 1985[87]
UK	Nottingham	1984–1986	1017	64*†	Katschinski BD *et al*, 1989[88]
UK	Bath	1986–1988	430	70*†	Holman RA *et al*, 1990[89]
UK	NE Scotland	1991–1993	1098	117	Masson J *et al*, 1996[90]
UK	north west Thames	1991–1993	NA	91	Rockall TA *et al*, 1995[91]
UK	South west Thames	1991–1993	NA	99	Rockall TA *et al*, 1995[91]
UK	West Midlands	1991–1993	NA	102	Rockall TA *et al*, 1995[91]
UK	Trent	1991–1993	NA	107	Rockall TA *et al*, 1995[91]
UK	West of Scotland	1992–1993	1882	172	Blatchford O *et al*, 1997[92]
Foreign studies:					
Sweden	Varberg	1957–1961	283	121*	Herner B and Lauritzen G, 1965[93]
Sweden	Sundsvall	1980–1988	978	100*	Henriksson AE and Svensson JO, 1991[94]
Spain	Cordoba	1983–1988	3270	160*	Mino Fugarolas G *et al*, 1992[95]
Denmark	Odense	1990–1992	183	88	Hallas J *et al*, 1995[96]
USA	San Diego	1991–1994	258	102*	Longstreth GF, 1995[97]
Saudi Arabia	Abha	1991–1993	240	31	Ahmed ME *et al*, 1997[98]
Finland	Central province	1992–1994	298	68	Soplepmann J *et al*, 1997[99]
Estonia	Tartu county	1992–1994	270	99	Soplepmann J *et al*, 1997[99]
Netherlands	Amsterdam	1993–1994	951	45	Vreeburg EM *et al*, 1997[83]
Crete	Heraklion	1998–1999	353	160	Paspatis GA *et al*, 2000[100]
Italy and Spain	Multicentre	1998–2001	2813	40	Laporte JR *et al*, 2004[101]

*Admission rates are expressed per 100 000 general population, instead of the usual 100 000 adult population for upper gastrointestinal haemorrhage, and therefore underreport incidence in comparison with the other studies; †admission rates are calculated from the cited number of cases and total populations served by the hospital(s).

Table 3.2.3 Incidence and prevalence rates (per 100 000 population) for Crohn's disease and for ulcerative colitis, as reported from various regional studies in the UK

City/region	Study period	Study sources*	No of cases	Incidence rate per 100 000 population	Prevalence per 100 000 population	Authors and reference
Crohn's disease:						
Cardiff	1931–90	SP, HR, Lab	86	2.3 in 1961–65 11.9 in 1981–85 8.6 in 1986–90	–	Thomas GA *et al*, 1995[121]
Cardiff	1991–95	SP, HR, Lab	84	5.6	–	Yapp TR *et al*, 2000[122]
Oxford	1951–60	SP, HR	24	0.8	9 in 1960	Evans JG and Acheson ED, 1965[131]
Derby	1951–85	HR, Lab	225	0.7 in 1951–55 6.7 in 1981–85	85 in 1985	Fellows IW *et al*, 1990[124]
Nottingham	1958–72	SP, HR, Lab	144	0.7 in 1958–60 3.6 in 1970–72	–	Miller DS *et al*, 1974[137]
Clydesdale	1961–70	HR	357	1.2 in 1961–65 1.9 in 1966–70	–	Smith IS *et al*, 1975[138]
Gloucester	1966–70	HR, Lab	19	1.5	–	Tresadern JC *et al*, 1973[139]
North Tees	1971–77	HR, Lab	73	5.3	35 in 1977	Devlin HB *et al*, 1980[134]
NE Scotland and N Isles of Scotland	1955–88	SP, HR, Lab	1008	1.3 in 1955–57 9.8 in 1985–87	147 in 1988	Kyle J, 1992[123]
Northern Ireland	1966–81	HR, Lab	440	1.3 in 1966–73 2.3 in 1974–81	–	Humphreys WG *et al*, 1990[140]
Blackpool	1968–80	HR, Lab	156	3.3 in 1971–75 6.1 in 1976–80	47 in 1980	Lee FI and Costello FT, 1985[125]
Leicestershire	1972–89	SP, HR, Lab	582	3.2–4.7 (among Europeans)	–	Jayanthi V *et al*, 1992[126]
North Tees	1985–94	SP	200	8.3	145 in 1994	Rubin GP *et al*, 2000[136]
Trent	2002	SP, HR, Lab	113	–	130 in 2002	Stone MA *et al*, 2003[141]
Ulcerative colitis:						
Oxford	1951–60	SP, HR	238	6.5	80 in 1960	Evans JG and Acheson ED, 1965[131]
NE Scotland	1967–76	SP, HR, Lab	537	11.3	–	Sinclair TS *et al*, 1983[135]
Cardiff	1968–87	SP, HR, Lab		6.4 in 1968–77 6.3 in 1978–87	–	Srivastava ED *et al*, 1992[133]
North Tees	1971–77	HR, Lab	146	15.1	99 in 1977	Devlin HB *et al*, 1980[134]
High Wycombe	1975–84	HR, Lab	313	7.1	84 in 1984	Jones HW *et al*, 1988[132]
North Tees	1985–94	SP	334	13.9	243 in 1994	Rubin GP *et al*, 2000[136]
Trent	2002	SP, HR, Lab	211	–	243 in 2002	Stone MA *et al*, 2003[141]

*Study sources: SP, survey of physicians; HR, review of hospital records or admission data; Lab, pathology data.

gastric cancer, while infection in later childhood may lead to antral gastritis, which predisposes to duodenal ulcers and duodenitis.[82] It has been estimated that one in 35 men and one in 60 women in England and Wales die from a *Helicobacter pylori* related disease.[78] Eradication therapy for *Helicobacter pylori* infection has been shown to be effective for pylori peptic ulcer disease.[49]

Gastrointestinal haemorrhage

Gastrointestinal haemorrhage refers to bleeding from the bowel wall or mucosa anywhere along the GI tract. Presentation depends on the location and rate of haemorrhaging and includes melaena from rapid bleeding high in the gastrointestinal tract, iron deficiency anaemia from chronic slow blood loss, or red blood from the colon or ileum.

Acute upper gastrointestinal bleeding is the commonest emergency managed by gastroenterologists. About half of all upper gastrointestinal haemorrhages are caused by peptic ulcers and NSAIDs, while other causes include oesophageal or gastric varices, gastric erosions, Mallory-Weiss tear in the lining of the oesophagus, angiodysplasia, and upper gastrointestinal malignancies. For example, a review of nine European studies from 1973 to 1995 reported that the main causes of haemorrhage were duodenal ulcer (24% of all cases), gastric ulcer (13%), varices (9%), gastritis/erosions (9%), oesophagitis (8%), malignancies (5%), and no diagnosis (14%).[83]

Lower gastrointestinal haemorrhage accounts for about 20% of all acute gastrointestinal haemorrhages. The most common causes are diverticular disease, inflammatory bowel disease, colonic polyps, ischaemic or infective colitis, gastroenteritis, haemorrhoids, angiodysplasia, and colorectal neoplasms. Most lower gastrointestinal haemorrhages occur in elderly people, and most of these bleeds settle spontaneously and do not require emergency surgery. It is estimated that 20–30% of all gastrointestinal haemorrhages are related to the use of non-steroidal anti-inflammatory drugs.

The incidence of upper gastrointestinal haemorrhage increases very sharply with age, it is higher in men than in women, and it tends to be highest in areas with high incidence of peptic ulcer—for example, in Scotland and the north of England rather than in southern regions. High hospital admissions rates of upper gastrointestinal haemorrhage have been reported in the west of Scotland (172 per 100 000 in 1992–93),[92] Aberdeen (117 in 1991–93),[90] and the north east of Scotland (116 in 1967–68[86]; table 3.2.2).

A study of four health regions in the south of England and the Midlands reported an overall hospital admission rate of 103 per 100 000; which varied between 91 for north west Thames and 107 for Trent.[91] However, lower hospitalised incidence rates of 45–70 per 100 000 were reported from earlier studies particularly in relatively affluent studies such as Bath and Oxford from the 1950s to the 1980s.[84 85 88 89] With an ageing UK population, incidence is likely to continue to rise.[91]

Incidence rates of upper gastrointestinal haemorrhage in the UK are often higher than those reported in other recent studies in Europe and elsewhere. These include studies in Central Finland,[99] the Netherlands,[83] Saudi Arabia,[98] Estonia,[99] and a multicentre study in Spain and Italy. None the less, high incidence rates of 160 per 100 000 have been reported from studies in Crete in the late 1990s,[100] and Spain in the 1980s.[95]

Incidence of diseases of the small bowel and colon

Inflammatory bowel disease

Ulcerative colitis and Crohn's disease are the two main idiopathic types of inflammatory bowel disease. Ulcerative colitis, otherwise known as idiopathic proctocolitis, causes

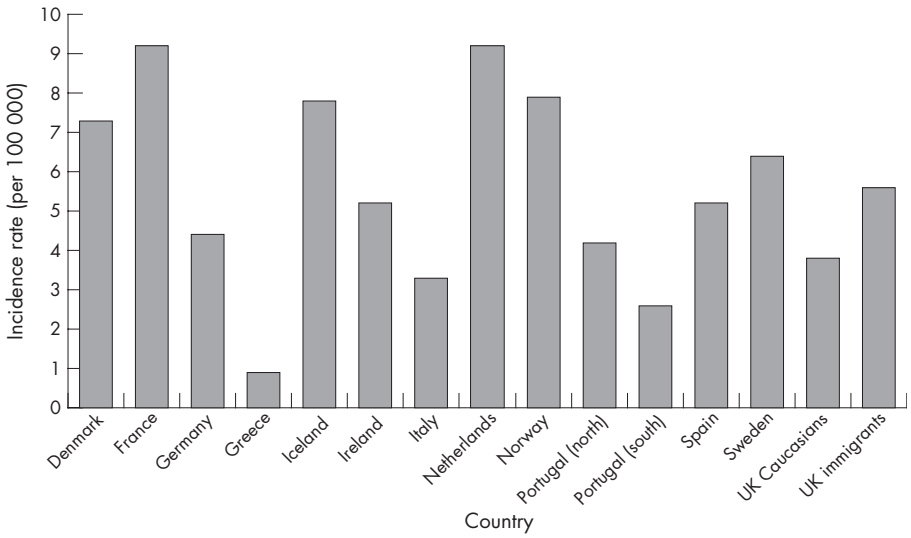


Figure 3.2.1 Incidence rate (per 100 000 population) for Crohn's disease in the UK and in other European countries. Source: Shivananda *et al*, 1996.[148]

inflammation and ulcers in the colon. Crohn's disease differs from ulcerative colitis because it can occur anywhere along the GI tract and causes inflammation deeper within the intestinal wall. Inflammatory bowel disease usually affects younger people and has a chronic relapsing course that impacts on educational, social, professional, and family life. Along with gastrointestinal cancers and liver disease, inflammatory bowel disease is one of the three most important areas for British gastroenterologists.

A total of about 150 000 people have inflammatory bowel disease in the UK, and a total of approximately 2.2 million across Europe.[102] Although there is substantial regional variation (table 3.2.3), the prevalence of Crohn's disease in the UK is currently about 55–140 per 100 000 population, and that of ulcerative colitis is about 160–240 per 100 000, with a combined incidence of about 13 300 new cases diagnosed each year.[103]

The causes of ulcerative colitis and Crohn's disease are not fully known. Although they are thought to be autoimmune diseases, it is not certain whether autoimmune abnormalities are a cause or result of the diseases. Suggested risk factors include appendectomy, diet, smoking, perinatal and childhood infections, and oral contraceptives,[102] while a possible link with measles vaccination has been disputed.[104 105] Inflammatory bowel disease predisposes strongly to cancer of the colon,[106–110] to venous thromboembolism,[111–113] and osteoporosis,[114–116] and it is also associated with coeliac disease,[117 118] and primary sclerosing cholangitis.[119 120]

There is a peak in incidence of inflammatory bowel disease between the ages of 10 and 19 years, and a smaller peak beyond 50 years of age. Women may be at a slightly increased risk of Crohn's disease than men, whereas the risk for ulcerative colitis is the same for men and women.

Studies of Crohn's disease in the UK, and in Europe, have typically reported large increases in incidence over the past 50 years, while others have reported incidence rates that have stabilised after earlier increases (table 3.2.3). There was a sharp increase in the incidence of Crohn's disease in Cardiff from the early 1960s to the early 1980s, before levelling off in the late 1980s,[121] and subsequently declining during 1991–95.[122] Other sharp increases in incidence of Crohn's disease up to the 1980s have been reported for the north east of Scotland,[123] Derby,[124] Blackpool,[125] and among Europeans in Leicestershire.[126]

Incidence rates for ulcerative colitis have been more stable over time than those for Crohn's disease,[127] although a few recent European studies have reported increasing,[128 129] or

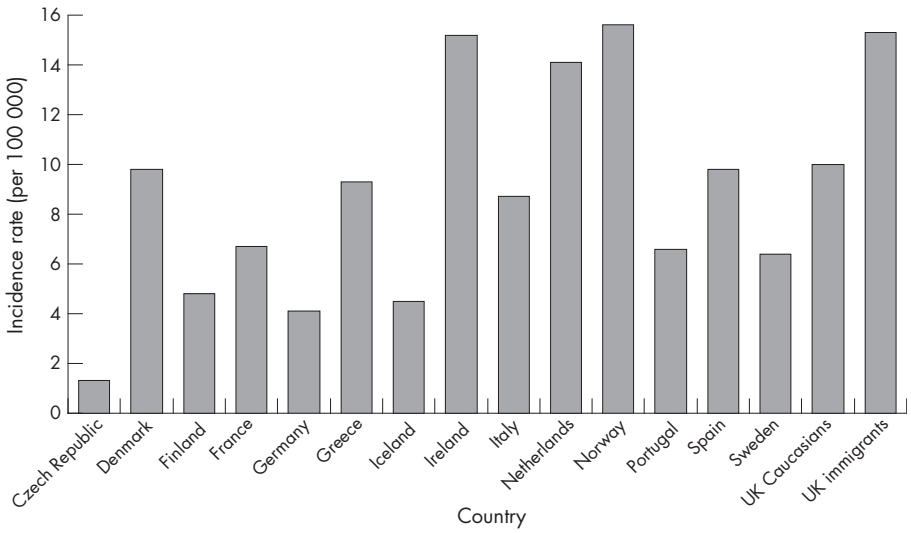


Figure 3.2.2 Incidence rate (per 100 000 population) for ulcerative colitis in the UK and in other European countries. Source: Shivananda *et al*, 1996.[148]

Table 3.2.4 Prevalence rates (expressed as percentages) of irritable bowel syndrome (IBS) reported from various studies in the UK and in other Western countries

Country	City/region	Year of study*	Study size	Prevalence (% of population)†	Authors and reference
UK studies:					
UK	Avon	1979	301	13.6	Thompson WG and Heaton KW, 1980[157]
UK	Hampshire	1991	1 620	22.0	Jones RH and Lydeard SE, 1992[43]
UK	Bristol	1991	1 896	9.5	Heaton KW *et al*, 1992[155]
UK	Teeside	1997	3 179	16.7	Kennedy TM and Jones RH, 2000[154]
UK	Bristol	1995–7	3 111	2.5	Thompson WG *et al*, 2000[156]
UK	Birmingham	2003	4 807	10.5	Wilson S *et al*, 2004[158]
Other Western countries:					
USA		1981	789	17.1	Drossman DA *et al*, 1982[159]
USA		1983	566	15.0	Sandler RS *et al*, 1984[160]
Italy	Umbria	1988	533	8.5	Gaburri M *et al*, 1989[161]
Japan		1988–89	231	25.0	Schlemper RJ *et al*, 1993[162]
USA		1990	5 430	9.4	Drossman DA *et al*, 1993[163]
The Netherlands		1991	500	9.0	Schlemper RJ *et al*, 1993[162]
USA	Olmsted County	1992	643	8.5–20.4	Saito YA *et al*, 2000[164]
Sweden	Osthammar	1988	1 290	14.0	Agreus L *et al*, 1995[165]
Denmark	Glostrup	1993	4 581	6.6	Kay L *et al*, 1994[166]
Australia	Penrith, Sydney	1996	3 240	4.4–13.6	Boyce PM *et al*, 2000[167]
Spain		2000	2 000	2.1–12.1	Mearin F *et al*, 2001[168]
France		2001	15 132	4.7	Dapoigny M *et al*, 2004[169]
Canada		2001	1 149	12.1–13.5	Thompson WG *et al*, 2002[170]
New Zealand	Dunedin	1998–99	980	3.3–18.8	Barbezat G *et al*, 2002[171]
Iceland		2000	2 000	30.9	Olafsdottir LB *et al*, 2005[64]
USA	Olmsted County	2002	643	5.1–27.6	Saito YA *et al*, 2003[172]

*Year before the year of publication is given, where the year of study was not specified; †ranges of prevalence refer to prevalence rates obtained using different criteria for diagnosing IBS.

decreasing rates.[130] Several regional British studies have reported incidence rates of about six or 7 per 100 000 (table 3.2.3),[131–133] although substantially higher rates of 11 to 15 have been reported for northern regions such as north Tees and the north east of Scotland.[134–136]

Although the incidence of inflammatory bowel disease may have shown a tendency to plateau in recent years, large increases in the incidence of paediatric Crohn's disease have continued to be reported in the UK. For example, in Scotland there was a threefold increase in paediatric incidence from 1968 to 1983,[142] a further 50% increase from 1981–83 to 1990–92,[143] and a 100% increase in north east Scotland from 1980–89 to 1990–99.[144] In south Glamorgan there was a 140% increase in the incidence of paediatric disease from 1983–88 to 1989–93,[145] although it is now thought to have reached a plateau.[146] A recent comparison of two national British birth cohorts indicates that the prevalence of Crohn's disease has increased in younger people, although the prevalence of ulcerative colitis has remained stable.[147]

A comparison of incidence rates for Crohn's disease and ulcerative colitis in the UK, with those reported for various other European countries in 1991–93, is shown in figs 3.2.1 and 3.2.2.[148] There is substantial international variation in the incidence of both types of inflammatory bowel disease. For Crohn's disease, incidence tends to be much higher in northern European countries, particularly in Scandinavia and the Netherlands.

The incidence of ulcerative colitis among the UK white population (10.0 per 100 000) is similar to the average of all European countries reported here (9.4), but UK immigrants have a substantially higher rate (figs 3.2.1 and 3.2.2). The incidence of Crohn's disease in the UK white population (3.8) is lower than the European average (5.5), but UK immigrants have similar incidence (5.6).

Irritable bowel syndrome

Irritable bowel syndrome (IBS) refers to longstanding symptoms of abdominal pain, bloating, flatulence, diarrhoea, and/or

Table 3.2.5 Prevalence rates of coeliac disease as reported from various international studies

Country	Screening method	Study size	Prevalence rate†	Authors and reference
The Netherlands	EMA*	1 440	1 in 288 (a)	Schweizer JJ *et al*, 2004[187]
Australia	EMA	3 011	1 in 251 (a)	Hovell CJ *et al*, 2001[188]
Sweden	TGA EMA	1 850	1 in 205 (a)	Lagerqvist C *et al*, 2001[189]
The Netherlands	EMA	6 127	1 in 198 (c)	Csizmadia CG *et al*, 1999[190]
Brazil	EMA	2 371	1 in 183 (a)	Pratesi R *et al*, 2003[191]
Argentina	AGA EMA	2 000	1 in 167 (a)	Gomez JC *et al*, 2001[192]
USA	AGA EMA	4 126	1 in 133 (a)	Fasano A *et al*, 2003[193]
Finland	EMA	1 070	1 in 130 (c)	Kolho KL *et al*, 1998[194]
Northern Ireland	AGA EMA	1 823	1 in 122 (a)	Johnston SD *et al*, 1997[195]
Finland	EMA	3 654	1 in 99 (c)	Maki M *et al*, 2003[196]
England	EMA*	7 550	1 in 87 (a)	West J *et al*, 2003[186]
Europe (Finland, Germany, Italy, Northern Ireland)	TGA EMA	29 268	1 in 50–1 in 220 (a) 1 in 88–1 in 123 (c)	Mustalahti K *et al*, 2004[197]

Determination in serum of IgA antibodies against gliadin (AGA), endomysium (EMA), and tissue transglutaminase (TGA).
*Diagnosis not confirmed by small bowel biopsy; †a, adults; c, children.

constipation. It is the most common functional gastrointestinal disorder seen by GPs, and it is the most common disease diagnosed by gastroenterologists. Although not life threatening, IBS may severely impair quality of life, and it usually persists for several years. Like dyspepsia, IBS has been defined in a number of different ways according to different diagnostic criteria, which affects prevalence estimates.

IBS typically affects 10 to 25% of the general UK population. About half of people with IBS consult their GP, and of these about 20% are referred to a consultant.[149] Consultation behaviour is often influenced by life events or psychological factors, as well as severity of symptoms. IBS constitutes about 20 to 50% of the outpatient gastroenterology workload.[150–152]

IBS can occur at any age, although it most commonly starts in late teenage years or early adulthood, and it is up to three times more common in women than in men. Although there is no consistent effect of age and ethnicity on symptoms,[149] they vary according to which parts of the gut are affected.

Recent community based studies in the UK have reported an IBS prevalence of 10.5% in Birmingham,[158] 16.7% in Teeside,[154] 9.5% and 2.5% in Bristol,[155 156] and 22% in Hampshire.[43] In each of these studies, the prevalence in women was two to four times higher than in men. Prevalence also appears to be increasing in the UK. For example, a comparison of two British national birth cohorts revealed a prevalence rate that had risen from 2.9% in 1988 to 8.3% in 2000 among people aged 30 years.[147]

The prevalence of IBS ranges in all countries of the world from about 3% to 25%. Although differing diagnostic criteria affect comparability across studies, reported prevalence rates in the UK appear to be comparable with, or perhaps slightly higher than those reported in most other Western countries (table 3.2.4).

Coeliac disease

Coeliac disease is an inflammatory condition of the small intestine resulting from sensitivity to gluten, a protein in wheat flour, and similar proteins in barley and rye. It develops in genetically predisposed people but can be diagnosed at any age from early childhood to old age. It appears that a ''trigger factor'' may be required to initiate that response. The trigger might be a viral infection but is usually not known. Removal of wheat gluten (as well as barley and rye) from the diet permits the intestinal mucosa to recover.

Coeliac disease is highly prevalent throughout the world, particularly in countries where wheat forms part of the staple diet, and it is one of the most important conditions managed by gastroenterologists. It is more prevalent in the families of those who are affected: it is estimated that as many as 10% of first degree relatives of patients are also affected.[173] Previous underdiagnosis of coeliac disease in primary care reflects an evolving awareness of the diversity in the presentation of coeliac disease.[174] Coeliac disease is often associated with other diseases such as ulcerative colitis, biliary cirrhosis, primary sclerosing cholangitis, osteoporosis, malignant lymphomas, and thyroid disorders,[175–183] as well as being linked to increased risks of gastrointestinal cancer.[182 184 185]

The prevalence of coeliac disease is thought to be about 1% in the UK,[186] which appears to be comparable with other countries, globally (table 3.2.5). The prevalence of coeliac disease has increased sharply in the UK in the last couple of decades; largely because of improved diagnosis rates as a result of the introduction of screening tools which can be used in primary care. In the diagnosis of coeliac disease, IgA antibodies to tissue transglutaminase and endomysium show good sensitivity and specificity for coeliac disease; however, it is recommended that the diagnosis is confirmed by small bowel biopsy. Cases of coeliac disease have been described in patients with normal biopsy and positive serology and visa versa. In patients with coeliac disease and IgA deficiency the serology will be negative, in such patients IgG transglutaminase and endomysial antibody should be determined.

Diverticular disease

Diverticular of the intestine is a major cause of mortality and morbidity in the UK, mainly among elderly people. It refers to diverticula, or small sacs or pouches that form in the wall of the colon. The most common complication is acute diverticulitis, which occurs when the diverticular become infected, and is sometimes associated with perforation, intestinal obstruction, fistula or abscess formation. Diverticular disease is very common in elderly people, but it is rare in younger age groups and in developing countries. It is thought to be caused mainly by longstanding constipation.[198]

Risk factors for diverticular disease include low fibre diets and low levels of physical activity, while vegetarians have a lower incidence of diverticular disease.[199 200] Increased risks of perforated diverticula have been identified for NSAIDs,[201–204] corticosteroids,[205] and opiate analgesics,[206] whereas calcium antagonists are thought to have a protective effect.[203]

Diverticular disease is much more common in the west than in less developed countries.[203] For example, a study from the 1960s reported a hospital admission rate of 12.9 per 100 000 in Scotland that was over 60 times higher than those in Fiji, Nigeria, and Singapore.[207] Westerners residing in those countries were also substantially more affected than the native populations. In Singapore, for instance, the admission rate among Europeans (5.4 per 100 000) was over 40 times that in the indigenous population.[207]

In the UK, diverticular disease is much more common among white people than among Asian ethnic groups,[208] while incidence increases sharply with age. About 5% of people are affected when in their 40s, and about 50% of people when aged over 80.[209] Diverticular disease is more common in men than in women among younger age groups, but it is more common in women among older age groups.[203]

Because uncomplicated disease is not associated with any particular symptoms, it is often not discovered until post-mortem examination, while few studies have examined the progression from uncomplicated to complicated diverticular disease. Lower gastrointestinal haemorrhaging, which occurs in about 15–20% of cases, and infection resulting in peritonitis or abscesses are the most common complications, and are the causes of most admissions to hospital.[210] For details of mortality associated with complicated and uncomplicated diverticular disease, see section 3.3.

With an ageing UK population, the incidence of diverticular disease is increasing.[211 212] For example, hospital admissions for diverticular disease increased by 16% in men from 20 to 23 per 100 000, and by 12% in women from 29 to 32 per 100 000 in England during the 1990s,[212] while emergency surgical admissions for diverticular disease increased significantly in the south west of England from 1974 to 1998.[213]

Incidence of diseases of the liver

Chronic liver disease and cirrhosis

Chronic liver disease and cirrhosis, traditionally referred to as liver cirrhosis, encompasses a wide range of acute and chronic liver conditions that are caused by a number of different agents. These conditions may lead to cirrhosis, resulting in scarring, injury, and dysfunction of the liver. They include heavy alcohol consumption, hepatitis B or C viral infections, prolonged exposure to certain drugs and toxins, inherited diseases such as haemochromatosis and Wilson's disease, autoimmune liver disease, and chronic liver diseases such as alcoholic fatty liver disease, primary biliary cirrhosis and other chronic diseases of

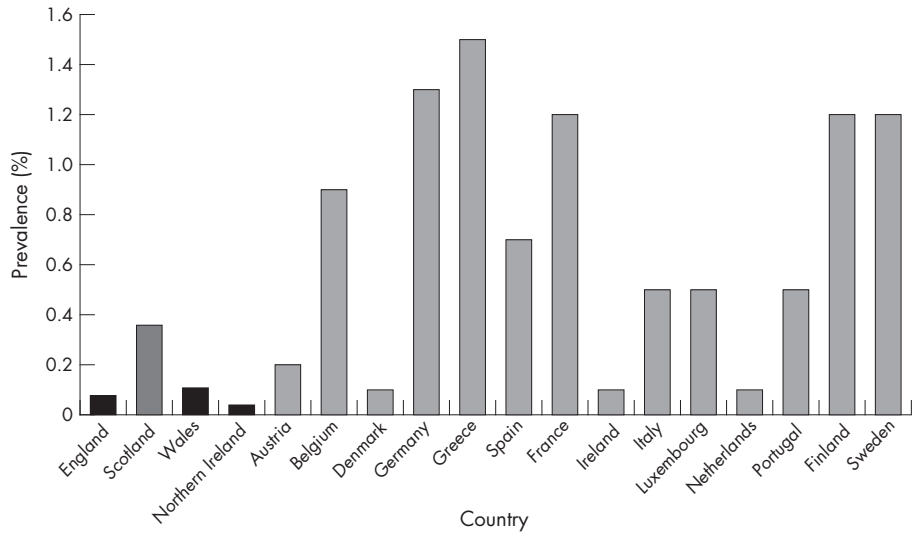


Figure 3.2.3 Prevalence rates (% of population) for reported hepatitis C infections in England, Scotland, Wales, Northern Ireland, and other European countries. Notes: Rates in England, Scotland, Wales, and Northern Ireland are based on reported laboratory diagnoses.[229] The data source for reported rates in the other European countries is Burroughs and McNamara.[227]

the bile ducts. Around 25% of liver disease is alcohol related, and a similar amount is caused by hepatitis C.[214]

Alcoholic liver disease

Alcoholic liver disease refers to a handful of liver diseases that are attributed to the effects of alcohol. These include alcoholic cirrhosis, alcoholic fatty liver disease, alcoholic hepatitis, and alcoholic hepatic failure. Because of diagnostic difficulties, there is negligible reporting of population based incidence rates for the different aetiologies; while in most cases routine hospital data fail to distinguish between them. For example, in Scotland in 1999–2000, 71% of hospital discharges for alcoholic liver disease were diagnosed as ''unspecified alcoholic liver disease''.[215] Since only 15–30% of heavy consumers of alcohol develop advanced alcoholic liver disease,[216] genetic and other environmental factors also have an important role.

Earlier, regional British studies reported incidence rates for alcoholic liver disease of 6.5, 14.6, and 2.8 per 100 000 population in respectively, west Birmingham in 1971–76,[217] Tayside in 1975–79, and the Scottish Islands of Lewis and Harris in 1977–82.[218] The study of west Birmingham also reported an increase in alcoholic liver disease from 2.3 to 9.5 per 100 000 from 1959–61 to 1974–76.[217]

More recent figures show a 160% rise in hospital admissions for alcoholic liver disease in Scotland between 1996 and 2000,[219] while an earlier Scottish study also reported a 160% increase in admissions for liver cirrhosis from 1983 to 1995.[220] The large increase in alcoholic liver disease in the UK in recent years has become a major public health concern and has led to the publication of a national alcohol reduction strategy.[221]

Incidence rates for alcoholic liver disease in the UK are still relatively low compared with those in many other Western

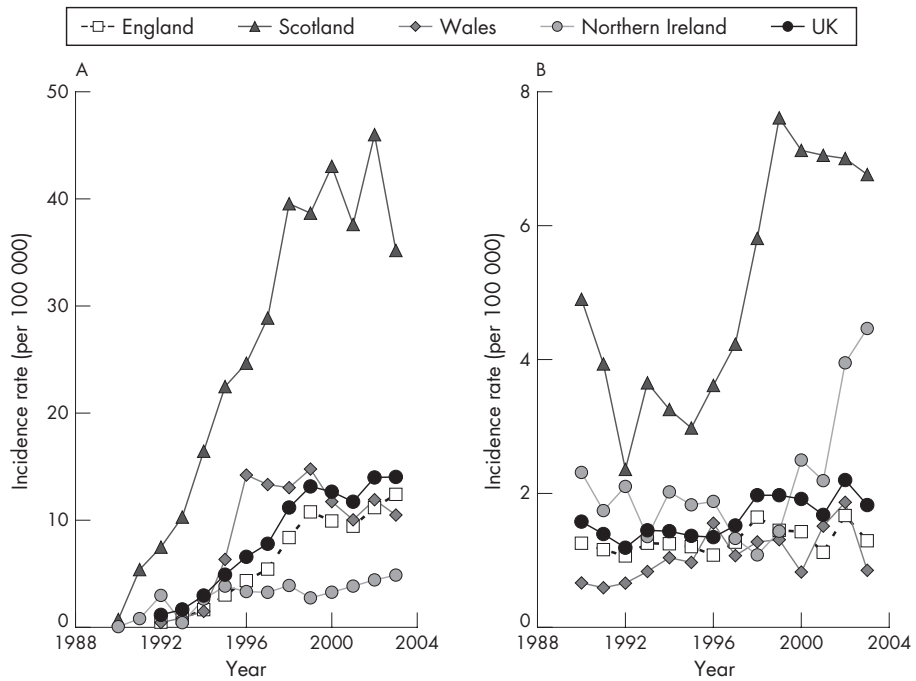


Figure 3.2.4 Trends in incidence rates (per 100 000 population) for reported hepatitis C and B infections in the UK, England, Scotland, Wales, and Northern Ireland, 1990–2003. (A) Hepatitis C infection; (B) hepatitis B infection. Notes: These incidence rates are based on reported laboratory diagnoses.[229]

countries. For example, a rate of 32 per 100 000 was recently reported for Los Angeles, which varied between 8 per 100 000 for Asian ethnic groups and 61 for Hispanics,[216] while the incidence rate in Stockholm County increased from 8 to 24 per 100 000 during the 1970s before falling to 12 per 100 000 by the late 1980s.[222]

Non-alcoholic fatty liver disease

Non-alcoholic fatty liver disease (NAFLD), largely unheard of before the 1980s, is another liver disease on the increase, coinciding with the epidemic of obesity in the UK and in other Western countries. NAFLD is the term used to describe a number of liver conditions, including simple steatosis (fat accumulation in liver cells), steatosis with non-specific inflammation, steatohepatitis (fat accumulation and liver cell injury), and hepatocellular cancer.[223] It has also been suggested that cryptogenic cirrhosis may often actually be ''burned out'' non-alcoholic steatohepatitis.[224]

NAFLD is commonly seen in conjunction with type 2 diabetes, obesity, hypertension, and dyslipidaemia, and is regarded as the liver's response to the metabolic syndrome. Although not the only risk factor, obesity is the most prevalent risk factor for NAFLD and is present in 65–90% of cases. Additional risk factors include advanced age and type 2 diabetes, while men and women are equally affected. Although many people with NAFLD remain undiagnosed, it is thought to affect about 20% of the general population in the UK,[225] while the obesity epidemic is expected to result in increases in the prevalence of NAFLD in the future.

Non-alcoholic steatohepatitis

Non-alcoholic steatohepatitis (NASH) is a major cause of non-alcoholic liver disease which closely resembles alcoholic liver disease, but occurs in people who consume little or no alcohol. As with alcoholic liver disease, an excess of fat is deposited in the liver, which leads to NASH, inflammation, and scarring, and can progress to cirrhosis. NASH is thought to progress to advanced liver disease in about 15–20% of cases. Most cases are asymptomatic and are diagnosed when abnormal liver blood results are discovered during routine investigations.[226]

Until relatively recently NASH was thought to be confined largely to middle aged obese women with diabetes. However, it has become increasingly recognised that NASH also occurs in people who are neither obese nor diabetic, and that it may be one of the most common liver diseases in the Western world.[226] Unfortunately, figures on the incidence or prevalence of NASH in the UK are conspicuous by their absence.

Hepatitis C

The hepatitis C infection is caused by a virus, which is mainly passed through blood and blood products. Most new cases in western Europe are related to intravenous drug abuse, through using infected needles, and to the increased prevalence of hepatitis C infection in Eastern European immigrants.[227] Other less common routes of infection in the UK include unprotected sex, through contaminated skin piercing and tattooing equipment, or from mother to baby.[228] As symptoms from acute hepatitis C infection are uncommon, infection is often discovered by chance on routine screening or on testing after the patient's liver function tests have been found to be abnormal.

An estimated 0.5% of the general UK population, or about 300 000 people, are infected with hepatitis C. Since about one fifth of those infected appear to get rid of the virus naturally without treatment,[228] the estimated prevalence of hepatitis C infection is about 0.4% or 240 000 people, which is about four times higher than the total number of 60 294 reported hepatitis C diagnoses in the UK up to the end of 2003.[229]

Prevalence rates, based on the total number of reported laboratory diagnoses in the UK, at the end of 2003 were 0.08% for the general population in England, 0.36% in Scotland, 0.11% in Wales, and 0.04% in Northern Ireland.[229] These are typically lower than prevalence rates reported for other European countries (fig 3.2.3). There are an estimated five million hepatitis C carriers in western Europe,[227] and 170 million in the world.[230] Prevalence rates in the UK, and in Europe (1.0% of the population) are lower than in other parts of the world, such as Africa (5.3%), the Eastern Mediterranean (4.6%), and South East Asia (2.2%).[230]

Greatly increased risks of hepatitis C infection are found among high risk subgroups of the UK population, such as injecting drug users. In Scotland, for example, reported prevalence rates for hepatitis C antibodies among injecting drug users varied between 23% in the Forth Valley and 62% in Greater Glasgow in 1999–2000,[229] while a prevalence rate of 44% was reported for injecting drug users in London in 2001.[231]

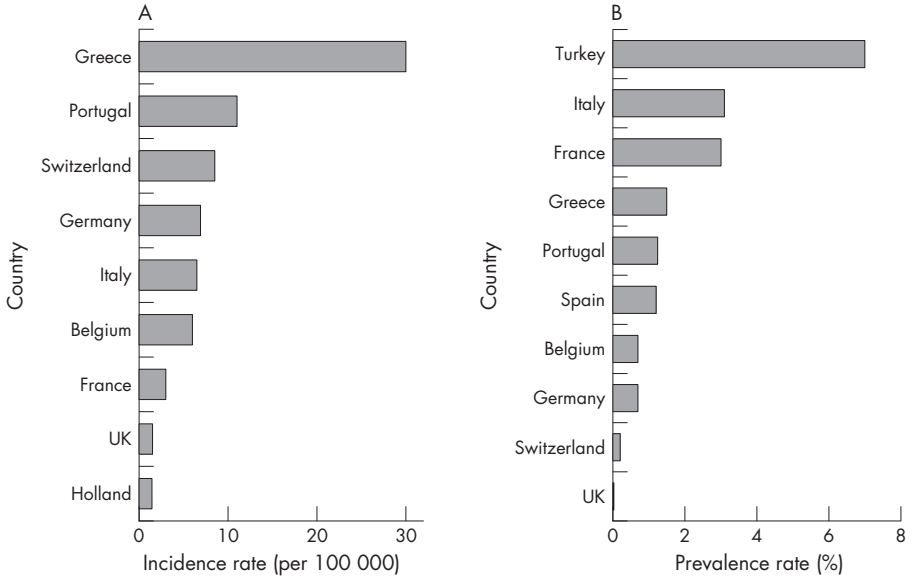


Figure 3.2.5 Incidence rates (per 100 000 population) and prevalence rates (% of population) for hepatitis B infection in the UK and in other European countries. (A) Incidence rate; (B) prevalence rate. Source: World Health Organisation.[230]

Table 3.2.6 Incidence and prevalence rates (per 100 000 population) for primary biliary cirrhosis as reported from various studies in the UK, and in other countries

Country	Region	Study period	Study sources*	No of cases	Incidence per 100 000 population	Prevalence per 100 000 population	Authors and reference
UK studies:							
UK	Sheffield	1976–79	SP, Lab	34	0.6	5.4	Triger DR, 1980[239]
UK	Northern England	1976–87	SP, Lab, HR	347	1.9	1.8 in 1976 12.9 in 1987	Myszor M and James OF, 1990[237]
UK	Dundee	1975–79	LHD	29	1.1	4.0	Hislop WS *et al*, 1982[240]
UK	NE England	1972–79	SP	117	1.0	3.7 (rural) 14.4 (urban)	Hamlyn AN *et al*, 1983[241]
UK	Glasgow	1965–80	Lab, LHD	373	1.1–1.5	7.0–9.3	Goudie BM *et al*, 1987[242]
UK	Northern England	1987–94	SP, Lab, HR, LHD, ND	770	2.3 in 1987 3.2 in 1994	20.2 in 1987 34.5 in 1994	James OF *et al*, 1999[238]
UK	Newcastle	1987–94	SP, Lab, HR, LHD, ND	160	2.2	18.0 in 1987 24.0 in 1994	Metcalf JV *et al*, 1997[243]
UK	Swansea	1995–96	Lab, HR, LHD	67	–	20.0	Kingham JG and Parker DR, 1998[244]
Foreign studies:							
Sweden	Umea	1972–83	SP, Lab, HR	86	1.3	15.1	Danielsson A *et al*, 1990[245]
Sweden	Malmo	1973–82	Lab, HR, ND	33	1.4	9.2 in 1982	Eriksson S and Lindgren S, 1984[246]
Sweden	Orebro	1976–83	Lab	36	1.4	12.8 in 1983	Lofgren J *et al*, 1985[247]
Europe	10 centres	1981	SP	569	–	2.3 (0.5–7.5)	Triger DR *et al*, 1984[248]
Canada	Ontario	1986	SP	206	0.3	2.2	Witt-Sullivan H *et al*, 1990[249]
Spain	Granada	1976–89	SP, HR	25	4.1	3.6 in 1976 6.2 in 1989	Caballero Plasencia AM *et al*, 1991[250]
Australia	Victoria	1991	SP, HR	84	–	1.9	Watson RG *et al*, 1995[251]
Norway	Oslo	1986–95	HR	25	1.6	14.6 in 1995	Boberg KM *et al*, 1998[252]
Estonia		1973–92	SP, Lab	69	0.2	2.7	Remmel T *et al*, 1995[253]
USA	Olmsted County	1976–2000	Lab, HR	22	1.3 in men 0.5 in women	6.3 in women	Bambha K *et al*, 2003[254]
Alaska		1984–2000	Lab, HR	18	–	16 (natives)	Hurlburt KJ *et al*, 2002[255]
Australia	Victoria	1990–2002	SP, Lab, HR	249	–	5.1	Sood S *et al*, 2004[256]

*Study sources: SP, survey of physicians; Lab, laboratory data on subjects with AMA; HR, review of hospital records or admission data; LHD, liver history data; ND, notification of deaths.

Another document reported the highest prevalence in 2001–02 of about 45–50% in London and the north west of England, the lowest prevalence of about 15% in the north east, and a prevalence of 20–35% in other English regions.[232]

Reported incidence rates for hepatitis C increased alarmingly in the UK during the 1990s, particularly in Scotland (fig 3.2.4A). Based on reported diagnoses, the incidence is currently about 40 per 100 000 in Scotland, 10–15 per 100 000 in England, Wales, and in the UK overall, and around 5 per 100 000 in Northern Ireland.[229] In Tayside, prevalence increased from 0.01% to 1.03% of the population from 1988 to 1998.[233] The rise of hepatitis C infections has led to the recent publication of national English strategy and action plan documents.[228 232]

About 40% of people with an acute hepatitis C infection have lifelong chronic infection, which often causes liver cirrhosis or cancer many years after the initial infection. Infected people who consume alcohol have accelerated liver damage, and increased incidence of liver cirrhosis and hepatocellular cancer.[234 235] Hepatitis C infection invariably causes chronic illness, resulting in a major financial burden on healthcare resources. In western Europe, hepatitis C accounts for 70% of all cases of chronic hepatitis, 40% of all liver cirrhosis, and 60% of all hepatocellular cancer.[227] Because of the increasing incidence of hepatitis C, it is estimated that the future burden of hepatitis C health care related to new incidence of cirrhosis will increase by 60% by 2008, and that there will be a fivefold increased need for liver transplantation.[214]

Hepatitis B

Hepatitis B is also caused by a virus; which, in Europe and North America, is mainly passed from person to person by unprotected sex. In the rest of the world it is mainly passed from infected mothers to their children or from child to child.[226] Both hepatitis B and chronic hepatitis C are premalignant diseases leading to hepatocellular cancer. However, unlike hepatitis C, vaccination for hepatitis B has proved to be successful in reducing infection rates.[227]

The prevalence of hepatitis B in the UK is thought to be 0.1% of the general population or approximately 60 000 people,[226] which compares with a total of about 13 000 reported diagnoses up to the end of 2003.[229] In districts of the UK where there are high levels of immigration, prevalence can be much higher; as high as 2% of the population. In Europe, an estimated one million people are infected each year, although the infection is more common in South East Asia, the Middle and Far East, Africa, and southern Europe.

Compared with hepatitis C, there is a less discernible trend in the incidence of reported hepatitis B diagnoses in the UK in recent years (fig 3.2.4B), although there appears to have been quite sharp increases in Scotland during the late 1990s and in Northern Ireland during the past few years. Reported incidence rates for hepatitis B are about one fifth of those for hepatitis C. Recent World Health Organisation figures also indicate that the incidence and prevalence of hepatitis B in the UK is relatively low compared with many European countries; particularly south European countries such as Turkey and Greece (figs 3.2.5A and 3.2.5B).

Primary biliary cirrhosis

Primary biliary cirrhosis is a disease characterised by inflammatory destruction of the small bile ducts within the liver that eventually leads to cirrhosis of the liver. The cause of primary biliary cirrhosis is unknown, but because of the presence of autoantibodies, it is generally thought to be an autoimmune disease. However, other aetiologies such as infectious agents have not been completely excluded.

About 90% of primary biliary cirrhosis occurs in women, and most commonly between the ages of 40 and 60 years. Incidence appears to be increasing sharply in the UK (table 3.2.6).[236] For example, the prevalence of primary biliary cirrhosis in northern

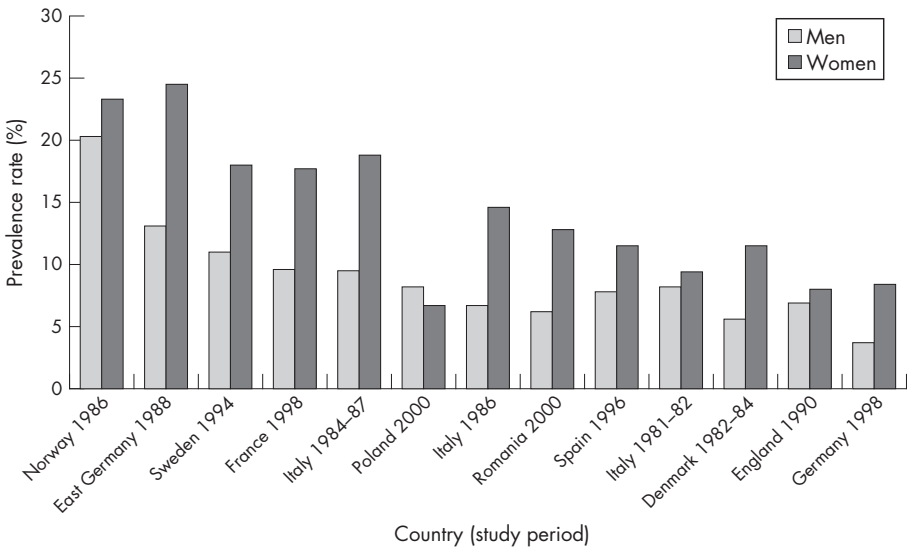


Figure 3.2.6 Prevalence rates (expressed as percentages) of gallstones among men and women in regional ultrasound surveys in the UK and in other European countries. Source: Aerts and Penninckx, 2003.[266] Notes: The year before publication is stated where the study period was not specified. Study regions, overall study sizes and references for the different studies from left to right are: Norway—Schwedt, n = 1371[272]; East Germany—Neuruppin, 3226[273]; Sweden—Stockholm, 556[274]; France—Viduaban, 831[275]; Italy—multicentre study, 29 379[276]; Poland—national study, 10 133[277]; Italy—Sirmione, 1911[278]; Romania—Timisoara, 1323[277]; Spain—Guadalajara, 536[279]; Italy—Rome, 2320[280]; Denmark— Copenhagen, 3608[281]; England—Bristol, 1896[267]; Germany—Romerstein, 2498.[282]

England rose sevenfold between 1976 and 1987,[237] and by 70% from 1987 to 1994.[238]

There are large geographical and secular variations in the prevalence of primary biliary cirrhosis world wide (table 3.2.6). The disease appears to be most common in north west Europe, particularly in northern Britain and Scandinavia: some of the highest reported prevalence rates are for northern England (34.5 per 100 000 population)[243] and for northern Sweden (15.2).[245] These compare with much lower prevalence rates of 1.9 in Victoria, Australia,[251] 2.2 in Ontario, Canada,[249] and 2.7 in Estonia,[253] while primary biliary cirrhosis is rarely found in Africa or Asia.

Primary sclerosing cholangitis

Primary sclerosing cholangitis is a chronic inflammatory condition that occurs when the bile ducts inside and outside the liver become inflamed and scarred. As the scarring increases, blockage of the ducts leads to damage to the liver. Although the exact cause of primary sclerosing cholangitis is unknown, it is thought that the tissue damage is mediated by the immune system.[257]

Table 3.2.7 Aetiology (expressed as percentages) of acute pancreatitis, as reported from various regional studies in the UK, and in other European or Western countries

				Aetiology			
Country	City/region	Study period	No of cases	Gallstones (%)	Alcoholic (%)	Other and unknown (%)	Authors and reference
UK studies:							
UK	Bristol	1950–69	590	58	5	37	Trapnell JE and Duncan EH, 1975[284]
UK	Bristol	1968–79	737	50	8	42	Corfield AP *et al*, 1985[285]
UK	Nottingham	1969–76	214	46	8	45	Bourke JB *et al*, 1979[286]
UK	NE Scotland	1983–85	378	41	15	44	Thomson SR *et al*, 1987[287]
UK	Wessex region	1994–95	186	33	20	47	Toh SK *et al*, 2000[288]
UK	Glasgow	1991–93	279	42	35	24	De Beaux AC *et al*, 1995[289]
UK	Somerset	1991–95	263	56	12	32	Norton SA *et al*, 2001[290]
Other European or Western countries:							
Finland	Tampere	1967–68	97	53	16	31	Mero M, 1982[291]
Sweden	Gothenburg	1974–75	204	26	66	8	Svensson JO *et al*, 1979[292]
Finland	Tampere	1977–78	163	23	58	19	Mero M, 1982[291]
Norway	Buskerud	1992	93	51	15	34	Halvorsen FA and Ritland S, 1996[293]
France	Nice	1986–94	57	51	25	24	Benchimol D *et al*, 1996[294]
Spain	Alicante	1991	473	52	20	28	Minguez M *et al*, 1995[295]
Italy	Bologna	1990–94	204	60	13	27	Gullo L *et al*, 2002[296]
Greece	Thessaloniki	1990–94	84	71	6	23	Gullo L *et al*, 2002[296]
Hungary	Gyor, Szeged	1990–94	483	24	61	13	Gullo L *et al*, 2002[296]
France	Paris	1990–94	65	35	39	26	Gullo L *et al*, 2002[296]
Germany	Ulm, Luneberg	1990–94	232	35	38	27	Gullo L *et al*, 2002[296]
Portugal	Coimbra	1994	91	59	24	17	Milheiro A *et al*, 1995[297]
Norway	Bergen	1986–95	978	49	25	26	Gislason H *et al*, 2004[298]
Sweden	Malmo	1985–99	929	42	25	33	Lindqvist B *et al*, 2004[299]
France	Nice	1994–95	121	43	31	26	Maes B *et al*, 1999[300]
Iceland	Reykavic	1998–99	50	42	32	26	Birgisson H *et al*, 2002[301]
New Zealand	Auckland	1998–2001	112	42	29	29	Flint R *et al*, 2004[302]

Table 3.2.8 Incidence rates (per 100 000 population) for acute pancreatitis, as reported from various national and regional studies in the UK

Region	Study period	Study sources*	Incidence rate per 100 000 population	Authors and reference
Bristol	1950–69	HR, Lab, DR	5.4 in 1961–67	Trapnell JE and Duncan EH, 1975[284]
Bristol	1968–79	HR, Lab, DR	5.4–7.3 from 1968 to 79	Corfield AP *et al*, 1985[285]
Nottingham	1969–76	HR, Lab, DR	5.7	Bourke JB *et al*, 1979[286]
Four counties of SE England	1963–98	HR	4.9 in 1963–74 9.8 in 1987–98	Goldacre MJ and Roberts SE, 2004[303]
Wessex region, south of England	1994–95	HR, Lab	15.2	Toh SK *et al*, 2000[288]
England	1989/90–1999/2000	HR	14.5 in 1989–90 20.7 in 1999–2000	Tinto A *et al*, 2002[304]
Scotland	1961–85	HR, Lab	6.9 (men) in 1961 75.0 (men) in 1985 11.2 (women) in 1961 48.4 (women) in 1985	Wilson C and Imrie CW, 1990[305]
NE Scotland	1983–85	HR, Lab	24.2	Thomson SR *et al*, 1987[287]
Scotland	1984–95	HR	25.8 in 1985 41.9 in 1995	McKay CJ *et al*, 1999[306]

*Study sources: HR, review of hospital records or admission data; Lab, pathology records; DR, deaths records.

Primary sclerosing cholangitis usually begins between the ages of 30 and 60 and is about twice as common in men as in women.[120] Primary sclerosing cholangitis is closely associated with inflammatory bowel disease, particularly ulcerative colitis,[257 258] and coeliac disease.[177] Around 75–80% of northern European people with primary sclerosing cholangitis have underlying inflammatory bowel disease.[120]

Primary sclerosing cholangitis usually progresses to biliary cirrhosis, persistent jaundice, and liver failure. For patients with end stage primary sclerosing cholangitis, liver transplantation remains the only effective treatment. Primary sclerosing cholangitis also predisposes to cholangiocarcinoma in up to 30% of cases,[120 259] and has been associated with increased risks of cancer of the colon, pancreas, gallbladder, and liver.[260] It has also been shown to potentiate the risks of cancer of the colon in people with ulcerative colitis.[261–263]

Although the disease is becoming increasingly common, there is relatively little reported information on incidence or prevalence. Prevalence rates of 12.7 per 100 000 have been reported in south Wales in 2003,[264] 8.5,[252] and 5.6[265] per 100 000 population have been reported from Norwegian studies in the mid-1990s, and 20.9 per 100 000 for Minnesota, USA in 2000.[254]

Gallstone disease

Gallstones or cholelithiasis occur when bile stored in the gallbladder hardens into pieces of stone-like material. The two types of gallstones are cholesterol stones that are made primarily of hardened cholesterol, and account for about 80% of gallstones, and pigment stones that are darker and made of bilirubin. It is thought that cholesterol stones form when bile contains too much cholesterol, too much bilirubin, or not enough bile salts, or when the gallbladder does not empty for some other reason. However, the cause of pigment stones is uncertain, although they tend to occur in people who have cirrhosis, biliary tract infections, and hereditary blood disorders, such as sickle cell anaemia, in which too much bilirubin is formed.

Gallstone disease is the most common abdominal condition for which patients are admitted to hospital in developed countries.[266] The incidence of gallstones increases with age and obesity, and it is higher in women than in men. Other risk factors include diabetes, Crohn's disease, cholesterol lowering drugs, gastric bypass surgery, hormone replacement therapy, fasting, and rapid weight loss. Gallstones are very common in the UK among older age groups, with reported prevalence rates of 12% among men, and 22% among women, who were aged over 60 years in an ultrasound survey in Bristol.[267]

Gallstones can block the normal flow of bile if they lodge in any of the ducts that carry bile from the liver to the small intestine. Complications of gallstones include chronic inflammation or infection of the gallbladder (cholecystitis), abscess formation, acute pancreatitis, and biliary obstruction.[266] Gallstones have been shown to be the dominant aetiological agent in 30–60% of cases of acute pancreatitis in the UK, and in 25–75% of cases in other European or Western countries (table 3.2.7).

Hospital admission rates and operations for gallstones have mainly increased in the UK in recent decades,[213 268–271] although admissions reflect the availability of hospital facilities and the prevalent medical practice, as well as the level of incidence.[271] In England, for example, admissions increased by 30% in men, and by 64% in women, in England from 1989–90 to 1999–2000.[271]

Figure 3.2.6 shows prevalence rates for gallstones, as measured through cross-sectional ultrasound surveys, in regional studies in England and in other European countries. The rates varied between 5 and 24%, they were typically 1.5 to two times higher in women than in men, and the highest rates were reported for Norway and for the former East Germany. The rates reported from the English study of Bristol are lower than those in most of the other European countries.

Haemochromatosis

Haemochromatosis is an inherited condition that is characterised by the deposition of excessive iron in tissue and organs throughout the body, resulting in progressive damage and organ failure. Apart from liver disease, other conditions associated with iron overload include diabetes, joint damage, heart disease, and impotence. Excessive iron overload is associated with increased risks of mortality; mainly from liver cirrhosis, liver failure, liver cancer, and diabetes. Many patients with haemochromatosis remain undiagnosed for several years during the early stages of this condition.[227] Although reliable prevalence data for haemochromatosis are not available for the UK, the disease is common in northern Europe. Prevalence rates of 1% and 0.93% have been reported for Germany and Ireland, with lower rates reported for France (0.5%), Sweden (0.5%), Denmark (0.38%), Iceland (0.37%), and Norway (0.34%).[227]

Incidence of diseases of the pancreas

Acute pancreatitis

Like liver disease, acute pancreatitis is also becoming increasingly common in the general population of the UK. It refers to a sudden inflammation of the pancreas that is activated by destructive pancreatic enzymes. Acute pancreatitis often lasts for a short period of time and, in many cases, it resolves. Severe cases of pancreatitis, however, particularly when necrotising pancreatitis occurs, usually lead to prolonged stays in hospital of three to six months, often with many weeks spent in intensive care and with a high mortality rate.

As there is no specific treatment for acute pancreatitis, surgery and manipulative endoscopy may be required for common duct stones or pancreatic necrosis, and especially for infected necrosis, which occurs in about 5–10% of cases of acute pancreatitis. However, surgery can carry a high mortality, particularly in the short term. Traditional open surgery for infected pancreatic necrosis carries a mortality rate of up to 50%, although a number of less invasive techniques, such as radiological drainage and a minimal access retroperitoneal approach, have been developed.[283]

The two main causes of acute pancreatitis are blockage of the pancreatic duct by gallstones and heavy alcohol consumption, although other causes can include abdominal trauma, surgery, hyperlipidaemia (types IV, V or VI), hyperparathyroidism, infections such as mumps, and some drugs such as corticosteroids, oral contraceptives, and thiazide diuretics. Because almost all people with an attack of acute pancreatitis are admitted to hospital, acute pancreatitis is one of few gastrointestinal diseases for which hospitalised incidence provides a good measure of true incidence.

Several British studies have shown sharp increases over time in the incidence of acute pancreatitis in recent decades (tables 3.2.7 and 3.2.8), although variation in the definition of incidence to some extent affects comparability across studies. One study of four counties in south east England reported a twofold increase in the incidence of acute pancreatitis from 4.9 to 9.8 per 100 000 population from 1963–74 to 1987–98.[303] A recent national English study reported a 43% increase in incidence from 1989–90 to 2000–01,[304] and an earlier study of Bristol reported a 35% increase in incidence from 1968 to 1979.[285]

A study of Scotland reported an even greater, 10-fold increase in incidence of acute pancreatitis among men, and a fourfold increase among women, from 1961 to 1985 (table 3.2.8),[305] although a more recent Scottish study reported a more modest (62%) increase from 1985 to 1995.[306] Increases in the incidence of acute pancreatitis have been attributed to a rise in alcoholic pancreatitis, linked to the increased use of alcohol in the community in the UK,[284 303] and in Finland,[291] although elsewhere in western Europe increases in incidence have been linked to gallstones.[299] Table 3.2.7 shows trends in aetiology across studies, most notably a rise in alcoholic pancreatitis, and a fall in gallstones pancreatitis, across most British studies since the 1950s.

Table 3.2.9 Familial association in the lifetime risk of developing colorectal cancer

Familial association	Lifetime risk
More than two first degree relatives affected	1:3
Two first degree relatives affected	1:6
One first degree relative aged <45 years affected	1:10
One first degree and one second degree relative affected	1:12
One first degree relative aged >45 years affected	1:17
General population	1:50

Source: Keighley, 2003.[324]

Despite differences in the measurement of incidence across studies, recently reported rates for acute pancreatitis are substantially higher in Scotland (about 25–65 per 100 000),[287 305 306] than in England (about 8–25 per 100 000).[285 288 303 304] Incidence rates in Scotland are typically comparable with the high rates reported in the Scandinavian countries,[293 298 307 308] Iceland,[301] and Germany,[309] while rates in England are comparable with those in the Netherlands.[310 311]

Chronic pancreatitis

Chronic pancreatitis occurs when digestive enzymes attack and destroy the pancreas and nearby tissues, causing scarring and pain. It is not usually the result of recurrent attacks of acute pancreatitis but seems to develop separately. The pancreatic gland becomes fibrosed and possibly calcified. Chronic pancreatitis is a disease that is characterised by horrific pain, it severely impairs quality of life and shortens life expectancy, although the exact prognosis is difficult to quantify and it is poorly documented.

The most common cause of chronic pancreatitis is long term, heavy alcohol use. Alcohol has been shown to be the dominant aetiological agent in about 70–80% cases of chronic pancreatitis in recent European studies.[312–314] However, chronic pancreatitis may be caused by blockage or narrowing of the pancreatic duct by gallstones. In other cases it is genetically linked, or it may be triggered by only one acute attack, especially if the pancreatic ducts are damaged, or it can be caused by the effects of malnutrition when calcification is present, and in other cases the cause cannot be determined. Some patients with chronic pancreatitis develop pancreatic cancer.

Chronic pancreatitis is more common in men than in women, and it often develops between the ages of 30 and 50. The prevalence of chronic pancreatitis in the UK is currently about 40–75 per 100 000 population,[315] with an incidence of about eight new cases per 100 000. The tropical form of pancreatitis is a major health problem in southern Africa and Asia, with, for example, high prevalence rates of 114–200 and 25–50 per 100 000 reported for southern India,[316] and Japan,[317 318] respectively.

Although less common than acute pancreatitis, the incidence of chronic pancreatitis is also increasing,[319] particularly with large increases in alcohol use in the UK population over the past 30 years.[320 321] Between 1989–90 and 1999–2000 the hospital admission rate for chronic pancreatitis doubled in England.[304]

There is a large geographical variation in the reported incidence of chronic pancreatitis in Europe, partly reflecting differences in alcohol consumption. High rates of 26, 23, and 14 per 100 000 have been reported for France,[322] Finland,[314] and Stockholm County, Sweden,[222] moderate rates of 5–8 per 100 000 in Luneberg County, Germany,[309] Warsaw, Poland,[323] and the Czech Republic,[314] and a low rate of 1.3 in Switzerland.[314]

Incidence of gastrointestinal cancer

Gastrointestinal cancer is the most common type of cancer in Europe. Out of 2.1 million new cancers in Europe in 2000, gastrointestinal cancers accounted for 579 542 or 28.3% of the total.[324] In the UK, there are about 60 000 new cases of gastrointestinal cancer each year.

Of all cancers in men in England and Wales in 1997, colorectal cancer was the third most common (incidence of 14 900, 13.7% of all new cases), while cancers of the stomach (5800, 5.3%), oesophagus (3600, 3.3%), and pancreas (2700, 2.5%) were ranked 5th, 7th, and 10th, respectively.[14]

Among women, colorectal cancer was the second most incident cancer (14 000, 12.4% of all new cancers), and cancers of the stomach (3300, 2.9%), pancreas (3000, 2.7%), and oesophagus (2500, 2.2%) were ranked 8th, 9th, and 12th, respectively. Together, gastrointestinal cancers represent around a quarter of all cancers in men (the most common

cancer grouping by some margin), and one fifth of cancers in women, behind only breast cancer.[14 103]

Colorectal cancer

Colorectal cancer is the most common type of gastrointestinal cancer in the UK, with about 30 000 new cases a year, and an incidence rate of about 50 per 100 000 population. It accounts for just over half of all gastrointestinal cancers in the UK, and mainly affects people aged between 50 and 80.[324] Of all cancers, when both sexes are included, colorectal cancer is the second most common cancer in England and Wales.[14]

Risk factors for colorectal cancers include a family history of bowel cancer, long term inflammatory bowel disease, high fat diets with low consumption of fibre, smoking, and lack of exercise. Table 3.2.9 illustrates the strong familial association with colorectal cancer. The predisposition to colorectal cancer among people with ulcerative colitis is well established,[106 107 325] with relative risks as high as 21 cited.[108 109] The link between Crohn's disease and colorectal cancer is less well documented, although in recent studies it has been reported as comparable to that for ulcerative colitis.[108 326 327]

From 1971 to 1997 in England and Wales, age standardised incidence of colorectal cancer increased by about 10% in men from about 45 to 50 per 100 000 population, and also increased slightly in women from about 30 to 35 per 100 000.[14]

Gastric cancer

Gastric cancer is twice as common in men as in women, and mainly affects older people: 80% of cases are diagnosed in people aged between 60 and 80. There are currently about 10 000 new cases a year in the UK, representing about 15% of all gastrointestinal cancers, with an incidence rate of approximately 17 per 100 000 population. In the past 30 years there has been a change in the distribution of gastric cancers, with an increase in the incidence of proximal tumours near the gastro-oesophageal junction, but a larger decline in the incidence of antral cancers that used to dominate.[324]

Risk factors include longstanding infection with *Helicobacter pylori*, family history of gastric cancer, a history of gastric polyps, and other disorders such as atrophic gastritis and pernicious anaemia, poor hygiene and socioeconomic conditions, malnutrition, heavy alcohol consumption, smoking, and certain food products and preservatives, including salt and pickled foods. Diets high in fresh fruit and vegetables seem to protect against gastric cancers as they contain high levels of antioxidant vitamins that are thought to protect the stomach lining.

From 1971 to 1997 in England and Wales, the age standardised incidence of gastric cancer fell by about 50% in men from about 30 to 20 per 100 000, and almost halved in women from about 15 to 8 per 100 000.[14]

Oesophageal cancer

There are about 7000 new cases of oesophageal cancer a year in the UK, with an incidence rate of about 11 per 100 000 population. This represents about 11% of all gastrointestinal cancers in the UK, which is higher than the 5.9% in Europe as a whole. Oesophageal cancers mainly occur in people between the ages of 60 and 80, and are three times more common in men than in women.[324]

The most important risk factor is smoking, although others include severe acid reflux from the stomach, heavy alcohol consumption, obesity, a rare muscular disorder known as achalasia, diet, and chewing of betel nuts. Although the incidence of adenocarcinoma of the oesophagus is increasing in several European countries, squamous cell carcinoma remains the predominant histological type. In Europe, it is estimated that 63% of all squamous cell carcinomas in men and 33% in women are attributable to smoking.[328]

It is unclear why oesophageal adenocarcinoma is on the increase, although it is thought to be linked to the rise of gastro-oesophageal reflux disease.[21 329] From 1971 to 1997 in England and Wales, age standardised incidence of oesophageal cancer increased by about 50%, from 8 to 12 per 100 000 population in men, and from 4 to 6 per 100 000 in women.[14]

Pancreatic cancer

In the UK, there are about 6000 new cases of pancreatic cancer a year (about 8% of all gastrointestinal cancers), with an overall incidence rate of about 11 per 100 000 population. Cancers of the pancreas are more common in men than in women, and are predominantly diagnosed in the 50–70 year age group.[324]

Risk factors include pre-existing chronic pancreatitis, liver cirrhosis, diabetes and a history of surgery to the upper digestive tract, smoking, family history, and environmental exposure to certain insecticides or chemicals such as gasoline. Chronic pancreatitis is an especially important risk factor for pancreatic cancer, with relative risks as high as 27 having been reported.[330]

From 1971 to 1997 in England and Wales, age standardised incidence of pancreatic cancer fell by approximately one sixth in men from about 12 to 10 per 100 000 population, but remained stable at about 7 per 100 000 in women.[14]

Liver cancer

Most liver cancers (about 95%) are metastatic: primary cancer sites in order of frequency are colon and rectum, pancreas, oesophagus, stomach, breast, lung, and kidney.[324] There are about 2300 new cases of primary liver cancer a year, with an overall incidence of approximately 4 per 100 000 population. Primary liver cancer accounts for about 3% of all gastrointestinal cancers in the UK, and is more common in men than in women.

Risk factors for primary liver cancer include liver cirrhosis, either of alcoholic aetiology, through hepatitis B or C infection, or through inherited conditions such as haemochromatosis and α_1 antitrypsin deficiency, exposure to certain chemicals such as vinyl chloride, smoking, and long term use of anabolic steroids.

Incidence of other gastrointestinal diseases and related conditions

Appendicitis

Appendicitis refers to the inflammation of the appendix when it becomes blocked. The blockage is thought to be caused by a build up of thick mucus within the appendix, or by a stool that enters the appendix from the caecum, or by swollen lymphatic tissue within the appendix. The most common complication of appendicitis is perforation, which is usually caused by a delay in treatment, and which can lead to a periappendiceal abscess or diffuse peritonitis.

Appendicitis can occur at any age, although it is rare in children under 2 years of age. Incidence peaks in late teens and early twenties, it declines with increasing age, and it is higher in men than in women. Appendicitis has also been linked to low fibre and refined carbohydrate diets, amoebiasis, bacterial gastroenteritis, and mumps.

About 10% of the UK population will develop acute appendicitis at some stage, and about 70 000 appendicectomies are performed each year. The incidence of acute appendicitis declined in the UK and in most other Western countries between the 1930s and the early 1990s, and there was a further reduction in hospital admissions for acute appendicitis, of 13% among men and 19% among women in England during the 1990s.[331]

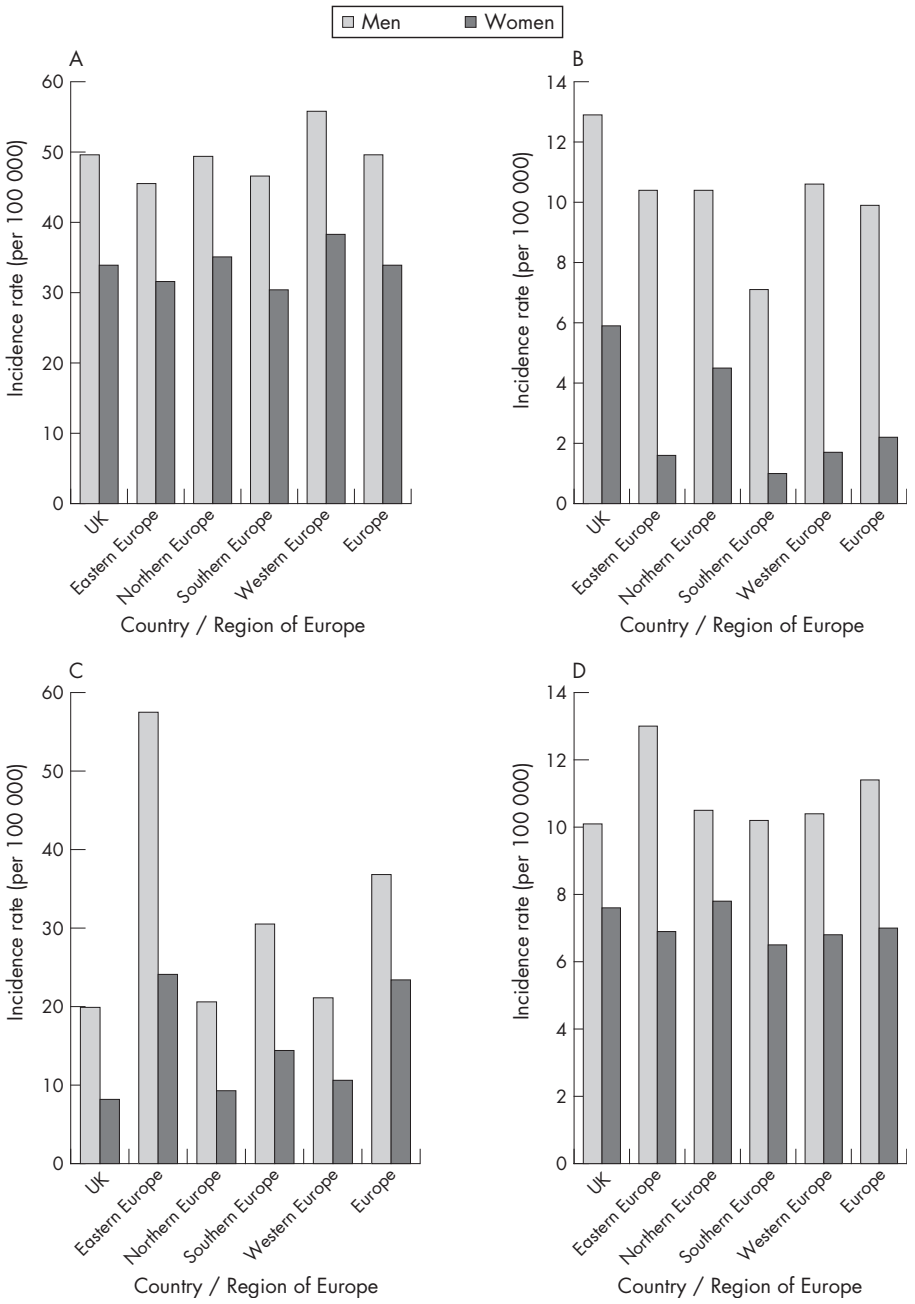


Figure 3.2.7. Estimates of age standardised population based incidence rates (per 100 000 population) for the main types of gastrointestinal cancer among men and women in the UK, eastern Europe, northern Europe, southern Europe, western Europe, and in Europe in 1995. (A) For colorectal cancer; (B) for oesophageal cancer; (C) for gastric cancer; (D) for pancreatic cancer. Notes: Western Europe includes Austria, Belgium, France, Germany, Luxembourg, Switzerland, and The Netherlands. Eastern Europe includes Belarus, Bulgaria, Czech Republic, Hungary, Poland, Republic of Moldova, Russia, Slovakia, and the Ukraine. Northern Europe includes Denmark, Estonia, Finland, Iceland, Ireland, Latvia, Lithuania, Norway, Sweden, and the UK. Southern Europe includes Albania, Croatia, Greece, Italy, Macedonia, Malta, Portugal, and Spain. Europe refers to all countries listed above for these four regions. Source: Bray *et al*, 2002.[328]

Obesity

Obesity is not a gastrointestinal disorder but plays a significant part in many diseases of the liver and gut. A recent report by the Royal College of Physicians dealt with the growing epidemic of obesity in the UK and outlined its impact on a number of diseases, including heart disease, diabetes, and gastrointestinal disorders such as gallstones, liver disease, and gastrointestinal cancers.[6] Other studies have also documented obesity as a risk factor for a wide range of gastrointestinal diseases, such as colorectal cancer,[332–334] oesophageal cancer,[334–336] gastric cancer,[337 338] hepatocellular cancer,[339 340] gallstone disease,[328 333] alcoholic liver disease,[341–343] non-alcoholic fatty liver disease,[333 339 342 344–346] gastro-oesophageal reflux disease,[17] Barrett's oesophagus,[347 348] hiatus hernia,[349] surgical complications,[350 351] and prognosis for acute pancreatitis.[352 353]

The Royal College of Physicians recommend prevention strategies targeted towards improvements in nutritional labelling of foods, public education, and social marketing and retailing, promotion of leisure-time sports and activities, NHS priorities and planning, promoting healthy schools, ''active transport'', further research and development, and promotion of local level programmes.[6]

Alcohol related morbidity

Several of the gastrointestinal disorders covered in the previous sections of this report, such as alcoholic liver diseases, upper gastrointestinal haemorrhage from oesophageal varices, acute and chronic pancreatitis, gastric, oesophageal and liver cancer, and gastro-oesophageal reflux disease are linked to alcohol consumption in varying proportions of cases. Alcohol has often been associated with a wide range of other non-gastrointestinal diseases and conditions such as injury from traffic accidents, other trauma, violence, suicide, breast cancer, and haemorrhagic stroke, as well as being the direct cause of other

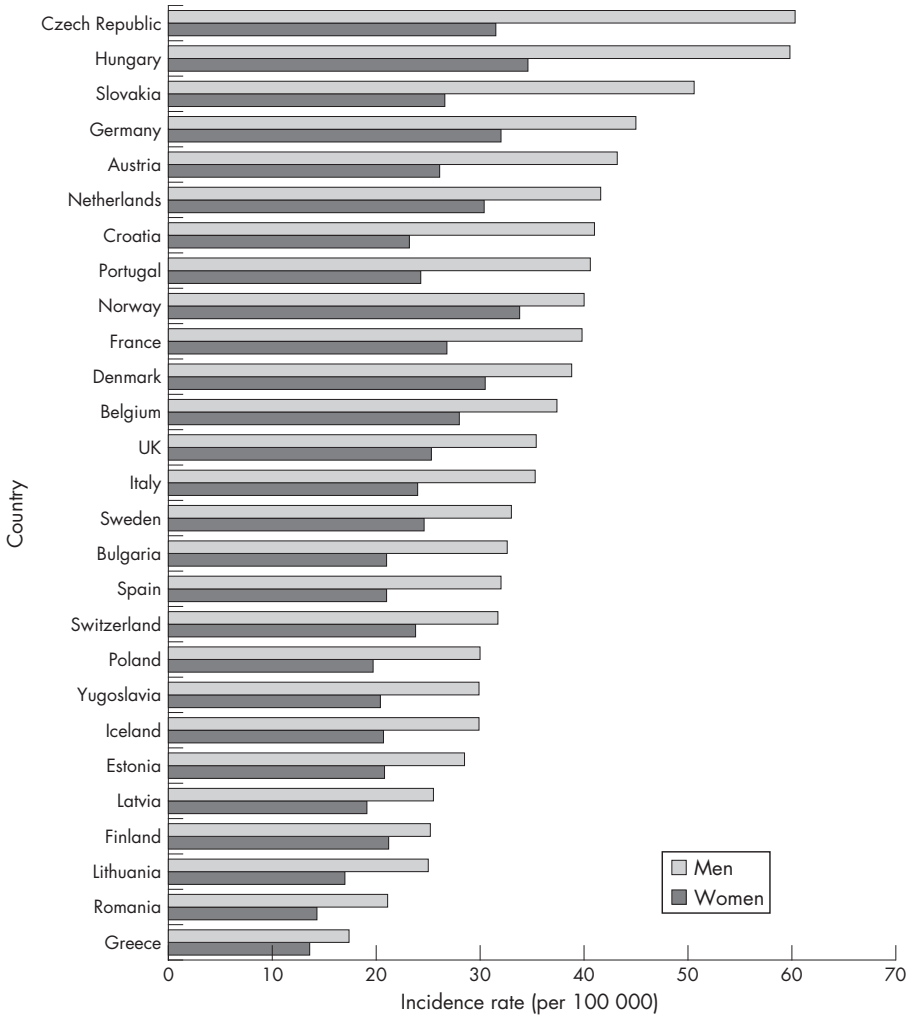


Figure 3.2.8 Standardised population based incidence rates (per 100 000 population) for colorectal cancer in 27 different European countries, 2000. Source: Keighley, 2003.[324]

disorders such as alcoholic psychoses and alcoholic dependence syndrome.[354] In the UK in recent years, there have been reports of increasing numbers of people admitted to general hospitals with alcohol related illnesses, particularly in Scotland.[220 355 356] For example, a recent study in Glasgow reported that during one month, 51% of all gastroenterology inpatients had been admitted owing to alcohol related conditions,[357] and 65% of these were caused by alcoholic liver disease.

Infectious intestinal diseases and food poisoning

Food poisoning and infectious intestinal disease (IID) are important diseases in the UK. Food poisoning notifications and laboratory reports of pathogens responsible for IID have been falling in the past four years. However, in 2001, there were over 85 000 food poisoning notifications; and 1 in 60 people consulted a GP for IID in England and Wales.[358]

Defaecation problems

Faecal incontinence, the involuntary loss of rectal contents at a socially inappropriate time or place, is an underappreciated condition, which affects at least 2% of adults in the community. The prevalence in elderly people is up to 15%, and higher still among those living in residential or nursing homes. However, compared with urinary incontinence, the condition is neglected.[359] Neurological related bowel problems present a heavy burden on nursing resources,[360 361] with diseases or conditions such as multiple sclerosis,[362–364] Parkinson's disease,[365] spina bifida,[366] stroke,[367] and spinal cord injuries,[368–370] associated with faecal incontinence or constipation, or both in 50% or more cases.[371] The management of constipation alone can account for up to 10% of district nursing time.[372]

Biliary atresia

Biliary atresia is a disease of unknown cause in which all, or part of, the extrahepatic bile ducts are obliterated, leading to complete biliary obstruction. Biliary atresia is, however, a rare condition with fewer than 50 cases annually in the UK and Ireland.[373]

Short bowel syndrome (HPN)

Patients with a short small intestine as a result of disease or surgery may need additional feeding. Home parenteral nutrition (HPN) is a complex technology involving the intravenous infusion of all nutrients required for life directly into a central vein. These nutrients include carbohydrates, fat, amino acids, electrolytes, trace elements, and water. The patient, or carer, is taught to manage the complicated routine, enabling transfer of care to the home. Patient referral patterns for HPN treatment are inconsistent, with some regions in the UK having very few patients receiving HPN. However, there are several large centres in the UK where HPN is considered as an essential, life-saving treatment. The point prevalence of patients receiving HPN in the UK in 2003 was 8.8 per million. Prevalence was higher in Scotland (12.9 per million) than in England (8.6), Wales (4.5),

Table 3.3.1 Population based mortality rates for the different ICD-9 chapters in England and Wales, 1990 and 2000

Underlying cause of death	ICD-9 chapter	ICD-9 code	2000		1990	
			No of deaths	Mortality rate per 100 000 population	No of deaths	Mortality rate per 100 000 population
Infectious and parasitic diseases:	I	001–139	3 767	7.1	3 046	6.0
Intestinal infectious diseases		001–009	547	1.0	187	0.4
Viral hepatitis		070	200	0.4	112	0.2
All other infectious diseases		010–069, 071–139	3 020	5.7	2 749	5.4
Neoplasms:	II	140–239	134 793	254.6	144 577	285.1
Malignant neoplasms of the digestive system		150–159	37 004	69.9	40 965	80.8
Benign and other neoplasms of the digestive system		210, 211, 230, 235.2–235.5	74	0.1	66	0.1
All other neoplasms		140–149 etc,	97 715	184.6	103 646	204.2
Endocrine, nutritional and metabolic disorders, and immunity disorders	III	240–279	7 247	13.7	10 249	20.2
Diseases of blood and blood-forming organs	IV	280–289	1 791	3.4	2 427	4.8
Mental disorders	V	290–319	10 866	20.5	13 395	26.4
Diseases of the nervous system and sense organs	VI	320–289	9 632	18.2	11 644	23.0
Diseases of the circulatory system	VII	390–459	207 228	391.4	259 247	511.1
Diseases of the respiratory system	VIII	460–519	92 461	174.6	61 018	120.3
Diseases of the digestive system	IX	520–579	22 134	41.8	18 429	36.3
Diseases of the genitourinary system	X	580–629	7 270	13.7	7 317	14.4
Complications of pregnancy, childbirth and the puerperium	XI	630–676	38	0.1	57	0.1
Diseases of the skin and subcutaneous system	XII	680–709	1 266	2.4	823	1.6
Diseases of the musculoskeletal system and connective tissue	XIII	710–739	3 407	6.4	5 286	10.4
Congenital abnormalities	XIV	740–759	1 165	2.2	1 621	3.2
Certain conditions originating to the perinatal period	XV	760–779	83	0.2	249	0.5
Symptoms, signs and ill-defined conditions	XVI	790–799	13 656	25.8	4 897	9.7
Injury and poisoning	XVII	800–999	16 525	31.2	17 943	35.4
Total gastrointestinal diseases		001–009,070, 150–159,210, 211,230, 235.2–235.5, 520–579	59 959	113.3	59 759	117.8
All causes of death	I–XVII	1–999	533 329	1007.4	562 225	1108.5

Sources: ONS, 2001;[379] OPCS, 1992.[380]

and Northern Ireland (9.6). There is considerable regional variation in period prevalence of patients receiving HPN in the UK: across strategic health authorities in the UK, prevalence varied between 1 and 21 per million population, with higher prevalence reflecting that HPN is more common in areas that are close to major referral centres.[374]

Iron deficiency anaemia

Iron deficiency anaemia (IDA) resulting from gastrointestinal bleeding is a common feature of many gastrointestinal disorders, including colorectal and gastric cancers. Patients investigated for IDA have been found to have gastrointestinal cancers in about 5–20% of cases,[375–377] while IDA is also one of the most common presenting symptoms of coeliac disease.[378]

International comparisons of the incidence of gastrointestinal cancers

Figure 3.2.7 shows estimates of population based incidence rates for the main types of gastrointestinal cancer in the UK and in other regions of Europe in 1995.[328] Among men, the UK had the third highest, age standardised incidence of oesophageal cancer in Europe (12.9 per 100 000), after France (17.0) and Hungary (14.9), with an overall rate of 9.9 for the whole of Europe. Among women, the UK had the second highest incidence of oesophageal cancer (5.9 per 100 000) after Ireland (6.6), with an overall rate of 1.9 for Europe.[328]

Incidence rates for gastric cancer among men and women in the UK were similar to those in western Europe and in northern Europe, but lower than in eastern Europe, southern Europe and Europe overall. Incidence of gastric cancer was highest in eastern Europe, and probably reflects the relatively low levels of affluence in these countries, and the resulting poor diet of their inhabitants. For both colorectal and pancreatic cancers, incidence in the UK among both men and women was very similar to those in Europe overall.[328]

Figure 3.2.8 shows incidence rates of colorectal cancers in the UK and in 26 other European countries in 2000. Incidence rates vary greatly across countries among men, although the highest rates were in eastern European states such as the Czech Republic (60.3 per 100 000), Hungary (59.8), and Slovakia (50.6). The rate for the UK (35.4) is similar to the average of these 27 countries (35.9). Among women, there is considerably less variation in national rates, with the UK incidence rate (25.3) similar to the European average of 24.2. The UK ranked as 13th of 27 for highest incidence of colorectal cancer in men, and 11th for women.

3.3 Mortality from gastrointestinal diseases

Of 533 329 deaths in England and Wales in 2000, 59 959 (11.2%) had a gastrointestinal disease as the certified underlying cause of death. These include diseases of the digestive system (37% of all deaths from gastrointestinal disease), malignant neoplasms of the digestive system (62%), benign and other neoplasms of the digestive system (0.1%), intestinal infectious diseases (0.9%), and viral hepatitis (0.3%; tables 3.3.1 and 3.3.2).

Diseases of the digestive system, which exclude gastrointestinal neoplasms and infectious diseases, ranked as the fourth ICD chapter that accounted for most deaths in England and Wales in 2000, after diseases of the circulatory system (207 228 deaths), neoplasms (134 793), and diseases of the respiratory system (92 461).

Table 3.3.2 Population based mortality rates for different gastrointestinal diseases in England and Wales, 1990 and 2000

		2000		1990	
Underlying cause of death	**ICD-9 code**	**No of deaths**	**Mortality rate per 100 000 population**	**No of deaths**	**Mortality rate per 100 000 population**
Diseases of the digestive system:					
Diseases of oral cavity, salivary glands and jaws	520–529	33	0.1	18	0.0
Oesophagitis	530.1	143	0.3	110	0.2
Other diseases of oesophagus	530.2–530.9	446	0.8	456	0.9
Peptic ulcer	531–534	4 022	7.6	4 381	8.6
Gastritis and duodenitis	535	168	0.3	96	0.2
Other disorders of stomach and duodenum	536–537	103	0.2	104	0.2
Appendicitis	540–543	139	0.3	148	0.3
Hernia of abdominal cavity	550–553	721	1.4	771	1.5
Crohn's disease	555	166	0.3	190	0.4
Ulcerative colitis	556	184	0.3	190	0.4
Vascular insufficiency of intestine	557	1 883	3.6	1 483	2.9
Other non-infective gastroenteritis and colitis	558	501	0.9	341	0.7
Intestinal obstruction without mention of hernia	560	1 396	2.6	1 217	2.4
Diverticular of intestine	562	1 826	3.4	1 466	2.9
Peritonitis	567	562	1.1	313	0.6
Other diseases of intestines and peritoneum	564–566,568,569	1 134	2.1	698	1.4
Chronic liver disease and cirrhosis	571	4 770	9.0	3 063	6.0
Other disorders of liver	570,572,573	412	0.8	320	0.6
Cholelithiasis, cholecystitis and other disorders of the gallbladder	574–575	784	1.5	673	1.3
Other disorders of biliary tract	576	324	0.6	261	0.5
Acute pancreatitis	577.0	848	1.6	793	1.6
Chronic pancreatitis	577.1	77	0.1	88	0.2
Other diseases of the pancreas	577.2–577.9	37	0.1	30	0.1
Gastrointestinal haemorrhage	578	1 429	2.7	1 167	2.3
Intestinal malabsorption	579	26	0.0	52	0.1
Total diseases of the digestive system	520–579	22 134	41.8	18 429	36.3
Benign and other neoplasms of the digestive system	210, 211, 230, 235.2–235.5	74	0.1	66	0.1
Malignant neoplasms, digestive system:					
Oesophagus	150	6 061	11.4	5 259	10.4
Stomach	151	5 779	10.9	8 712	17.2
Small intestine	152	269	0.5	210	0.4
Colon	153	9 554	18.0	11 527	22.7
Rectum, rectosigmoid junction and anus	154	4 682	8.8	5 696	11.2
Liver and intrahepatic ducts	155	2 091	3.9	1 388	2.7
Gallbladder and extrahepatic ducts	156	527	1.0	813	1.6
Pancreas	157	6 105	11.5	6 145	12.1
Retroperitoneum and peritoneum	158	186	0.4	192	0.4
Other and ill-defined sites, digestive system	159	1 750	3.3	1 023	2.0
Total malignant neoplasms, digestive system	150–159	37 004	69.9	40 965	80.8
Intestinal infectious diseases:					
Cholera	001	0	0.0	0	0.0
Typhoid and paratyphoid fevers	002	0	0.0	2	0.0
Other salmonella infections	003	13	0.0	68	0.1
Shigellosis	004	0	0.0	0	0.0
Other food poisoning (bacterial)	005	1	0.0	1	0.0
Amoebiasis	006	1	0.0	0	0.0
Other protozoal intestinal diseases	007	1	0.0	4	0.0
Intestinal infections due to other organisms	008	452	0.9	43	0.1
Ill-defined intestinal infections	009	79	0.1	69	0.1
Total intestinal infectious diseases	001–009	547	1.0	187	0.4
Viral hepatitis	070	200	0.4	112	0.2
Total gastrointestinal diseases	001–009,070, 150–159,210, 211,230,235.2–235.5,,520–579	59 959	113.3	59 759	117.8

Sources: ONS, 2001[379]; OPCS, 1992.[380]

Figure 3.3.1 shows population based mortality rates for each major body system when deaths from cancer were allocated to their respective body systems; for example, when gastrointestinal cancers were included with diseases of the digestive system, when respiratory cancers were included with diseases of the respiratory system, etc. Then, gastrointestinal disease was the third body system that accounted for the most deaths (59 000), after circulatory diseases (207 000) and respiratory diseases (123 000). Among people aged 15–64 years, however, the mortality rate for gastrointestinal diseases was roughly equal to that from respiratory diseases, as the leading major cause of death after circulatory diseases among working aged people (fig 3.3.2).

The number of deaths from diseases of the digestive system in 2000 increased by 20% from 18 429 in 1990. Deaths from malignant neoplasms of the digestive system fell by 10% from 40 965 in 1990, and the small numbers of deaths from intestinal infectious diseases and from viral hepatitis

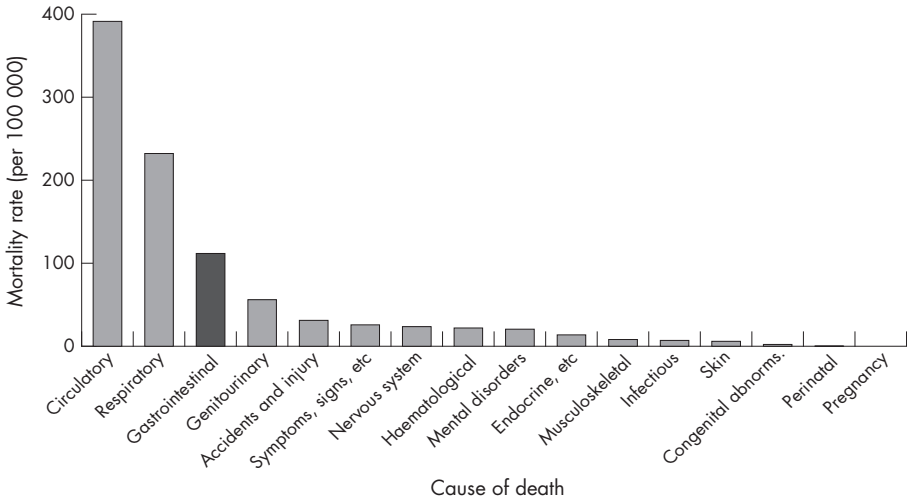


Figure 3.3.1 Population based mortality rates for major disease groupings, in England and Wales, 2000: people of all ages. Source: ONS, 2001.[379]

respectively, almost trebled and increased by 80% from 1990 to 2000 (table 3.3.2).

The major causes of death from diseases of the digestive system, excluding gastrointestinal cancers, in 2000 were liver cirrhosis (22%), peptic ulcer (18%), vascular insufficiency of the intestine (9%), diverticular disease of the intestine (8%), and gastrointestinal haemorrhage (6%; fig 3.3.3).

Gastrointestinal cancer is the most common cause of cancer death of all major cancer groupings. In England and Wales in 2000, gastrointestinal cancers caused 27% of all cancer deaths, followed by respiratory cancers (23%) and cancers of the genitourinary system (17%; fig 3.3.4). The gastrointestinal tract was also the most common site for all cancer deaths (fig 3.3.5).

Figure 3.3.6 shows the most common sites for all gastrointestinal cancer deaths. These were the colon and rectum (39% of all gastrointestinal cancer deaths), the pancreas, the oesophagus, and the stomach (16% each).

Table 3.3.3 shows the number of deaths and corresponding population based mortality rates in England and Wales in 2000 among working aged people (aged 15–64 years) for some of the most common diseases and causes of death in the general population. The mortality rate for diseases of the digestive system (16.3 per 100 000 population) was lower than that from all cancers (97.6) and from ischaemic heart disease (43.4), but was about twice as high as for stroke and for pneumonia, six times higher than for diabetes mellitus, and 12 times higher than for asthma. If gastrointestinal cancers are included with diseases of the digestive system as gastrointestinal diseases, the corresponding mortality rate (39.9) was only slightly lower than for ischaemic heart disease, and much higher than for stroke, pneumonia, diabetes mellitus, chronic airways obstruction, and asthma (fig 3.3.7).

Mortality statistics, based on underlying cause of death, to some extent underreport true mortality from gastrointestinal diseases and, importantly, this underreporting is greater for gastrointestinal diseases than for the two other major causes of death, circulatory and respiratory diseases. The following sections describe mortality rates and patterns in the UK for some of the main gastrointestinal disorders in anatomical sequence.

Mortality from diseases of the stomach and duodenum

Peptic ulcer

Although the incidence of peptic ulcer has fallen sharply in the UK in recent years, it was still the second largest cause of gastrointestinal death, after liver cirrhosis, in England and Wales in 2000, with over 4000 deaths and a mortality rate of 7.6 per 100 000 population (table 3.3.2).

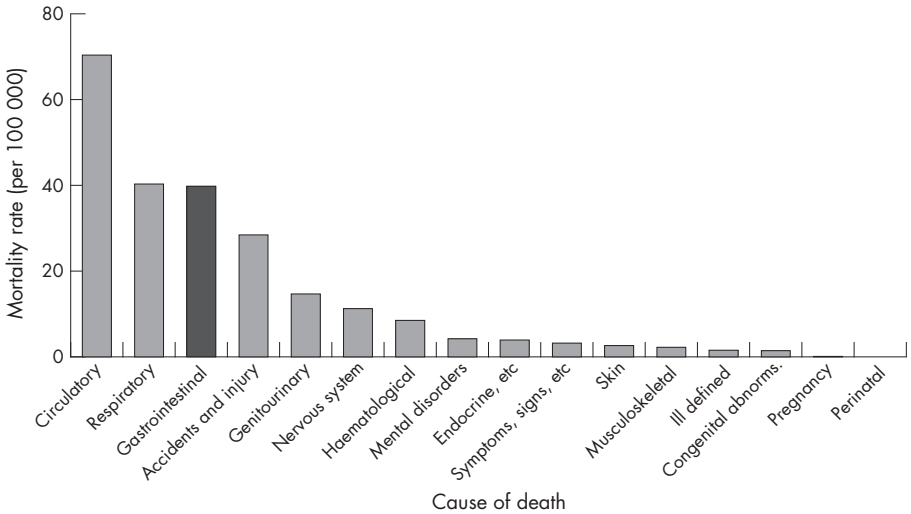


Figure 3.3.2 Population based mortality rates for major disease groupings, in England and Wales, 2000: people aged 15–64 years. Source: ONS, 2001.[379]

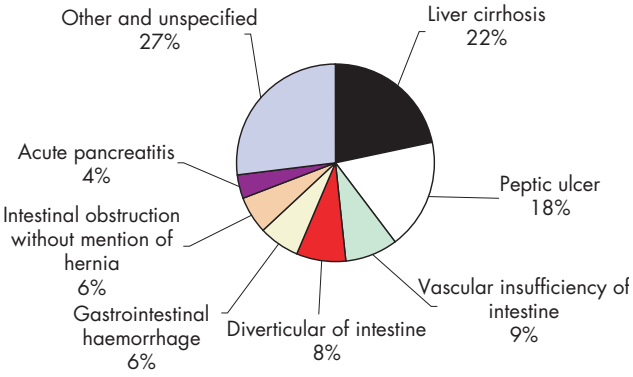


Figure 3.3.3 Percentage causes of all deaths from diseases of the digestive system (excluding cancers) in England and Wales, 2000. Source: ONS, 2001.[379]

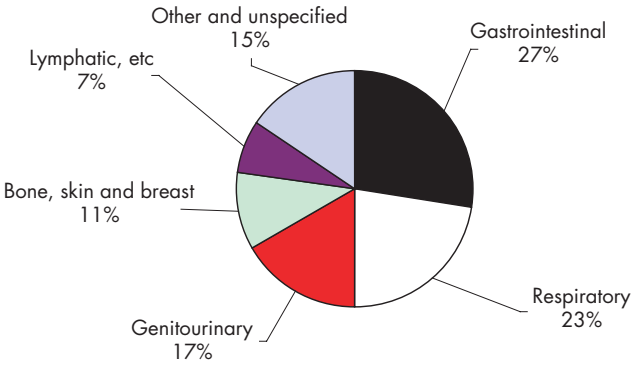


Figure 3.3.4 Percentage causes of all deaths from cancer, according to major groupings of cancer, in England and Wales, 2000. Source: ONS, 2001.[379]

Patient deaths after hospital admission for peptic ulcer in the UK between 1991 and 1994 was reported as 4.4%,[381] with increased risks of mortality for patients who had no previous history of peptic ulcer (relative risk = 3), or who were undergoing surgery, were elderly or were current users of non-steroidal anti-inflammatory drugs. Much higher case fatality rates of 34% for perforated peptic ulcer,[382] and 43% for perforated duodenal ulcer,[383] have been reported in regional British studies.

Gastrointestinal haemorrhage

Gastrointestinal haemorrhage was the cause of almost 1500 deaths in England and Wales in the year 2000, with a population based mortality rate that had risen by over 17% since 1990 (table 3.3.2).

Patient deaths for upper gastrointestinal haemorrhage vary in the UK from about 5% to 15% (table 3.3.4), although lower rates of less than 4% have been reported.[89 90] Case fatality varies strongly according to case mix, which would explain some of the geographical variation; while, as ever, case fatality is affected by factors such as the length of follow-up and the inclusion of deaths after discharge with in-hospital deaths.

Case fatality for upper gastrointestinal haemorrhage is increased in surgical cases, and for cases of haemorrhages in inpatients. For example, surgical mortality rates of 13–41% have been reported from studies since the 1980s,[84 85 89] while case fatality for haemorrhages in inpatients of 18–45% have also been reported.[73 74 86 87 90 91 334 335 387] Other important risk factors include gastrointestinal malignancies or other pre-existing comorbidity, shock, and advanced age.[92 391 398] Despite improvements in treatment and management over time, a lack of impact on patient deaths is probably linked to older ages at presentation, increases in comorbidities,[399] and less selective reporting over time.[400]

Mortality from diseases of the small bowel and colon

Inflammatory bowel disease

Inflammatory bowel disease is a major cause of debilitating morbidity, particularly among young adults, rather than a major cause of mortality. In the year 2000 in England and Wales, there were only 166 and 184 deaths, respectively, which were certified with Crohn's disease and ulcerative colitis as the underlying causes of death.

Most British population based studies have found no increased mortality among people with inflammatory bowel disease. For example, a study in Leicestershire reported standardised mortality ratios (SMRs) of 0.72 (compared to a mortality of 1.00 in the general population) for Crohn's disease,[401] and 0.93 for ulcerative colitis,[402] among European subjects; another study of three district hospital general centres reported SMRs of 0.94 for Crohn's disease and 0.93 for ulcerative colitis.[403]

However, some population based studies have reported increased mortality. For example, a study of Crohn's disease in Cardiff from 1934 to 1976 reported a significantly increased SMR of 2.2, that was particularly high in people aged under 20 (SMR of 11.0).[404] Another study, a national UK primary care based study during the 1990s, reported significantly increased hazard ratios of 1.7 for Crohn's disease and 1.4 for ulcerative colitis. The hazard ratios were more highly increased among younger age groups: 3.8 among people aged 20–39 years with Crohn's disease, and 1.8 among those aged 40–59 with ulcerative colitis.[405]

Coeliac disease

Although coeliac disease is not usually recorded as an underlying cause of death, people with coeliac disease have been shown to be at moderately increased risks of mortality. For example, cohort studies in Scotland, Italy, and Sweden have reported increased mortality of 1.9- to 3.8-fold respectively,[406–409] with excess mortality often caused by malignant lymphomas or malignancies of the gastrointestinal tract.[406–410]

Diverticular disease

Diverticular of the intestine is quite a common cause of death in the UK, accounting for 1826 deaths in England and Wales in 2000. Population based mortality rates for diverticular disease

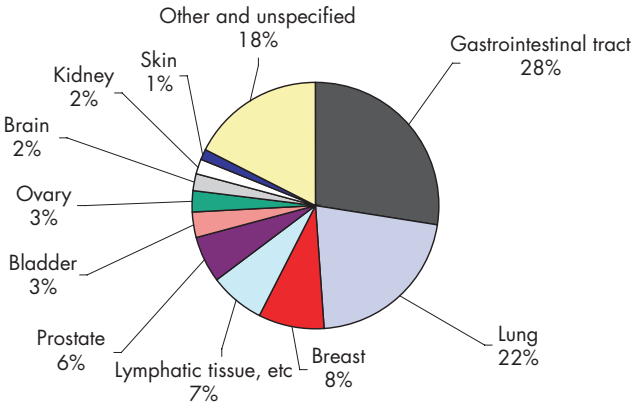


Figure 3.3.5 Percentage causes of all cancer deaths, according to the site of the cancer, in England and Wales, 2000. Source: ONS, 2001.[379]

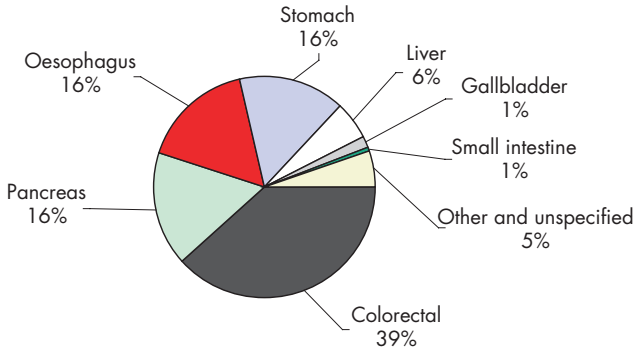


Figure 3.3.6 Percentage causes of all gastrointestinal cancer deaths, according to the site of the cancer, in England and Wales, 2000. Source: ONS, 2001.[379]

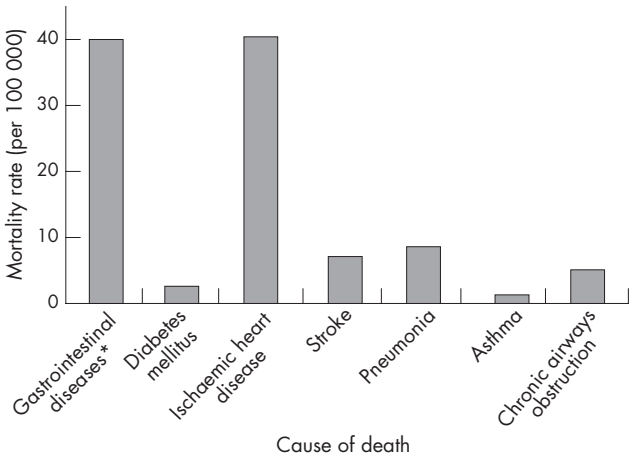


Figure 3.3.7 Population based mortality rates (per 100 000 population) for selected causes of death among people aged 15–64 years in England and Wales, 2000. *Gastrointestinal diseases include diseases of the digestive system, malignant neoplasms of the digestive system, benign and other neoplasms of the digestive system, intestinal infectious diseases, and viral hepatitis. Source: ONS, 2001.[379]

increased greatly over the course of the 20th century, although this probably reflects an increase in the use of barium enema diagnostic testing and changing fashions of death certification, as well as a true increase in the prevalence of diverticular disease. From 1979 to 1999, age standardised population based mortality rates remained fairly constant in England at about 1.5 per 100 000 population in men and 2.25 per 100 000 in women.[212]

Mortality rates after hospital admission for diverticular disease are fairly low. From 1989–90 to 1990–2000 in England, age standardised in-hospital case fatality rates were about 2.5% and 3.5% among men and women respectively,[212] while a recent study in London reported case fatality of 9.5% at one year after admission.[411]

Higher mortality is associated with the severe complications such as perforated diverticular.[203] For example, a recent study in Exeter reported a case fatality rate of 5.7% for acute complications of diverticular disease, which rose to 18% for those undergoing surgery[412]; a study in Birmingham reported case fatality of 11% for acute complications of diverticular disease from 1985–88[413]; and a study in Glasgow reported surgical mortality of 26% for perforated diverticular disease from 1976 to 1983.[414]

Mortality from diseases of the liver

Chronic liver disease and cirrhosis

Chronic liver disease and cirrhosis is one of the major causes of death from gastrointestinal disease in the UK. Cirrhosis mortality increased by 50% in England and Wales from 6 to 9 per 100 000 population during the 10 year period from 1990 to 2000 (table 3.3.2). From 1957–61 to 1997–2001 it increased by over threefold among men in England and Wales and in Scotland, by 250% among women in England and Wales, and by 160% among women in Scotland.[415] Other studies have reported increases of 350% in England from 1970 to 1998,[416] and 112% in the West Midlands from 1993 to 2000.[417]

This contrasts with a fall of almost 30% in the EU average cirrhosis mortality rate of 14 to 10 per 100 000 from 1970 to 1998. Together with a rise in national alcohol consumption,[320 321] and in hospital admissions for alcoholic liver disease,[220] the increase in cirrhosis mortality in the UK has led to the recent publication of a national alcohol harm reduction strategy.[221]

In recent years, the large increases in the number of people infected with the hepatitis C virus, who have a rapid progression of liver cirrhosis,[234] and a poor outcome,[418] have also contributed towards the increase in cirrhosis mortality.[234] Hepatitis C infection has also been the subject of national strategy and action plan documents in England.[228 232]

Mortality after hospital admission with chronic liver disease and cirrhosis is extremely high, and does not appear to have improved in the past 40 years.[217 419] Mortality varies greatly according to aetiology: case fatality rates of 40% for alcoholic cirrhosis and 17% chronic hepatitis were reported from an earlier study of west Birmingham in 1959–76.[217] Mortality from chronic liver disease and cirrhosis is still relatively low compared with that in many other European countries (fig 3.3.8). However, while cirrhosis mortality rates have been falling in most European countries in recent years, there has been a sharp increase in mortality in the UK (fig 3.3.9).

Table 3.3.3 Population based mortality rates for selected causes of death among people aged 15–64 years in England and Wales, 2000

Cause of death	ICD-9 code	No of deaths	Mortality rate per 100 000 population
Diseases of the digestive system	520–579	5 488	16.3
Diabetes mellitus	250	864	2.6
Ischaemic heart disease	410–444	14 567	43.4
Stroke	431–434, 436	2 375	7.1
Pneumonia	480–486	2 879	8.6
Asthma	493	437	1.3
Chronic airways obstruction	496	1 700	5.1
Neoplasms	140–239	32 795	97.6

Source: ONS, 2001.[379]

Table 3.3.4 Case fatality rates (% of cases) after hospital admission for upper gastrointestinal haemorrhage, as reported from regional studies in the UK

City/region	Study period	No of cases	Case fatality rate (%)	Authors and reference
NW London	1940–1947	687	9.9	Jones AF, 1947[384]
Aberdeen	1941–1948	476	13.9	Needham CD and McConachie JA, 1950[385]
London	1947–1958	325	13.0	Coghill NF and Willcox RG, 1960[386]
Oxford	1953–1967	2149	8.9	Schiller KF *et al*, 1970[84]
Birmingham	1963–1974	158	12.0	Hoare AM, 1975[387]
NE Scotland	1967–1968	817	13.7	Johnston SJ *et al*, 1973[86]
Birmingham	1971–1973	300	9.7	Allan R and Dykes P, 1976[388]
Cardiff	1972–1978	583	10.3	Mayberry JF *et al*, 1981[389]
Bristol	1974–1976	267	4.4	Brown SG *et al*, 1981[390]
West Lothian	1980–1983	326	11.7	Clason AE *et al*, 1986[391]
Newport, Gwent	1980–1981	330	15.2	Madden MV and Griffith GH, 1985[87]
Oxford	1981–1982	125	4.8	Berry AR *et al*, 1984[85]
Bath	1981–1985	NA	10–12	Holman RA *et al*, 1990[89]
North London	1986	292	4.8	Sanderson JD *et al*, 1990[392]
Bath	1986–1988	430	3.7	Holman RA *et al*, 1990[89]
Nottingham	1986–1989	1147	6.1	Daneshmend TK *et al*, 1992[393]
Bridgend	1990	109	4.6	Clements D *et al*, 1991[394]
NE Scotland	1991–1993	1098	3.9	Masson J *et al*, 1996[90]
4 Health Regions in SE England and Midlands	1991–1993	4185	14	Rockall TA *et al*, 1995[91]
West of Scotland	1992–1993	1882	8.1	Blatchford O *et al*, 1997[92]
Newport, Gwent	1993–1995	524	9.4	Kapur KC *et al*, 1998[395]
Sheffield	1995–1998	900	8.1	Sanders DS *et al*, 2004[396]
Sutton Coldfield	2002–2003	716	14.6	Lim CH *et al*, 2006[397]

Gallstone disease

Cholelithiasis, cholecystitis, and other diseases of the gallbladder were the cause of almost 800 deaths in England and Wales in 2000. Age standardised mortality for cholelithiasis fell from about 8.5 to 5.5 per 100 000 population in England from 1979 to 1989, but has not fallen since.[271]

Case fatality after hospital admission for gallstones fell by one third in men (from 0.6% to 0.4%) and by 42% in women (from 0.5% to 0.3%) in England from 1989–90 to 1999–2000.[271] Although death rates after admission for gallstones are low, reported risk factors include acute pancreatitis, liver cirrhosis, age, acute cholecystitis, and diabetes.[421]

Mortality from diseases of the pancreas

Acute pancreatitis

Acute pancreatitis was the underlying cause of about 850 deaths in England and Wales in 2000. Population based mortality for acute pancreatitis in England and Wales increased slightly from 1.56 per 100 000 population in 1990 to 1.60 in 2000 (table 3.3.2), which had increased from 1.37 per 100 000 in 1980. A slightly lower mortality rate of 1.23 per 100 000 population was reported for Northern Ireland in 1974–83,[422] while mortality increased from 2.7 to 4.0 per 100 000 in Nottingham from 1969 to 1983.[423]

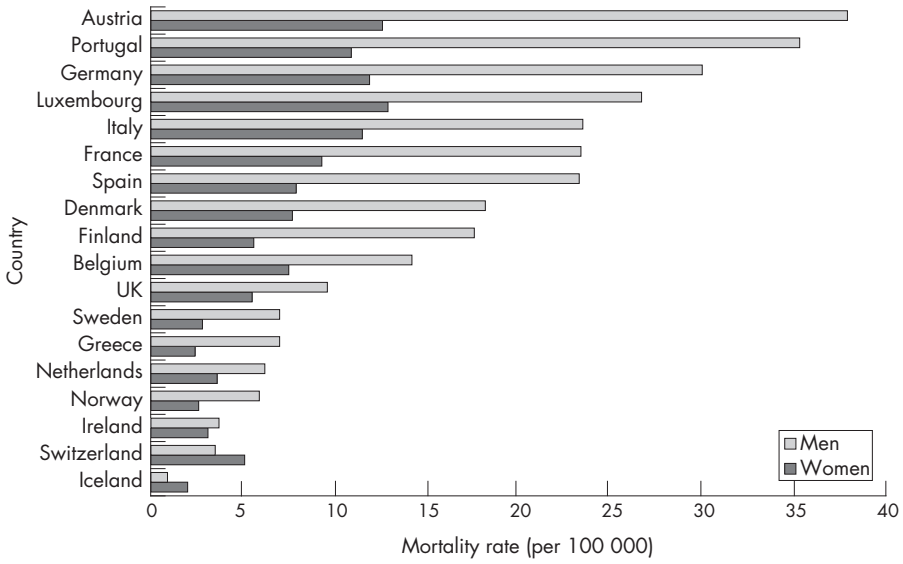
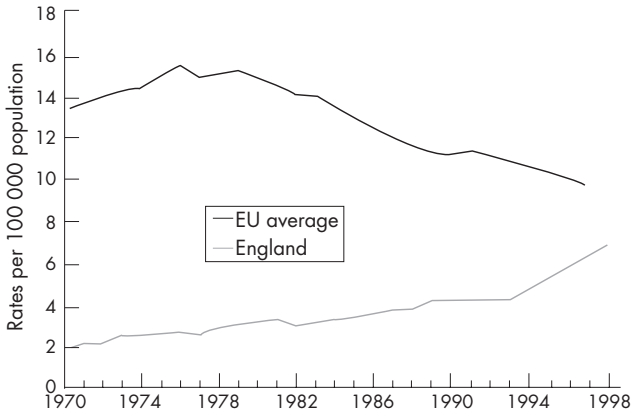


Figure 3.3.8 Standardised mortality rates (per 100 000 population) for chronic liver disease and cirrhosis, in men and women in the UK and in 17 other European countries, 2000. Source: Burroughs and McNamara, 2003.[227]



Chronic liver disease and cirrhosis (ICD-9 571), age standardised death rates, (aged 0–64 years)
Source: WHO HFA database (2001), office for national statistics

Figure 3.3.9 Trends in standardised mortality rates (per 100 000 population) for chronic liver disease in the UK and in Europe, 1970–1998. Source: Department of Health.[420]

Almost all people with acute pancreatitis are admitted to hospital. Case fatality has fallen over time from about 30% to roughly 10%, although as there seems to have been little further improvement in recent years, it remains a lethal disease. Case fatality at one year after admission for acute pancreatitis fell only slightly in four counties of southern England from 13.5% in 1963–74 to 11.8% in 1987–98.[303] However, it appears to have fallen more sharply in Scotland; with reported reductions from 17.6% in 1961–65 to 5.6% in 1981–85,[305] and from 9.1% to 6.6% from 1984 to 1994.[306]

Other British studies have reported case fatality of 9.1% in the Wessex region in 1994–95,[288] 9.0% in the North West Thames region in 1988–92,[424] 6.3% in Somerset in 1991–95,[290] 5.4% in Nottingham in the late 1990s,[425] and 17% in Cottingham in 1998.[426] Reported mortality rates for acute pancreatitis in England have been comparable or slightly higher than those in Europe. For example, case fatality was 6.1% in Luneberg, Germany from 1980 to 1994,[427] 5% in an Italian multicentre study in 1996–2000,[428] 7.5% in north Jutland from 1981 to 2000,[308] and 10.7% in the Netherlands in 1995.[310]

Prognosis depends strongly on disease severity, with much higher case fatality in severe cases; which can be as high as 50% for surgery or for infected pancreatic necrosis.[283 429] For example, two Scottish studies reported case fatality of 38% and 43% for pancreatic necrosectomy,[430 431] and a study in London reported mortality of 39% for severe cases.[432] The Italian multicentre study reported case fatality that varied between 1.7% for mild acute pancreatitis and 17% for severe cases,[428] a Swedish study reported mortality of 27% in severe cases,[433] while a German study reported mortality of 17% for necrotising pancreatitis, compared with 5% overall.[434]

Chronic pancreatitis

Although chronic pancreatitis is rarely recorded as an underlying cause of death—in only 77 cases in England and Wales in 2000—it often leads to substantially increased risks of mortality. For example, an American study identified an SMR of 3.6 for people who underwent treatment for chronic pancreatitis, with prognosis influenced strongly by age at diagnosis, alcohol consumption, and smoking.[435] In particular, chronic pancreatitis often leads to increased risks of pancreatic cancer,[330 436–440] which carries a very poor prognosis.

Mortality from gastrointestinal cancers

Colorectal cancer

Colorectal cancer is the most common cause of death from gastrointestinal cancer, causing 39% of all gastrointestinal cancer deaths, and 11% of all cancer deaths, in England and Wales in 2000. There were over 14 000 deaths from colorectal cancers in England and Wales in 2000, with a population based mortality rate of 27 per 100 000, which has fallen in recent decades.[14]

Prognosis for colorectal cancer is substantially better than for most other gastrointestinal cancers. Five year survival rates after diagnosis with colorectal cancer were 35% for men, and 39% for women in England and Wales between 1996 and 1999.[441] These had increased from 31% and 35% respectively, in 1991–95. Over 80% of people with colorectal cancers in Europe undergo surgical treatment, and five year survival after surgical resection ranges from 40% to 60% depending on the stage of the tumour.[324]

Table 3.3.5 Percentage five year survival after diagnosis for the main types of gastrointestinal cancers in various European countries

	Gastrointestinal cancer				
Country	Oesophageal (%)	Gastric (%)	Pancreatic (%)	Colorectal (%)	Liver (all cases) (%)
Austria	14	28	9	49	11
Denmark	5	14	2	41	1
Estonia	3	19	1	39	2
Finland	8	21	3	49	4
France	9	25	8	50	8
Germany	8	27	4	48	6
Iceland	25	24	3	52	9
Italy	8	24	4	37	4
Netherlands	12	20	2	55	0
Poland	3	11	4	25	3
Slovakia	8	19	8	39	5
Slovenia	3	16	3	35	0
Spain	9	28	5	48	10
Sweden	14	17	3	51	4
Switzerland	15	24	2	52	3
UK	9	12	3	41	4
Average of the 16 European countries	9.6	20.6	4.0	44.4	4.6

Source: Keighley, 2003.[324]

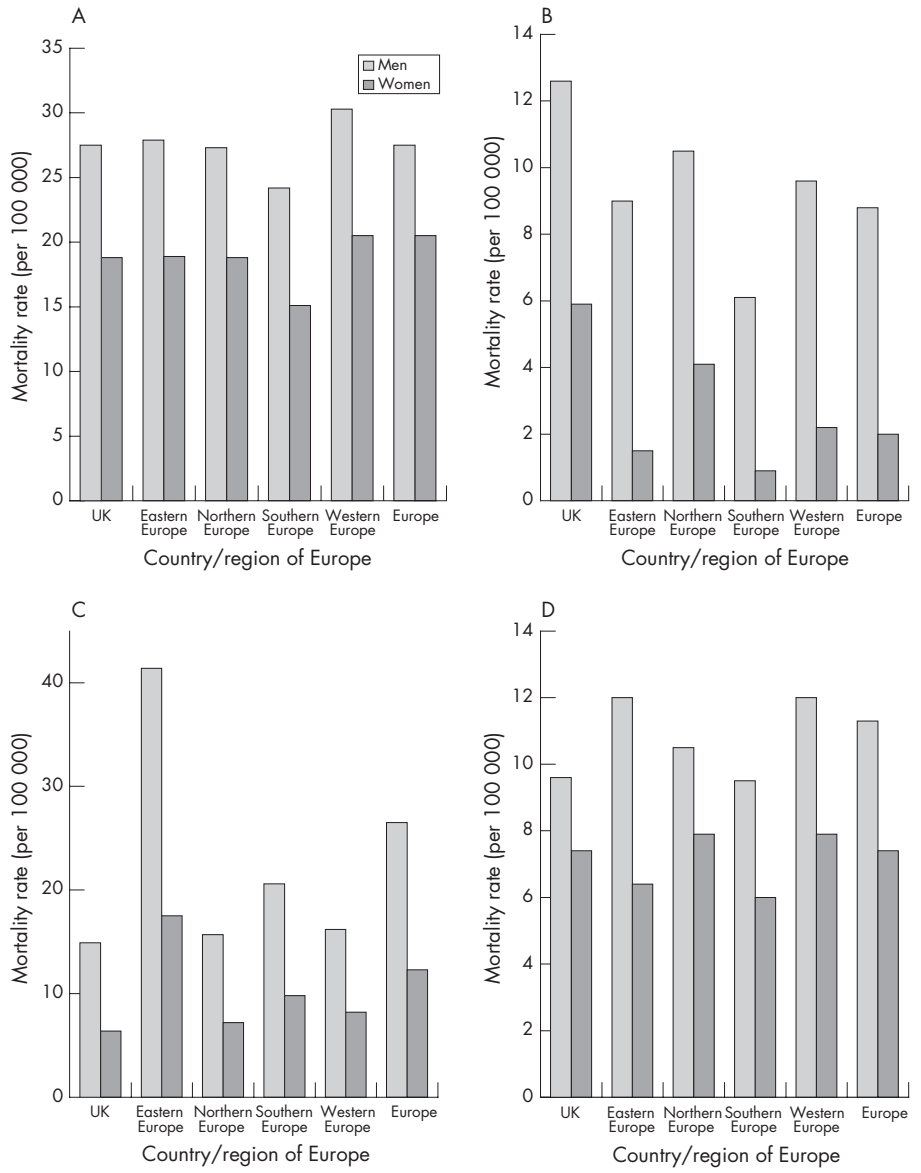


Figure 3.3.10 Estimates of age standardised population based mortality rates (per 100 000 population) for different gastrointestinal cancers among men and women in the UK, eastern Europe, northern Europe, southern Europe, western Europe, and in Europe, 1995. (A) For colorectal cancer; (B) for oesophageal cancer; (C) for gastric cancer; (D) for pancreatic cancer. Notes: Western Europe includes Austria, Belgium, France, Germany, Luxembourg, Switzerland, and the Netherlands. Eastern Europe includes Belarus, Bulgaria, Czech Republic, Hungary, Poland, Republic of Moldova, Russia, Slovakia, and the Ukraine. Northern Europe includes Denmark, Estonia, Finland, Iceland, Ireland, Latvia, Lithuania, Norway, Sweden, and the UK. Southern Europe includes Albania, Croatia, Greece, Italy, Macedonia, Malta, Portugal, and Spain. Europe refers to all countries listed above for these four regions. Source: Bray *et al*, 1997.[328]

Survival rates for colorectal cancer in the UK have been rising steadily over the past three decades, but substantial international differences suggest that there is considerable scope for further improvement: five year survival in the UK is lower than in Europe as a whole (table 3.3.5). The contrast in survival for the UK and western Europe is particularly marked for colon cancer, which often presents in an advanced state as an emergency, with a relatively poor prognosis. This further indicates that the poor survival in the UK has been mainly due to late diagnosis. Some studies have linked late diagnoses in the UK to patients' GP consultation behaviour: for example, while rectal bleeding is a common symptom that affects up to 15% of adults,[43] and is often an important symptom of colon cancer,[442 443] many patients don't seek medical advice.[444]

Survival rates are also lower in Europe than in the USA.[445] This has also been attributed to diagnoses at earlier stages in the USA, as well as a higher proportion of cancers in the USA that are coded as adenocarcinoma in polyp, and which have a better prognosis.[445]

Oesophageal cancer

Cancers of the oesophagus represented over 6000 deaths in England and Wales in 2000, or 4.5% of all cancer deaths, with a mortality rate that has increased in recent decades.[14]

Five year survival after diagnosis with oesophageal cancer in the UK (9%) is slightly lower than a European average of 9.6% (table 3.3.5). The poor prognosis is largely due to the spread of tumours from the wall of the gullet, by the time of diagnosis. In Europe, only about one quarter of all oesophageal cancers are operable and, of these, five year survival is only about 20–30%.[324]

Gastric cancer

Cancers of the stomach are also responsible for 4.5% of all cancer deaths in the UK. In England and Wales in 2000, there were a total of 5779 deaths from gastric cancers, with a corresponding mortality rate of 10.9 per 100 000 population, which has fallen over time.[14]

The five year survival of about 12% in the UK is much lower than a European average of 21% (table 3.3.5). In Europe, only

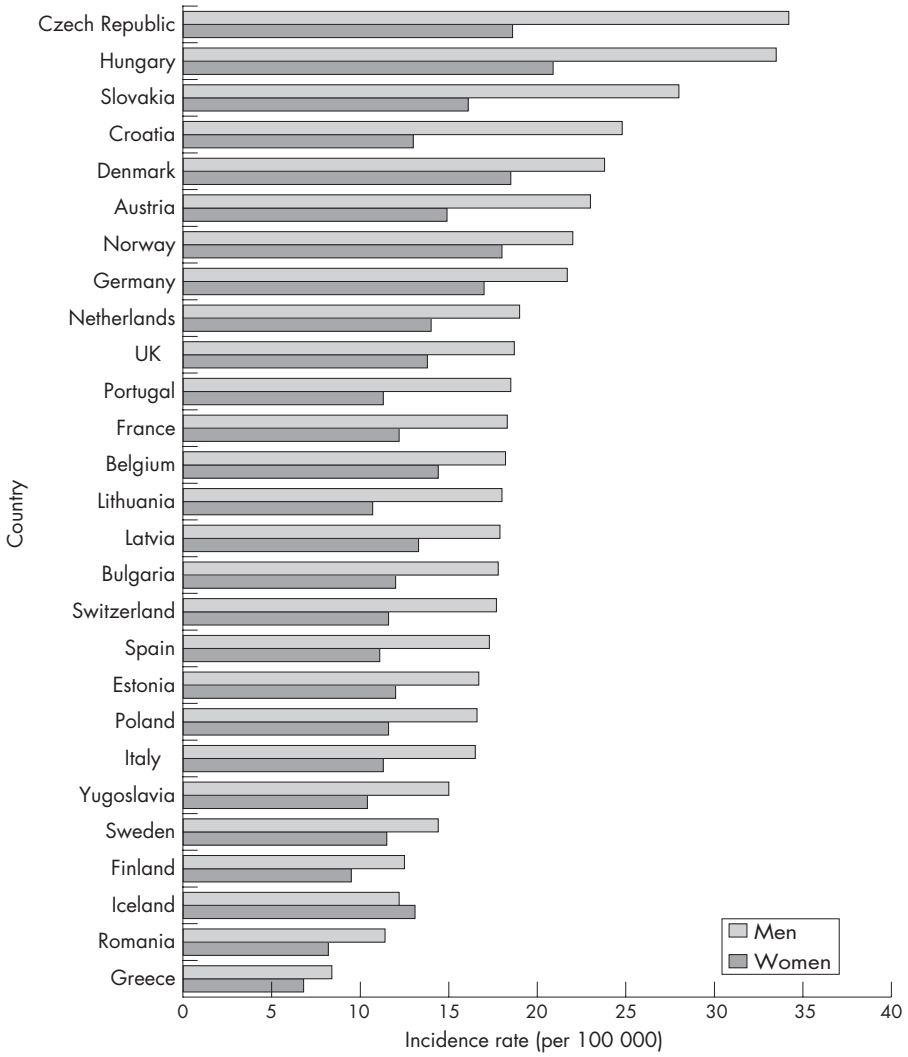


Figure 3.3.11 Population based mortality rates (per 100 000 population) for colorectal cancer in the UK and in 26 other European countries, 2000. Source: Keighley, 2003.[324]

about 60% of gastric cancers are resectable when first diagnosed and surgical resection for cure is only achieved in about 40% of cases. Five year survival after surgical resection is closely related to the spread of the tumour, and varies from 95% for early cancers to only 20% for extensive lesions.[324]

Pancreatic cancer

Cancer of the pancreas also caused 4.5% of all cancer deaths in England and Wales in 2000 (6105 deaths), with a population based mortality rate of 11.5 per 100 000 that has remained fairly stable since the 1970s.[14]

Prognosis after diagnosis remains extremely poor. Survival is about 2% at five years among both men and women in England and Wales (table 3.3.5).[441] A small minority (about 7%) of pancreatic cancers occur around the distal end of the bile and pancreatic ducts, present early and have relatively good prognosis. The rest, however, are located in the main body of the pancreas, present late and have dismal prognosis. In Europe, only 10% of pancreatic cancers are resectable, and the overall postoperative five year survival rate is only 10–15%.[324] Prognosis in the UK is slightly worse than in the rest of Europe (table 3.3.5).

Liver cancer

Liver cancer caused 2091 deaths in England and Wales in 2000 and mortality has been increasing since the 1960s. Age standardised mortality rates per 100 000 population increased from 1.29 to 1.93 in women, and from 2.56 to 3.70 in men, between 1968 and 1996.[446]

Prognosis for liver cancer is also extremely poor (table 3.3.5). Five year survival in the UK was recently reported as 4%.[324] This is largely because 95% of liver cancers are secondary deposits from tumours located elsewhere. Prognosis is slightly worse than the European average of 4.6% (table 3.3.5).

International comparisons of gastrointestinal cancer

Figure 3.3.10 shows population based mortality rates for each of the four main types of gastrointestinal cancer in the UK and, for comparison, with corresponding age standardised rates in other regions of Europe. Mortality from cancer of the oesophagus is particularly high in the UK (fig 3.3.10B), among both men and women, and it is higher than that in all other European countries presented here, except France (for men) and Ireland (for women).

Mortality from gastric cancer, which is particularly high in eastern Europe (fig 3.3.9C), is substantially lower in the UK than in the rest of Europe. Death rates from colorectal cancer in the UK are similar to the European average, while mortality from pancreatic cancers in the UK is about average in women, but slightly lower in men.

Figure 3.3.11 shows large variation in mortality rates for colorectal cancer among men across 27 different European

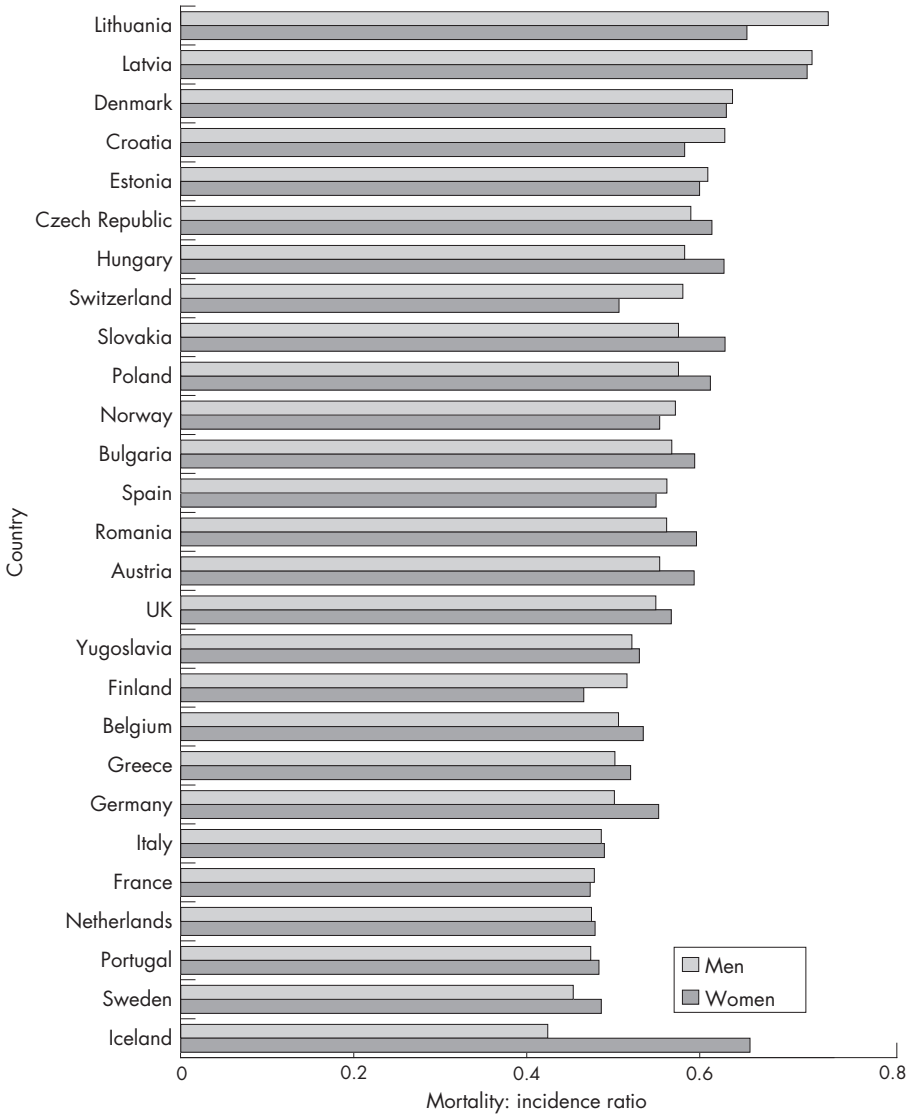


Figure 3.3.12 Mortality:incidence ratios for colorectal cancer in the UK and in 26 other European countries, 2000. Source: Keighley, 2003.[324]

countries in 2000. Highest colorectal cancer mortality is found in eastern European countries such as the Czech Republic, Hungary, and Slovakia, with the UK mortality rate of 18.7 per 100 000 population similar to the European average of 19.1. Among women, there is much less variation, with the UK again similar to the European average.

Figure 3.3.12 shows incidence to mortality ratios for colorectal cancers in the 27 European countries in 2000. The highest mortality ratios among men were in Lithuania (0.72), Latvia (0.70), and Denmark (0.61), and among women in Latvia (0.70), Iceland, and Lithuania (both 0.63). Mortality ratios in the UK, 0.55 and 0.53 for men and women, respectively, were similar to the corresponding European averages.

3.4 Morbidity, quality of life

Although the data for mortality and activity in hospital and primary care are relatively reliable, they do not describe the burden of chronic GI diseases on the lives of sufferers. Several common chronic conditions—gastro-oesophageal reflux disease (GORD), non-ulcer dyspepsia, irritable bowel syndrome (IBS), and inflammatory bowel disease (IBD)—have mortality rates that are similar to those of the general population.[447] Consulting rates vary, with some people more likely to opt for self care or alternative complementary therapies.[53] Activity data reflect the burden on the health service, therefore, more than on the population.

Objective evidence or clinical assessment and self reported symptoms do not match well.[20] Because of this there has been an increasing focus in health care generally, and in gastroenterology, in particular, on assessing patients' health related quality of life (HRQoL). Measurements of HRQoL can be used to identify problems of individual patients or populations, to enhance understanding of diseases, and to assess health technologies, treatments, and service delivery.[448]

Using self reported HRQoL, the prevalence of functional GI disorders in a population in Australia was found to be 34.6%.[449] Sufferers were found to be more likely to have impaired mental health and physical functioning, measured by the SF12, an effect which was intensified amongst those who sought treatment. Halder *et al* emphasised the confounding effect of the psychological state, and suggested that some of the association between IBS/dyspepsia and HRQoL can be explained by psychological factors.[450] Gastrointestinal symptoms in the elderly were found to be common in a study in Minnesota, with chronic constipation and chronic diarrhoea having prevalences of 24% and 14%, respectively. Faecal

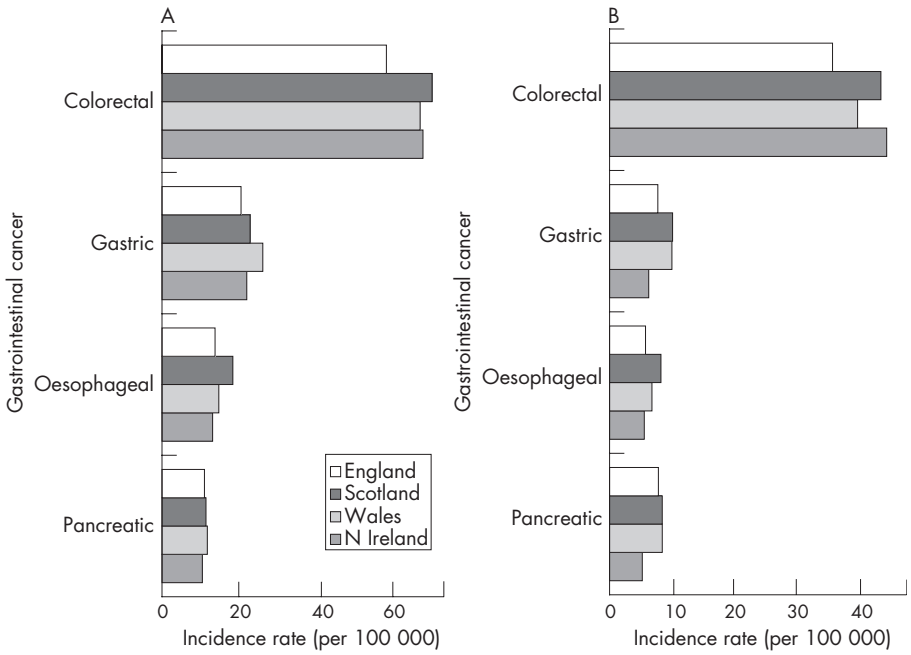


Figure 3.5.1 Standardised incidence rates (per 100 000 population) for colorectal, gastric, oesophageal, and pancreatic cancers in England, Scotland, Wales, and Northern Ireland, for the period 1993–2001. (A) For men; (B) for women. Notes: Incidence rates are directly standardised to the standard European population. Sources: England: National Cancer Intelligence Centre, Office for National Statistics; Scotland: Information and Statistics Division, NHS in Scotland; Wales: Welsh Cancer Surveillance and Intelligence unit; Northern Ireland: Northern Ireland Cancer Registry.[215 454–456]

incontinence more than once a week was reported in 3.7%. IBS was estimated from reported symptoms to be a condition for 10.9%. Only 23% had seen a physician during the previous year, and attendance did not correlate well with symptom reporting.[53]

Borgaonkar and Irvine's review of HRQoL measures for GI diseases summarised research into the impact of chronic GI disorders on the quality of life of patients.[447] HRQoL measures can be global, generic or disease-specific. Disease-specific tools have been developed to measure HRQoL for patients in each of the disease groupings below.

- Symptoms of GORD occur in about 40% of adults each month, and in 7% daily. Symptoms such as heartburn, regurgitation, and chest pain substantially impair HRQoL and over half of patients require treatment. Patients with GORD were reported to feel as seriously affected as patients with cardiovascular disease, with SF36 physical functioning scores worse than for patients with acute myocardial infarction, and social function scores lower than for patients with congestive heart failure.
- Dyspepsia occurs in 25% of the general population, with patients reporting considerable anxiety, abdominal pain, interruption of daily activities, and decreased sexual drive.
- Irritable bowel syndrome is a commonly experienced disorder, with a prevalence of up to 22%. Sufferers report abdominal pain, altered bowel habit, and disturbed sensory and motor function, as well as symptoms elsewhere in the body—back pain, headache, dyspareunia, urinary symptoms, and sleep disturbances. People with IBS have significantly poorer SF36 scores than healthy controls, and patients have difficulty travelling, playing sports, and attending social events. Sufferers take time off work and finish their working lives at a young age.
- Patients with IBD have been shown to have impaired HRQoL compared with healthy controls in physical, emotional, and social function. Family members and clinicians tend to underestimate the effects on patients compared with self reported health status. The most common problems reported are loose or frequent stools, abdominal pain, worries about disease flares, cancer or the need for surgery, and social restrictions. Eighty per cent of sufferers can maintain employment.
- Anorectal disorders affect 4% of the population. Patients with anal fissure, constipation, or incontinence have all been reported to record depressed HRQoL life scores.
- GI cancers account for 20% of all newly diagnosed cancers. Many do not respond to treatment and require palliative care. Patients experience side effects of treatment such as nausea, vomiting, pain, and fatigue, in addition to the symptoms directly caused by the cancer.
- Patients with hepatitis C were found to record lower SF36 scores than those with hepatitis B across the dimensions of social functioning, physical role limitation, and energy and fatigue, although both groups displayed lower scores than healthy controls.

Overall the burden of GI disease on HRQoL in the general population is not well described, although there are efforts to assess impact in some conditions in studies carried out in various locations. Standardised measures for specific diseases are being developed and validated, which will help to understand and describe the burden and assess treatments and models of care.

3.5 Geographical variation

Peptic ulcer

The incidence of peptic ulcer has been higher in Scotland and in the north of England than further south,[66 92] to some extent because of a higher prevalence of the *Helicobacter pylori* infection in the north.[451] In primary care, the prevalence of peptic ulcer has also been reported as two to three times higher in the north of England than in the south.[71]

Gastrointestinal haemorrhage

The incidence of upper gastrointestinal haemorrhage is higher in Scotland and in the north of England than further south. High incidence rates of upper gastrointestinal haemorrhage have been reported in the west of Scotland (172 per 100 000 in 1992/93),[92] and Aberdeen (117 per 100 000),[90] compared with

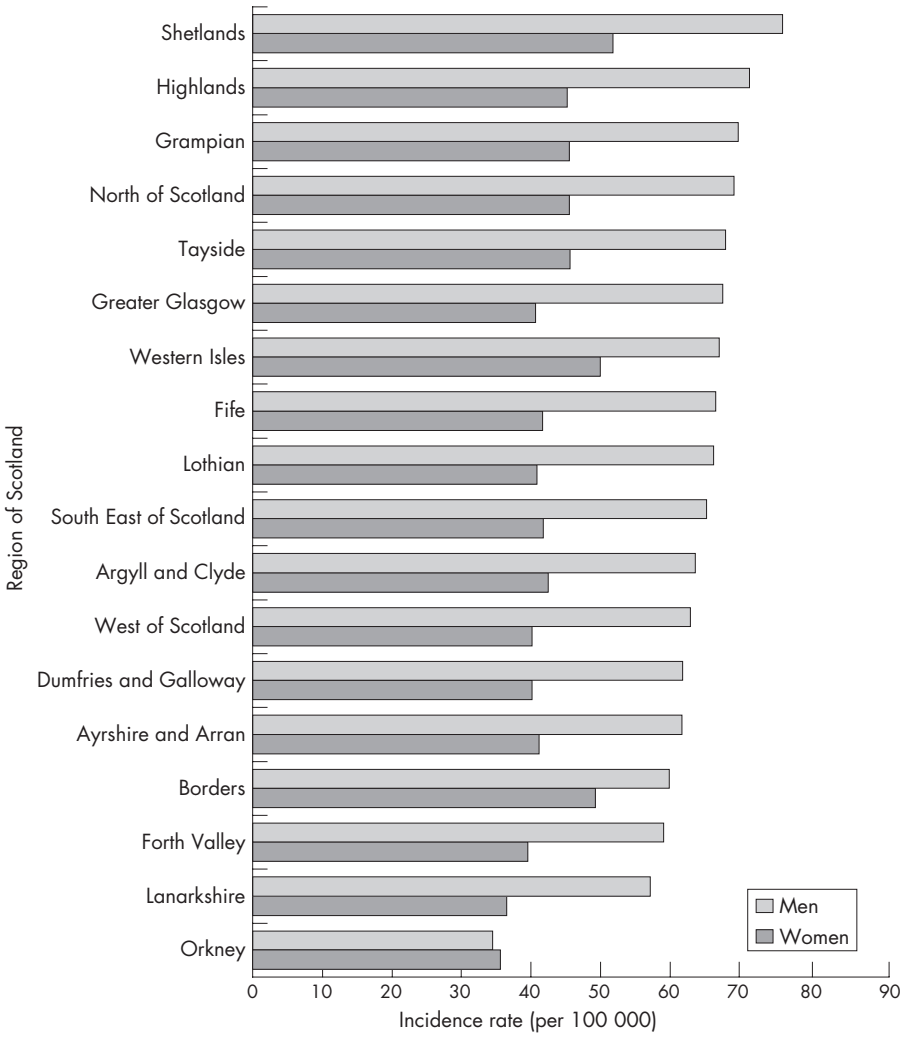


Figure 3.5.2 Incidence rates for colorectal cancer among men and women in different regions of Scotland, 1992–2001. Incidence rates are directly standardised to the standard European population. Source: Information and Statistics Division, NHS in Scotland.[215]

the lower rates of 107 for Trent, 102 for the West Midlands, 99 for South West Thames and 91 for North West Thames.[91]

Inflammatory bowel disease

Regional studies of the incidence of Crohn's disease in the UK show little systematic geographical variation (table 3.2.2). However, the highest incidence rates for ulcerative colitis have been reported in northern regions such as north east Scotland,[134] and north Tees.[135 136] The incidence of juvenile onset Crohn's disease has been reported as 50% higher ($p<0.001$) in northern Scotland than in southern Scotland during 1981–95, although no significant difference was found for ulcerative colitis.[452]

Alcoholic liver disease

There seems to be a substantially higher incidence of alcoholic liver disease in Scotland than in England. For example, in 1999–2000 the hospital admission rate for alcoholic liver disease in Scotland, 75.2 per 100 000 population,[215] was about 2.5 times higher than the corresponding rate in England during the four year period, 1999–2000 to 2001–02, 31.4 per 100 000.[453]

Hepatitis B and C infection

Reported diagnoses of hepatitis B and C infections have been shown to vary geographically throughout the UK (fig 3.2.4). In particular, the incidence of both infections since the early 1990s has been highest in Scotland, with rates about four times higher than in the rest of the UK. The lowest rates of reported hepatitis B infections were in Wales, and the lowest rates for hepatitis C were in Northern Ireland.[229]

Primary biliary cirrhosis

Some of the highest prevalence rates for primary biliary cirrhosis in the world have been reported for northern England: 34.5 per 100 000 population,[238] and 24 per 100 000.[243] Relatively high rates of 20 and 9 per 100 000 have been reported for south Wales,[244] and the west of Scotland.[242]

Acute pancreatitis

Reported incidence rates for acute pancreatitis, which is sometimes associated with heavy alcohol consumption, are normally substantially higher in Scotland,[287 305 306] than in England.[285 288 303 304]

Gastrointestinal cancers

Figure 3.5.1 shows incidence rates among men and women, respectively, for the main types of gastrointestinal cancer in England, Scotland, Wales, and Northern Ireland during the period 1991–2002. Among both men and women, the incidence of colorectal cancer is lowest in England, oesophageal cancer is most common in Scotland, gastric cancer is most common in Wales among men, and pancreatic cancer shows little cross-national variation in incidence among men, but a substantially reduced incidence rate in Northern Ireland among women.

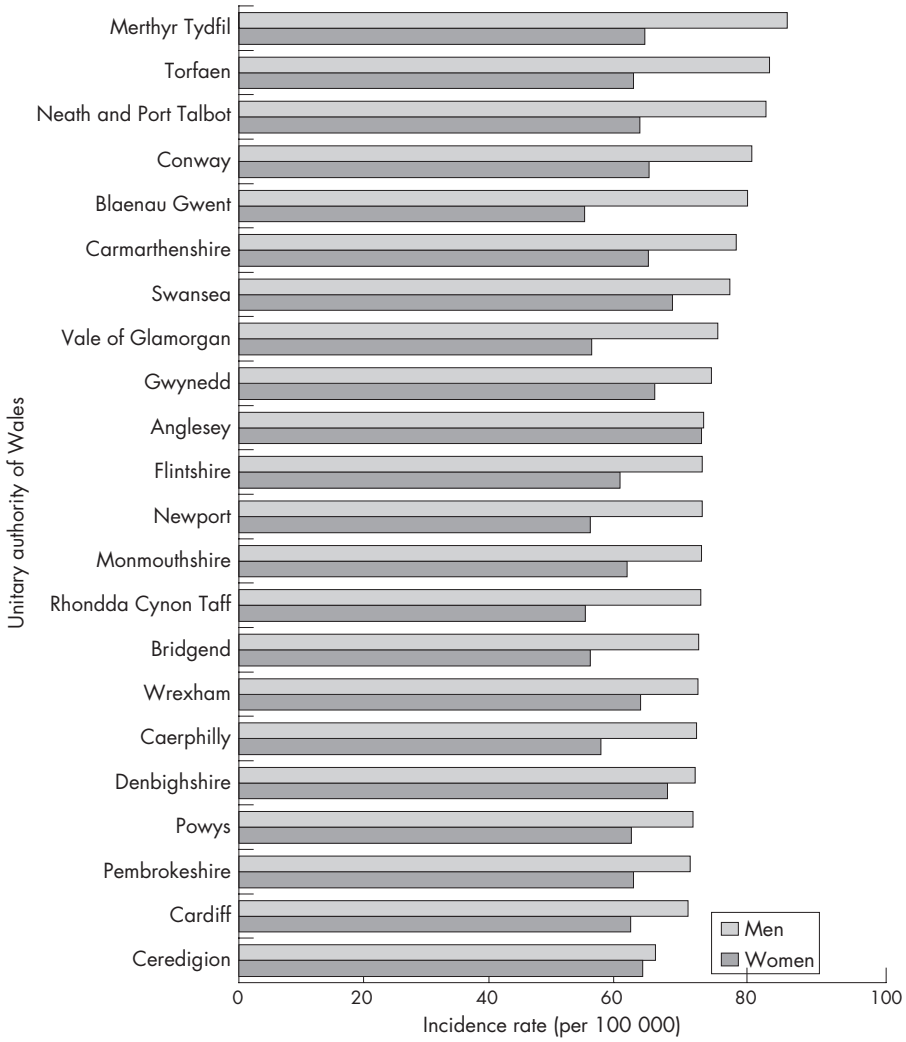


Figure 3.5.3 Incidence rates for colorectal cancer among men and women in different Welsh unitary authorities, 1992–2001. Incidence rates are directly standardised using the Welsh population. Source: Welsh Cancer Surveillance and Intelligence unit.[455]

For colorectal cancer, there is evidence of a north-south gradient in incidence among men in Scotland, with the highest incidence rates in the Shetlands, Highlands, the Grampian region, and the north of Scotland, but less of a geographical trend for women (fig 3.5.2). In Wales there is little geographical pattern in the incidence of colorectal cancer in either men or women (fig 3.5.3). Importantly, the incidence rates in Scotland and Wales are standardised using different standard populations, so no direct comparison of rates can be made across countries.

Figure 3.5.4 shows incidence rates for the main types of gastrointestinal cancer in different regions of England during the calendar year 2001. For gastric cancer, there is a clear north-south gradient, with incidence highest in the north and lowest in the south. For colorectal cancer, incidence among men is lowest in London and the south east and highest in the north and the south west, while for women there appears to be no clear pattern. Similarly for oesophageal and pancreatic cancers, no clear pattern is evident. Mortality to incidence ratios for each of the main types of gastrointestinal cancer also show little geographical pattern in England (fig 3.5.5).

For each of the main types of gastrointestinal cancer, table 3.5.1 shows which Welsh unitary authorities have significantly increased or reduced incidence rates relative to the rest of Wales. Unlike England, there is no systematic geographical pattern in the incidence of any of the main gastrointestinal cancers.

3.6 Socioeconomic factors

Dyspepsia

There is little evidence of an association between dyspepsia and social class.[457] A historical study found a similar incidence of dyspepsia in private practice and in a dispensary in London around 1800,[458] and a recent study in England and Scotland reported that symptom prevalence was unrelated to social class, but that social class affected consultation behaviour, rising from 17% in social class I to 29% in social class IV.[38]

Helicobacter pylori infection and peptic ulcer

There is a well recognised association between *Helicobacter pylori* infection, socioeconomic group,[459] and childhood living conditions,[460] which has persisted over time. For example, a recent study of [^{13}C]urea breath testing for *Helicobacter pylori* infection among children in Glasgow, reported a significantly higher prevalence of 34% among children classified with the least affluent Carstairs' deprivation categories, compared with 16% among the most affluent categories, and 22% among intermediate groups.[461]

The incidence of peptic ulcer is strongly associated with lower social class or socioeconomic conditions,[147 462 463] largely because of the higher prevalence of the *Helicobacter pylori* infection among people from lower socioeconomic backgrounds. However, gastric ulcers have been associated with manual social classes, and duodenal ulcers with non-manual classes.[464]

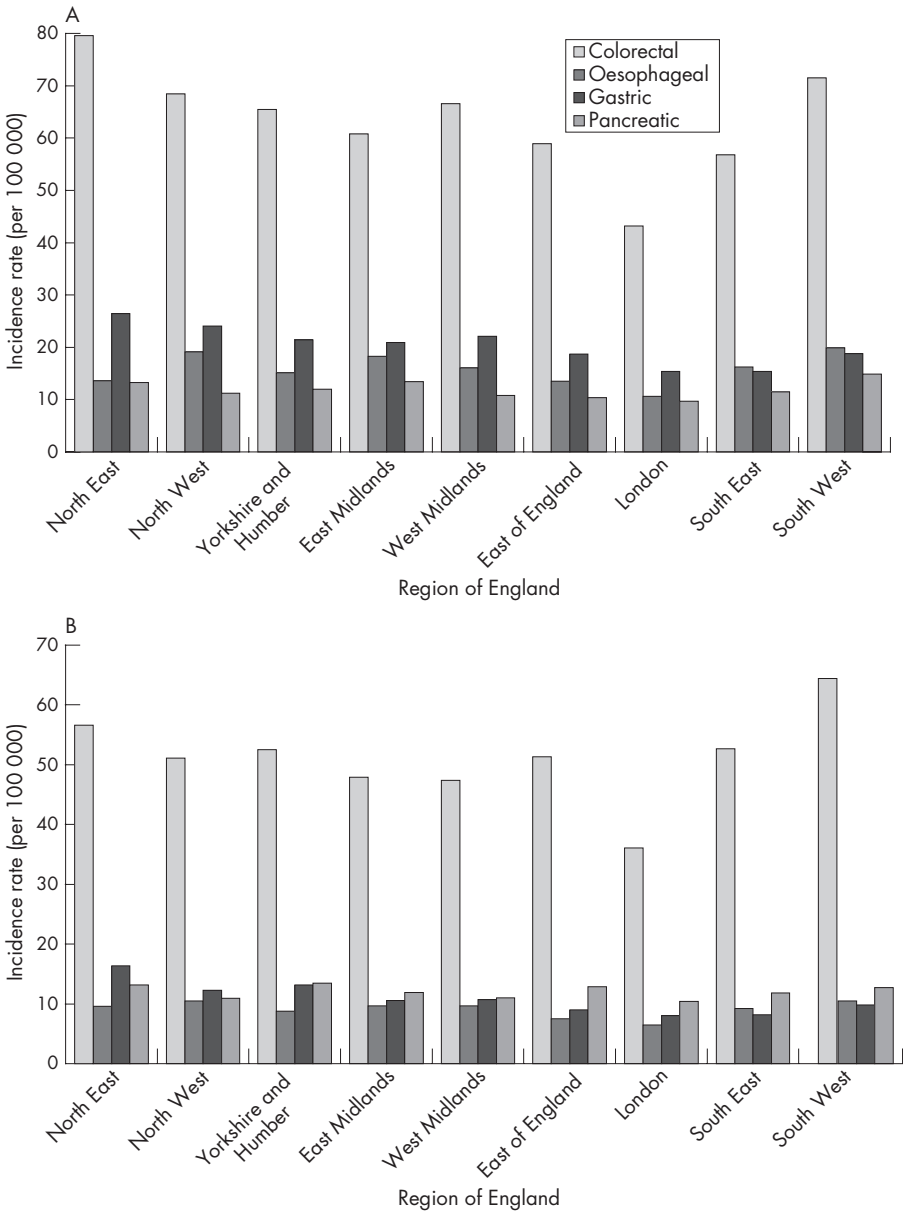


Figure 3.5.4 Incidence rates (per 100 000 population) for colorectal, oesophageal, gastric, and pancreatic cancers in different regions of England, 2001. (A) For men; (B) for women. Source: England: National Cancer Intelligence Centre.[454]

Gastrointestinal haemorrhage

Gastrointestinal haemorrhage is also strongly related to social class, especially as the most common underlying cause of upper gastrointestinal haemorrhage is peptic ulcer. A recent study of the west of Scotland reported that the incidence of upper gastrointestinal haemorrhage was higher in areas of greater social deprivation: it was 2.2 times higher in the least affluent quarter than in the most affluent quarter.[92]

Inflammatory bowel disease

Inflammatory bowel disease is not thought to be related to social class or poverty. Studies of British national birth cohorts have found no association with social class for either Crohn's disease or ulcerative colitis.[147 465] In Scotland, though, the incidence of juvenile onset Crohn's disease has been reported as significantly higher in areas of most affluence from 1981 to 1995, although no association was found for ulcerative colitis.[452]

Irritable bowel syndrome (IBS)

Some studies have reported of an increased prevalence of IBS in higher social classes, which has been considered as consistent with an allergic aetiology for IBS. These include studies in England[466] and Australia.[467] However, other British studies have reported of no significant association between IBS and social class,[147 468] and a Danish study also reported no association for incidence or prevalence of IBS.[166] Some studies,[166 469 470] although not others,[157 471 472] have reported that psychiatric illness or psychological factors may be of greater importance for IBS than socioeconomic and lifestyle factors.

Coeliac disease

There is not thought to be a strong association between coeliac disease and social class or poverty. One British study reported of a non-significant tendency towards a higher prevalence among higher socioeconomic groups.[186]

Table 3.5.1 Significantly increased and reduced risks of gastrointestinal cancers among men and women resident in Welsh unitary authorities, 1992–2001

		Gastrointestinal cancer				
Unitary authority	**Sex**	**Colon**	**Rectum**	**Oesophagus**	**Stomach**	**Pancreas**
Anglesey	Men				↑	
	Women	↑		↑		
Blaenau Gwent	Men		↑	↓		↓
	Women					
Bridgend	Men				↓	
	Women	↓	↓	↓		
Caerphilly	Men					
	Women			↑		
Cardiff	Men				↓	↑
	Women					
Carmarthenshire	Men	↑		↓	↑	
	Women			↓		
Ceredigion	Men		↓			↓
	Women					
Conwy	Men					
	Women					
Denbighshire	Men					
	Women				↓	
Flintshire	Men					
	Women					
Gwynedd	Men			↑	↑	↑
	Women					
Merthyr Tydfil	Men			↑		↓
	Women					
Monmouthshire	Men				↓	
	Women				↓	↓
Neath and Port Talbot	Men					
	Women				↑	
Newport	Men					
	Women	↓		↑		
Pembrokeshire	Men					
	Women					
Powys	Men		↓		↓	
	Women					↓
Rhondda Cynon Taff	Men					
	Women	↓	↓			
Swansea	Men		↑			
	Women		↑		↑	
Torfaen	Men			↓		
	Women					
Vale of Glamorgan	Men				↓	
	Women					
Wrexham	Men	↓				
	Women			↑		

↓ denotes significantly ($p<0.05$) reduced risk, relative to the rest of Wales; ↑ denotes significantly ($p<0.05$) increased risk, relative to the rest of Wales.
Source: Welsh Cancer Surveillance and Intelligence Unit.[455]

Diverticular disease

Socioeconomic factors are thought to influence the incidence of diverticular disease of the intestine. A Scottish study reported that diverticular disease was more common in lower than in higher income groups. It is likely that higher income groups are more aware of the importance of dietary fibre and more able to afford protective foods such as fresh fruit and vegetables.[473]

Liver cirrhosis

A recent study reported that social class is a risk factor for alcohol related mortality, including liver cirrhosis, with men in manual occupations significantly more likely than professional men to die of alcohol related causes. Alcohol seems to be similar to other psychoactive substances in that problem use is linked to social structural factors such as poverty, disadvantage, and social class.[474] Another recent study reported that social class differentials in mortality from liver cirrhosis increased from 1961 to 1981 in England and Wales and in Scotland.[475]

Hepatitis B and C infections

Both hepatitis B and C are linked to deprivation and poverty. For example, a study of routine neonatal screening in Scotland found the highest prevalence of hepatitis C infections in high deprivation areas, particularly the most deprived areas in Greater Glasgow[476]; and a USA study reported of a strong association between both hepatitis B and C with deprivation, that was largely related to the impact of poverty on the spread of the two viruses.[477]

Acute pancreatitis

The incidence of acute pancreatitis is often much higher in areas of higher alcohol consumption and lower affluence—for example, in Scotland compared with the south of England. However, one prominent British study found no association between social class and the incidence of acute pancreatitis in the Nottingham region, but instead found a large excess for people resident in areas with ''particularly hard drinking water''.[286]

Gastrointestinal cancers

The incidence of gastric cancer, in particular, and cancer of the oesophagus is highest in deprived or poor areas. In Scotland from 1991 to 1995, for example, there was a strong social gradient for gastric and oesophageal cancers, with the highest

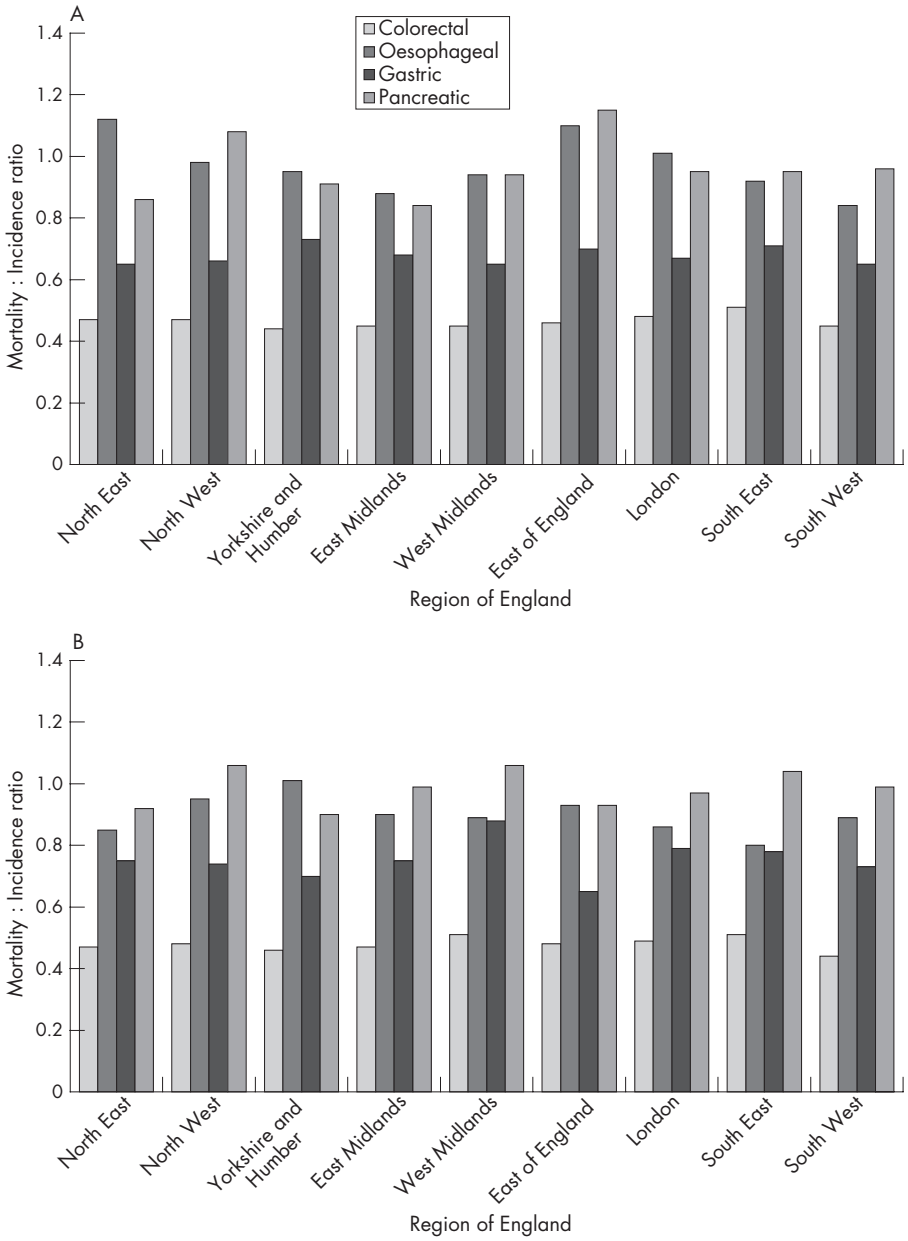


Figure 3.5.5 Mortality: Incidence ratios for colorectal, oesophageal, gastric, and pancreatic cancers in different regions of England, 2001. (A) For men; (B) for women. Source: England: National Cancer Intelligence Centre, Office for National Statistics.

incidence in areas having the highest Carstairs' deprivation scores, and the lowest incidence found in areas that were the most affluent (fig 3.6.1). Socioeconomic variation in gastric cancer incidence occurs to some extent because of the association between *Helicobacter pylori* infection and poverty. However, there were no significant associations between deprivation and incidence of colorectal and pancreatic cancers; although colorectal cancer incidence appears to be highest in the most affluent areas.

In England and Wales, use of the ONS longitudinal Study from 1976 to 1990 showed significantly higher incidence of gastric cancers among lower social groups, no social inequalities in incidence of pancreatic cancer, and a significantly higher incidence of colorectal cancer among women but not among men in advantaged social groups.[478] Colorectal cancer has similarly been associated with professional or managerial occupations in another British study,[464] and colon cancer with sedentary occupations in Sweden.[479]

Population based mortality in Scotland shows similar patterns to those for incidence, although mortality from colorectal cancer in the most affluent areas is comparable to that in the rest of the population (fig 3.6.1). Five year survival rates in Scotland are positively and significantly correlated with affluence for colorectal cancer, in particular, and also for gastric and oesophageal cancer. However, for pancreatic cancers, which have the poorest prognosis, there is much less scope for socioeconomic variation in survival.

In England, inequalities in survival for colorectal cancer have been attributed to earlier surgical resection among people from more affluent backgrounds, reflecting inequalities in access to treatment,[480] while others have reported lower uptake of screening among people from more deprived areas.[481 482] For details of the impact of socioeconomic and demographic factors on consultations in primary care for diseases of the digestive system, see section 4.3.2.

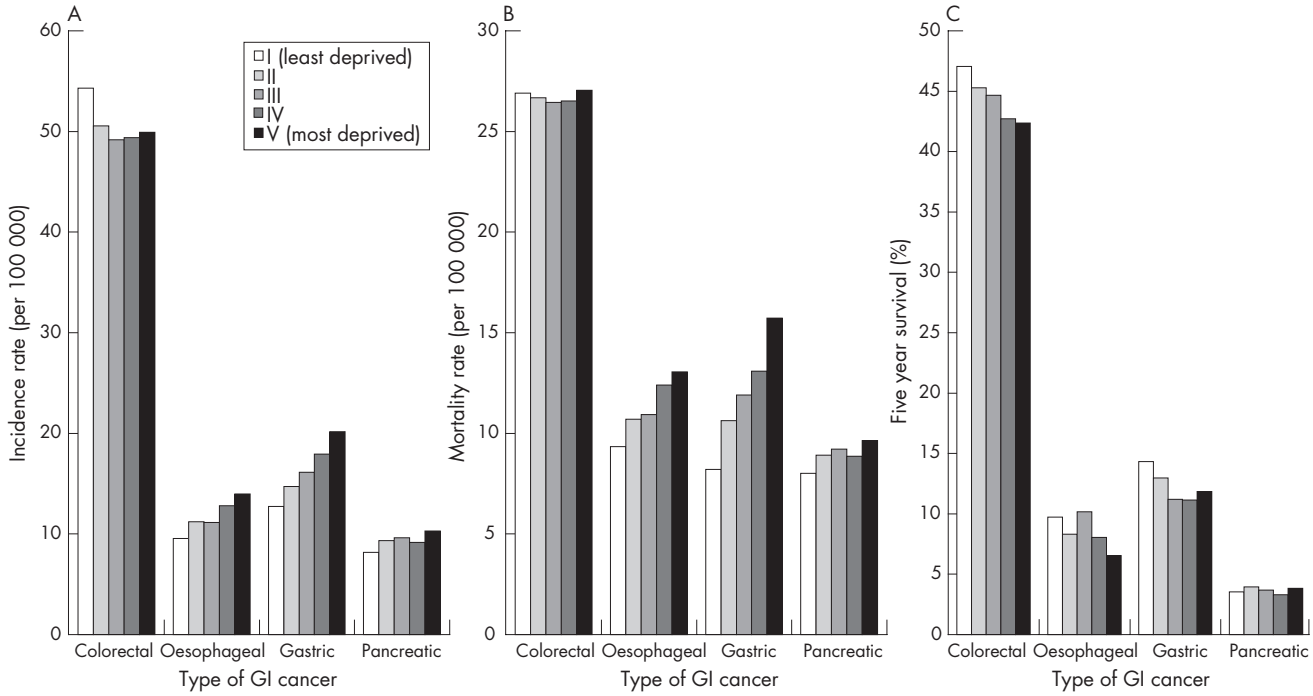


Figure 3.6.1 Standardised incidence and mortality rates (per 100 000 population), and five year survival, for colorectal, oesophageal, gastric, and pancreatic cancer shown for Carstairs deprivation categories in Scotland: cases diagnosed between 1991 and 1995. (A) Incidence; (B) mortality; (C) five year survival. Notes: Incidence and mortality rates are standardised using the European population. Incidence and mortality rates for oesophageal and gastric cancers are strongly associated with deprivation (both $p<0.001$), but those for colorectal or pancreatic cancers are not. Five year survival for colorectal ($p<0.01$), oesophageal ($p=0.01$), and gastric ($p=0.04$) cancers are all associated with deprivation, but that for pancreatic cancers is not. Carstairs deprivation categories are measured in quintiles. Source: Information and Statistics Division, NHS in Scotland.[215]

3.7 Costs to society

Costs to the NHS of GI disease are reported in section 4.5 below. In addition to health services costs, however, GI disease imposes a considerable burden on the other parts of the UK economy, as well as to patients and their families.

It was not possible to undertake a study of the full burden of illness within the time and financial constraints of this review. However, in 1996 the British Society for Gastroenterology commissioned the Unit for Policy Research in Science and Medicine (PRISM) of the Wellcome Trust to undertake a study to estimate the burden of GI disease in the UK.[483] The following estimates are based on that report.

One major element of burden is the years of working life lost by those who die of GI diseases before reaching retirement age. The PRISM study estimated that in 1997 approximately 147 400 person years were lost (from age of death (if 20+) to 65) from GI diseases in both men and women. They reported that "… the burden of gastrointestinal disease in terms of premature death has been approximately constant in recent years". On the assumption that this burden has remained constant since 1997 and applying their valuation method updated with current average earnings, the estimated cost of early death by GI disease in 2004 is £3230m.

A second major element of the burden of GI disease is the lost productivity due to long term sickness absences from work. The PRISM study estimated that GI disease causes 46 680 person years of lost productivity or roughly 1.7% of long term sickness absence in the UK. Applying their valuation method updated with current average earnings produces an estimated value of lost productivity in 2004 of £1050m.

With respect to short term sickness absence, the PRISM study crudely estimated that one fifth of all short term sickness absences were due to GI diseases. Updating their estimate with current earnings produces a value of lost productivity estimate of £2900m.

On this basis, the total estimated cost to the British economy in 2004 is thus £7180m. Although this figure may be crude, it identifies an order of magnitude which clearly indicates that GI morbidity and mortality impose major costs on the British economy.

In addition to costs for the economy, GI diseases impose considerable burden on individual patients and their families. This includes travel and other costs incurred in receiving treatment and the cost of over the counter drugs, which are not included in the NHS costs reported in section 4.5.

4 CURRENT SERVICE PROVISION IN THE UK

4.0 Methods and data limitations

The main methods used for the activity analysis in this chapter involved using routine data sources in the UK to provide information on hospital activity and costs. The main source used for hospital inpatient activity was hospital episode statistics (HES) in England, produced by the Department of Health. Record linkage allows hospital activity to be determined for the numbers of people receiving inpatient care, as well as the numbers of episodes of care. Linked hospital episode data were provided by the Unit of Health-Care Epidemiology, University of Oxford.[484]

Hospital activity for surgical procedures was also obtained from hospital episode statistics. However, because outpatient activity data are not yet available for the UK, data were obtained for outpatients from the USA.

For activity in primary care, the most recent comprehensive study of consultation patterns in primary care is the fourth national morbidity study in England and Wales in 1991–92.[485] This comprised a representative national sample of 60 general

Table 4.1.1 BSG published guidelines, including work-in-progress

The following guidelines have been published:
Oesophageal manometry and pH monitoring (revised 2006)
Antibiotic prophylaxis in gastrointestinal endoscopy (revised 2001)
Management of patients with short bowel (2006)
Complications of gastrointestinal endoscopy (2006)
Management of inflammatory bowel disease in adults (2004)
Dyspepsia management guidelines (revised 2002). Now NICE
Management of patients with coeliac disease (revised 2002)
Initial biopsy diagnosis of suspected chronic idiopathic inflammatory bowel disease (1997)
A structured approach to colorectal biopsy assessment (1997)
Management of acute pancreatitis (revised 2005)
Informed consent for endoscopic procedures (1999 and 2006)
Use of liver biopsy in clinical practice (2004)
Indications for referral and assessment in adult liver transplantation (2000)
Osteoporosis in coeliac disease and IBD (2000)
Management of iron deficiency anaemia (revised 2005)
UK guidelines on the management of variceal haemorrhage in cirrhotic patients (2000)
Management of irritable bowel syndrome (2000)
Treatment of hepatitis C incorporating the use of PEG interferon (revised 2003)
Management of oesophageal and gastric cancer (2002)
Management of osteoporosis associated with chronic liver disease (2002)
Non-variceal upper gastrointestinal haemorrhage (2002)
Colorectal cancer screening in high risk groups (2002)
Management of patients with coeliac disease (2002)
Diagnosis and treatment of cholangiocarcinoma (Nov 2002)
Diagnosis and treatment of hepatocellular carcinoma (HCC) in adults (2003)
Investigation of chronic diarrhoea (2003)
Resection of colorectal cancer liver metastases (2006)
Enteral feeding in adult hospital patients (Dec 2003)
Pancreatic cancer (2005)
Use of oesophageal dilatation in clinical practice (Feb 2004)

The following guidelines have been published in Gut:
Management of patients with pancreatic, peri-ampullary and ampullary carcinomas (2005)
Management of acute pancreatitis (revised 2005)
Management of gastroenteropancreatic neuroendocrine (including carcinoid) tumours (2005)
Management of ascites in cirrhosis (2006)
Diagnosis and management of Barrett's oesophagus (2006)

http://www.bsg.org.uk/bsgdisp1.php?id=48c1b0bcae9daa89d36aandh=1 (accessed 18 December 2006).

practices, covering just over half a million registered patients or 1% of the population of England and Wales. This study followed the third national morbidity survey in 1981–82.[486]

Some of the main data limitations for investigating activity include concerns about the accuracy of routine hospital episode statistics,[8–11] as well as increasing doubts that the finished consultant episode is still a valid measure in a health service where changing roles and teamwork are increasingly becoming the norm.[11 487 488]

A limitation of the investigation of primary care activity is that the latest comprehensive and freely available study of consultation patterns in primary care in England and Wales is the fourth national morbidity study which covers the period 1991–92.

The literature review described in section 5.0.1 has also contributed to some sections in this chapter. Workforce data have been collected by an annual census of consultant gastroenterologists taken on 30 September each year. These data are cross checked with the Royal College of Physicians annual census data (coordinated to 30 September each year). Advertisements in the *BMJ* and consultant gastroenterology advisory appointment committees are constantly monitored. Specialist registrars also complete an annual census, with data being cross checked against information from the consultant census, Joint Committee for Higher Medical Training, and by monitoring movements of the specialist registrar workforce as they occur. Data on nurses and non-consultant career grade (NCCG) doctors are collected from the consultant census, from the RCN directory, and from an unpublished survey of nurses.

4.1 Organisation

The current provision of services for patients with gastrointestinal disorders has been summarised in a joint report from the British Society of Gastroenterology and Royal College of

Table 4.1.2 NICE guidelines relating to GI disorders

The following guidelines have been published:
Eating disorders: core interventions in the treatment and management of anorexia nervosa, bulimia nervosa and related eating disorders (Jan 2004)
Colorectal: service guidance for the NHS in England and Wales improving outcomes for colorectal cancer (Jun 2004)
Dyspepsia: managing dyspepsia in adults in primary care (Aug 2004)
Nutrition support in adults (Feb 2006)

The following guidelines are in development:
Obesity (Dec 2006)
Faecal incontinence (June 2007)
Irritable bowel syndrome (Feb 2008)

http://www.nice.org.uk/page.aspx?o=cg (accessed 18 December 2006).

Table 4.1.3 SIGN guidelines relating to GI disorders

The following guidelines have been published:
Management of colorectal cancer (Mar 2003)
Dyspepsia (Mar 2003)
Management of obesity in children and young people (April 2003)
Management of harmful drinking and alcohol dependence in primary care (Sep 2003, updated Dec 2004)
Management of oesophageal and gastric cancer (June 2006)

The following guidelines are currently in development:
Management of continence within primary care

http://www.sign.ac.uk/guidelines/ (accessed 18 December 2006).

Physicians in 2003.[489] Common problems include indigestion, reflux, irritable bowel syndrome, and constipation. Many of these problems can be diagnosed and treated by the patient's family practitioner. Those with worrying or persistent symptoms will usually be referred to a consultant gastroenterologist in outpatients, to identify or exclude organic disease and receive advice on treatment. Investigations will often include blood tests, endoscopy, and imaging. If problems arise suddenly or appear very serious, urgent inpatient assessment and treatment may be required. Such problems include bleeding from peptic ulcer, jaundice, acute liver disease, and severe exacerbations of colitis and Crohn's disease. In hospitals many GI disorders require a team approach involving physicians, surgeons, radiologists, pathologists, specialist and non-specialist nurses, dieticians, nutritionists, physiotherapists, clinical scientists, physiologists, speech and language therapists, hypnotherapists, and psychologists. Some problems will require referral to a tertiary centre where a specific concentration of expertise is required to manage serious or rare disorders, both medically and surgically.

Conventional services for patients with gastrointestinal disorders reflect the traditional division between the primary and secondary care sectors. General practitioners usually have direct access to laboratory, radiological, and endoscopic investigations, but are required to refer patients to consultant colleagues in hospitals when a specialist opinion or care is needed. Not all hospitals provide a full range of diagnostic and treatment facilities and tertiary referral to a subregional or regional hospital is often necessary for complex problems.

The management of many gastroenterological conditions has been reviewed in evidence based guidelines produced by the British Society of Gastroenterology (table 4.1.1), National Institute for Health and Clinical Excellence (NICE; table 4.1.2), and Scottish Intercollegiate Guidelines Network (SIGN; table 4.1.3). This document will not examine the clinical management of individual disorders except in the context of the location and nature of the services required.

4.2 Workforce

Most patients with persistent symptoms suggestive of gastrointestinal disease will be managed by a team led by a gastroenterologist. The Royal College of Physicians has set out a description of the specialty[490] and defined the workload of a consultant-led gastroenterology team. It is recommended that a consultant-led team should look after no more than 20–25 inpatients at any one time, the majority being admitted on emergency take days. In outpatients a consultant physician in gastroenterology, working alone, in a new patient clinic, should see 6–8 patients; each allotted 20–30 minutes. When reviewed, 12–15 patients should be seen in a single session.

The Royal College of Physicians recommends that 65–74 consultant programmed activity sessions are required to serve a population of 250 000, which indicates a need for about six consultants for such a population. This takes into account the need to allow for education and training, audit, and service management. For diagnostic upper gastrointestinal endoscopy or flexible sigmoidoscopy, a maximum of 10–12 procedures should be carried out in a single session, allowing 15–20 minutes for each procedure. Therapeutic procedures will take at least twice as long, and diagnostic and therapeutic

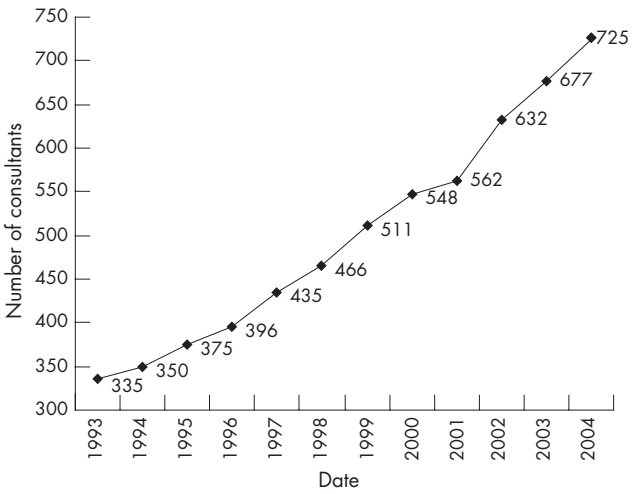


Figure 4.2.1 Numbers of consultant gastroenterologists in England and Wales against time.

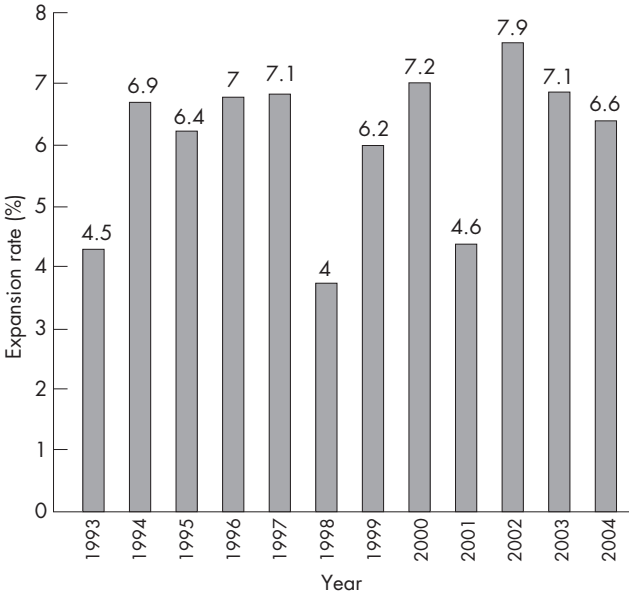


Figure 4.2.2 Consultant gastroenterologists expansion rates (England and Wales).

Table 4.2.1 Annual expansion (%) of consultants in different parts of the UK by year

UK regions	30 Sep 2000	30 Sep 2001	30 Sep 2002	30 Sep 2003	30 Sep 2004
England	7.6	5.7	8.0	7.2	6.5
Wales	0	20.0	6.7	6.3	8.1
Scotland	8.8	8.1	3.0	2.9	6.6
Northern Ireland	0	5.3	5.0	9.5	8.0

colonoscopy will usually take 30–40 minutes for each procedure.

The workforce in gastroenterology has expanded substantially over the past few years. The robust data on consultant gastroenterologist numbers show a rise from 335 to 725 in England and Wales (fig 4.2.1), with an average expansion of 6.3% a year over the whole of that period (fig 4.2.2). At present growth rates it will take 13 years to reach the recommended six consultants per 250 000 population. The total number of academic gastroenterologists is 118 (England 104, Scotland 10, Wales 3, and Northern Ireland 1). Currently, in excess of 400 stoma care nurses are listed in the RCN directory and, from a recent unpublished survey, there are about 100 IBD nurses in the UK. No data are available on workforce numbers in the allied professions that support the care of patients with GI disorders, but there are concerns that expansion has not matched that in medicine and nursing.

Expansion in consultant numbers has been greater in the past five years, averaging 7% in England with similar expansion in Wales and Northern Ireland and slightly less in Scotland (table 4.2.1). Thus the numbers of gastroenterology consultants in the UK total 826 (as of 30 September 2004) (table 4.2.2).

This consultant workforce is supported by at least 418 associate specialists (371 England, 18 Wales, 16 Scotland, 13 Northern Ireland) and 312 nurses undertaking duties that a few years ago would have been deemed the province of doctors—for example, endoscopy nurses (268 England, 13 Wales, 28 Scotland, 3 Northern Ireland). Neither of the groups is evenly distributed through regions or principalities, varying from 3 specialist nurses in Northern Ireland, 6 in Oxford to 32 in Trent and 35 in North Thames (East). For NCCG doctors this variation ranges from 14 in South Thames (West) to 39 in South Thames (East). The lack of correlation (direct or inverse) between consultant numbers, specialist nurse, and NCCG doctors suggests the distribution has developed in an ad hoc fashion rather than by formal planning based on population needs (see table 4.2.3).

In addition the specialist registrar trainees provide substantial service work and any reduction in training numbers (as seems likely as the number of consultants plateau at a required level) would need to be replaced by consultants or other workers of similar skill. Five hundred and fifty specialist registrars or equivalent currently have posts in the UK (as of 30 September 2004), though 131 are out of programme or undertaking research so contribute only a proportion of their time to service delivery (table 4.2.4).

In detailed work reported in *Consultant physicians working with patients*[490] the need for approximately 1950 consultant gastroenterology posts in the UK as a whole (assuming a population of 59.6 million), providing 1665 whole time equivalent posts, was demonstrated to deliver acceptable levels of care. This number allows for a proportion of part time consultants as estimates suggest such work is increasingly popular. Larger numbers may be required with the predicted expansion of the population to 65 million. Typically six to seven will serve a population of 250 000, with extra needed where other duties are fulfilled. These will include specialist training (for example, endoscopy courses), undergraduate teaching, academic and research roles over and above those expected in a district hospital. Each team will require additional support staff such as non-consultant career grade doctors, specialist nurses (with roles in nutrition, endoscopy, inflammatory bowel disease and more technical functions—for example, pH and manometry, videocapsule endoscopy, etc) and the service time provided by specialist registrars. No clear information exists on likely need but one could imagine a team consisting of six whole time equivalent consultants, one to two whole time equivalent non-consultant career grade doctors, two endoscopy nurses, and two to three specialist nurses (each providing additional help with IBD, pH, etc) and one to two specialist registrars being trained in gastroenterology and general medicine.

The MINuET study[491] has concluded that more diagnostic endoscopies could be undertaken by nurses. The implications of this are that at least one whole time equivalent specialist nurse, trained in endoscopy, would be required in each medium sized district general hospital. In practice, it is unlikely that a nurse endoscopist would wish only to undertake endoscopies and it is more probable that other specialist nurse roles would be included in the job description. On this basis it is predicted that two whole time equivalent specialist nurses would be required for each hospital. A survey of 196 endoscopy units, registered with the Joint Advisory Group for Gastrointestinal Endoscopy in 2004, identified 149 nurse endoscopists in post in 96 units (64% of the 150 units that responded).[492] On this basis it can be predicted that approximately 200 nurse endoscopists will need to be found and trained in the UK, if the majority of diagnostic procedures are to be undertaken by nurses.

4.3 Activity

4.3.1 Primary care

Routinely collected clinical data are coded and analysed using the International Classification of Diseases (ICD) for diagnosis

Table 4.2.2 Numbers of consultants in different parts of the UK by year

UK regions	30 Sep 2000	30 Sep 2001	30 Sep 2002	30 Sep 2003	30 Sep 2004
England	523	552	600	643	688
Wales	25	30	32	34	37
Scotland	62	67	69	71	76
Northern Ireland	19	20	21	23	25

Table 4.2.3 Numbers of nurses and associate specialists contributing to gastroenterology service provision in the UK

UK regions	Number of nurses	Non-consultant career grades
England	268	371
Wales	13	18
Scotland	28	16
Northern Ireland	3	13
Total	312	418

and Office for Population Censuses and Surveys Classification (OPCS) for surgical operations and procedures.

During 1991–92, 78% of people consulted a general practice on at least one occasion. Table 4.3.1 shows the prevalence rate or percentage of people who consulted for the major disease groupings (ICD-9 chapters). Of the different gastrointestinal diseases, 8.7% of people consulted for diseases of the digestive system, 4.1% consulted for intestinal infectious diseases, 0.1% consulted for malignant neoplasms of the digestive system, and 0.04% for viral hepatitis (table 4.3.1).

Diseases of the digestive system formed one of the leading ICD chapters as the cause of people consulting their GP, following respiratory diseases (30.7% of all people), diseases of the nervous system (17.3%), musculoskeletal diseases (15.2%), diseases of the skin and subcutaneous tissue (14.6%), infectious diseases (14.0%), injury and poisoning (13.9%), genitourinary diseases (11.3%), and diseases of the circulatory system (9.3%).

The percentage of patients consulting general practice for diseases of the digestive system rose by one fifth from 7.2% of people in 1981–82 to 8.7% in 1991–92 (fig 4.3.1), which was closer to the 8.2% and 10.0% of people consulting for diseases for the digestive system in the historical national morbidity surveys in 1955–56 and 1971–72, respectively.[12] The proportion of people consulting for most other ICD-9 chapters also increased, although there were reductions for infectious diseases, mental disorders, and ill-defined diseases.

The total consultation rate for gastrointestinal diseases was 2083 per 10 000 population; or just over one consultation for every five people in the general population (table 4.3.2). These comprised 1495 consultations per 10 000 for diseases of the digestive system, 517 for intestinal infectious diseases, 54 for malignant neoplasms of the digestive system, nine for benign and other neoplasms of the digestive system, and eight per 10 000 for viral hepatitis.

Consultation rates per 10 000 population for individual gastrointestinal diseases are also shown in table 4.3.2. The most common causes of consultation were ill-defined intestinal infectious diseases (497 consultations per 10 000 population), disorders of the function of the stomach (224 per 10 000), diseases of the oral cavity, salivary glands and jaws (185), diseases of the oesophagus (169), hernia (104), gastritis and duodenitis (101), and peptic ulcer (90; table 4.3.2).

For people consulting GPs with gastrointestinal diseases, the most common causes of consultation were infectious intestinal diseases (4.0% of people), functional disorders not elsewhere classified (2.1%), disorders of function of stomach (1.5%), diseases of the oesophagus (1.0%), and gastritis and duodenitis (0.7%; fig 4.3.2).

Socioeconomic and demographic influences on consultations for diseases of the digestive system in primary care

Consultations for diseases of the digestive system in primary care in 1991–92 show a strong social class gradient, with significantly increased rates of consultation for the manual social classes IV, V, and III manual, and reduced consultation levels for social classes I, II, and among men in the III non-manual class (fig 4.3.3A).

Consultation rates for digestive diseases were greatly increased for Pakistani and Bangladeshi ethnic groups, by 84% among men and 139% among women, but were not significantly increased or reduced for all other classified ethnic groups (fig 4.3.3B).

Consulting was reduced among people in full-time employment, and among women in part-time employment, but was increased among people who were unemployed or who were registered long term sick, and for women who were classified as looking after the home or family (fig 4.3.3C). People living in council housing and other rented accommodation also had increased rates of consultation, while people in owner occupied housing and women in communal accommodation had reduced consultation rates (fig 4.3.3D).

Increased rates of consultation were also reported for men in the Midlands and Wales, widowed or divorced people, and smokers, while people in southern England, people in rural areas of residence, single women, and non-smokers had reduced rates of consultation (fig 4.3.4).

4.3.2 Inpatients

Out of 39 million finished consultant episodes (FCEs) in England during the four year period 1998–99 to 2001–02, 6.5 million (17%) had a gastrointestinal disease as the principal diagnosis (table 4.3.3); although about 45% of these admissions were day cases and mainly refer to endoscopic assessments. Of these, 5.2 million were for diseases of the digestive system, one million were for malignant neoplasms of the digestive system, 225 820 were for benign and other neoplasms of the digestive system, 160 160 were for intestinal infectious diseases, and 20 232 were for viral hepatitis.

Diseases of the digestive system was the second ICD chapter after neoplasms, and excluding ''symptoms, signs, and abnormal findings'', that was the principal diagnosis for most FCEs (table 4.3.3). Using record linkage to identify person based admission rates, as well as episode based rates, diseases of the

Table 4.2.4 SpR/NTN posts in the UK (as of 30 September 2004)

SpR/NTN posts	England	Wales	Scotland	Northern Ireland
Specialist registrar (clinical)	265	10	22	6
Senior registrar	1			
Research registrar	99	4	9	3
Out of programme	11	1	1	3
Visiting registrar, inc FTTA	53	10		
LAT	28	1	2	
Locum/hon consultant	21			
Total	478	26	34	12

Table 4.3.1 Rates per 10 000 population for patients consulting general practice, and for the total consultation rate, for the different ICD-9 chapters, England and Wales, 1991–1992

Diagnosis at consultation	ICD-9 chapter	ICD-9 code	Percentage of patients consulting general practice		Consultation rate per 10 000 population	
			All consultations	Serious	All consultations	Serious
Intestinal infectious diseases:		001–009	4.09	NA	517	NA
Infectious and parasitic diseases	I	001–139	13.99	0.09	2 006	12
Viral hepatitis		070	0.04	NA	8	NA
All other infectious diseases		010–069, 071–139	NA	NA	1 489	NA
Neoplasms:	II	140–239	2.39	0.90	492	287
Malignant, digestive system		150–159	0.13	NA	54	NA
Benign and other neoplasms, digestive		210,211,230, 235.2–235.5	NA	NA	9	NA
All other neoplasms		140–149, etc	NA	NA	436	NA
Endocrine, nutritional, metabolic and immunity disorders	III	240–279	3.77	1.85	710	419
Diseases of blood and blood-forming organs	IV	280–289	0.97	0.08	151	12
Mental disorders	V	290–319	7.28	1.13	1 761	350
Diseases of the nervous system and sense organs	VI	320–389	17.32	1.99	2 848	378
Diseases of the circulatory system	VII	390–459	9.31	3.67	2 397	977
Diseases of the respiratory system	VIII	460–519	30.70	5.79	6 200	1314
Diseases of the digestive system	IX	520–579	8.66	2.29	1 495	414
Diseases of the genitourinary system	X	580–629	11.33	0.31	2 050	53
Complications of pregnancy, childbirth and the puerperium	XI	630–676	1.08	0.19	183	25
Diseases of the skin and subcutaneous system	XII	680–709	14.55	0.00	2 289	0
Diseases of the musculoskeletal system and connective tissue	XIII	710–739	15.21	5.34	3 070	1067
Congenital abnormalities	XIV	740–759	0.53	0.29	69	41
Certain conditions originating from the perinatal period	XV		0.13	0.03	16	4
Symptom, signs and ill-defined conditions	XVI	760–779	15.10	0.07	2 340	7
Injury and poisoning	XVII	800–999	13.90	0.61	1 946	90
Total gastrointestinal diseases		001–009, 070, 150–159, 210,211, 230, 235.2–235.5, 520–579	NA	NA	2 083	NA
All illnesses	I–XVII	001–999	78.03	19.84	30 021	5450

Source: McCormick *et al*, 1995.[485]

digestive system was the ICD chapter that was the principal cause for most people being admitted to hospital (4.4 million in England from 1998–99 to 2001–02).[484]

Figure 4.3.5 shows the percentage of inpatient admissions for each major body system, after deaths from cancer were allocated to their respective body systems—for example, when gastrointestinal cancers were included with diseases of the digestive system, when respiratory cancers were included with diseases of the respiratory system, etc. Then, gastrointestinal diseases were the leading major cause of hospital admission, either as FCEs (6.55 million; 17% of the total) or as people admitted (5.00 million; 17% of the total).

In other words, 1 in 39 people were admitted each year with a principal diagnosis of gastrointestinal disease. This compares with

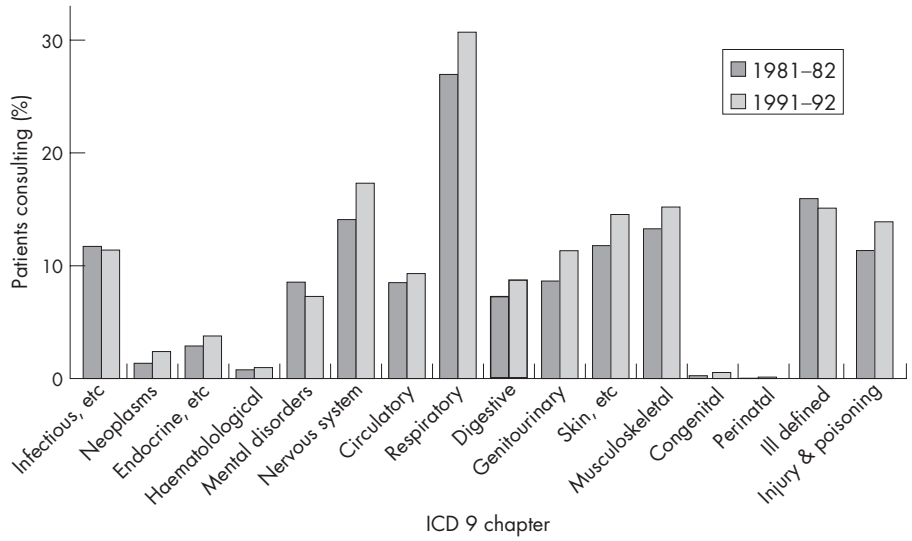


Figure 4.3.1 Percentage of patients consulting general practice for the different ICD-9 disease chapters in England and Wales, 1981–82 and 1991–92; a comparison over time between the last two national morbidity surveys. Source: McCormick *et al*, 1995.[485]

Table 4.3.2 Consultation rates (per 10 000 population) for patients consulting general practice for gastrointestinal diseases in England and Wales, 1991–1992

Diagnosis at consultation	ICD-9 code	Consultation rate per 10 000 population
Diseases of the digestive system:		
Diseases of oral cavity, salivary glands, and jaws	520–529	185
Diseases of oesophagus	530	169
Peptic ulcer	531–534	90
Gastritis and duodenitis	535	101
Disorders of function of stomach	536	224
Other disorders of stomach and duodenum	537	1
Appendicitis	540–543	13
Hernia of abdominal cavity	550–553	104
Crohn's disease	555	20
Ulcerative colitis	556	26
Vascular insufficiency of intestine	557	0
Other non-infective gastroenteritis and colitis	558	21
Intestinal obstruction without mention of hernia	560	8
Diverticular of intestine	562	40
Peritonitis	567	1
Other diseases of intestines and peritoneum	564–566, 568, 569	413
Chronic liver disease and cirrhosis	571	10
Other disorders of liver	570, 572, 573	1
Cholelithiasis, cholecystitis, and other disorders of gallbladder	574–575	36
Other disorders of biliary tract	576	5
Diseases of pancreas	577	6
Gastrointestinal haemorrhage	578	16
Intestinal malabsorption	579	5
Total diseases of the digestive system	520–579	1495
Malignant neoplasms of the digestive system:		
Oesophagus	150	10
Stomach	151	10
Small intestine	152	0
Colon	153	18
Rectum, rectosigmoid junction, and anus	154	11
Liver and intrahepatic ducts	155	1
Gallbladder and extrahepatic ducts	156	0
Pancreas	157	4
Retroperitoneum and peritoneum	158	0
Other and ill-defined sites of the digestive system	159	0
Total malignant neoplasms of the digestive system	150–159	54
Benign and other neoplasms of the digestive system	210, 211, 230, 235.2–235.5	9
Infectious intestinal diseases:		
Cholera	001	0
Typhoid and paratyphoid fevers	002	0
Other salmonella infections	003	6
Shigellosis	004	2
Other food poisoning (bacterial)	005	2
Amoebiasis	006	0
Other protozoal intestinal diseases	007	1
Intestinal infections due to other organisms	008	9
Ill-defined intestinal infections	009	497
Total infectious intestinal diseases	001–009	517
Viral hepatitis	070	8
Total gastrointestinal diseases	001–009, 070, 150–159, 210 211, 230, 235.2–235.5, 520–579	2083

Source: McCormick *et al*, 1995.[485]

1 in 60 people admitted each year for genitourinary disease, 1 in 63 for circulatory disease, 1 in 76 for accidents and injury, 1 in 81 for respiratory disease, and 1 in 90 for musculoskeletal disorders.

Using the criterion of ''any diagnosis'' rather than ''main diagnosis'', a total of 7.5 million people were admitted with ''any diagnosis'' of gastrointestinal disease during the four year period (one in 26 people per year), with a corresponding total of 10.0 million FCEs (26% of all FCEs).

Gastrointestinal cancer is the most common cause of hospital admission of all major cancer groupings. It was the principal diagnosis of 23% of all cancer FCEs, followed by lymphatic and haematological cancer (22%) and genitourinary cancer (18%; fig 4.3.6). FCEs for GI cancers mainly comprised colorectal cancer (60%), followed by cancers of the oesophagus (12%), stomach (11%), pancreas (7%), and the liver and intrahepatic ducts (2%).

The main causes of hospital admission for (non-cancer) diseases of the digestive system include hernia (12% of all FCEs), non-infective gastroenteritis and colitis (9%), cholelithiasis, cholecystitis and other diseases of the gallbladder, and gastritis and duodenitis (7%; fig 4.3.7).

Figure 4.3.8 shows hospital admission rates, based on number of FCEs and on number of people admitted, for some of the most common diseases and conditions in the general

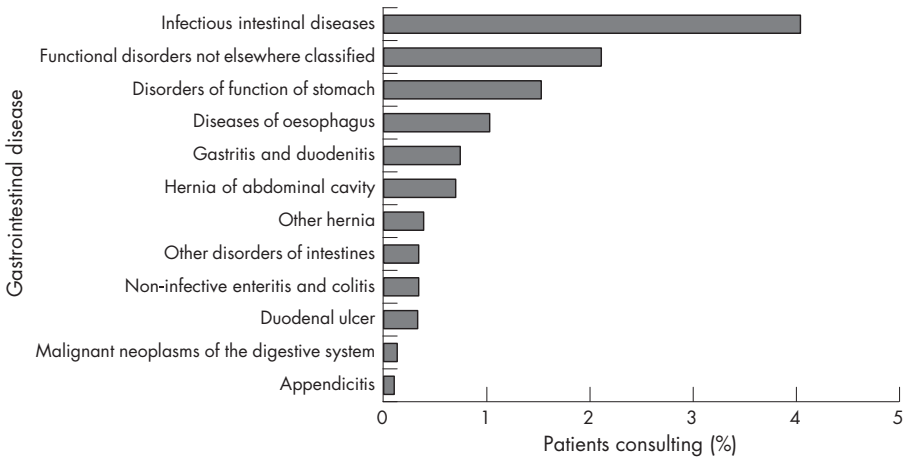


Figure 4.3.2 Percentage of patients consulting general practice for the most common gastrointestinal diseases in primary care in England and Wales, 1991–1992 (at least 0.10% of the general population consulting). Source: McCormick *et al*, 1995.[485]

population. The number of people admitted for gastrointestinal diseases was more than double that for all types of accident, four times that for ischaemic heart disease, over 10 times that for stroke and pneumonia, and 20–40 times that for diabetes, asthma, and all traffic accidents.

4.3.3 Outpatients

Currently HES only includes data on admitted patients. In the near future, outpatient data will be available on HES online, but this will not include clinical data.

However, using figures for the USA in 2000, these show that out of an estimated total of 27.4 million outpatient visits for gastrointestinal symptoms, the leading gastrointestinal complaint was abdominal pain, cramps and spasms (12.3 million outpatient visits), followed by diarrhoea (4.06 million), nausea (3.32), vomiting (2.89), dyspepsia (1.82), constipation (1.33), anal or rectal bleeding (1.26), and melaena (1.18).[493]

The leading physician diagnoses for the same 27.4 million outpatient visits were abdominal pain (5.24 million), gastro-oesophageal reflux disease (4.62 million), gastroenteritis (3.43), gastritis (2.4), haemorrhoids (1.57), irritable bowel syndrome (1.56), non-inguinal hernia (1.54), benign neoplasms of the colon (1.52), malignant colorectal neoplasm (1.49), inguinal hernia (1.24), and diverticulosis of the colon (1.00).

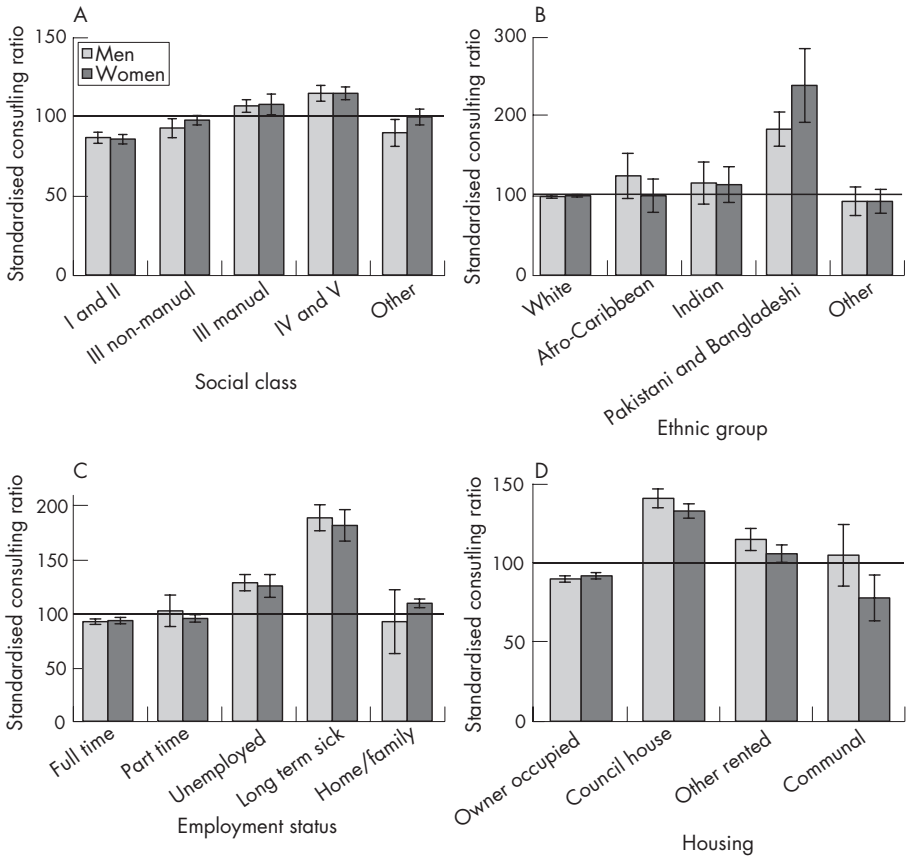


Figure 4.3.3 Standardised consulting ratios (general population = 100) for diseases of the digestive system in general practice in England and Wales, 1991–92 according to (A) social class; (B) ethnic group; (C) employment status; (D) housing. Note: Standardised consulting ratio in the general population = 100. Vertical bars represent 95% confidence intervals. Source: McCormick *et al*, 1995.[485]

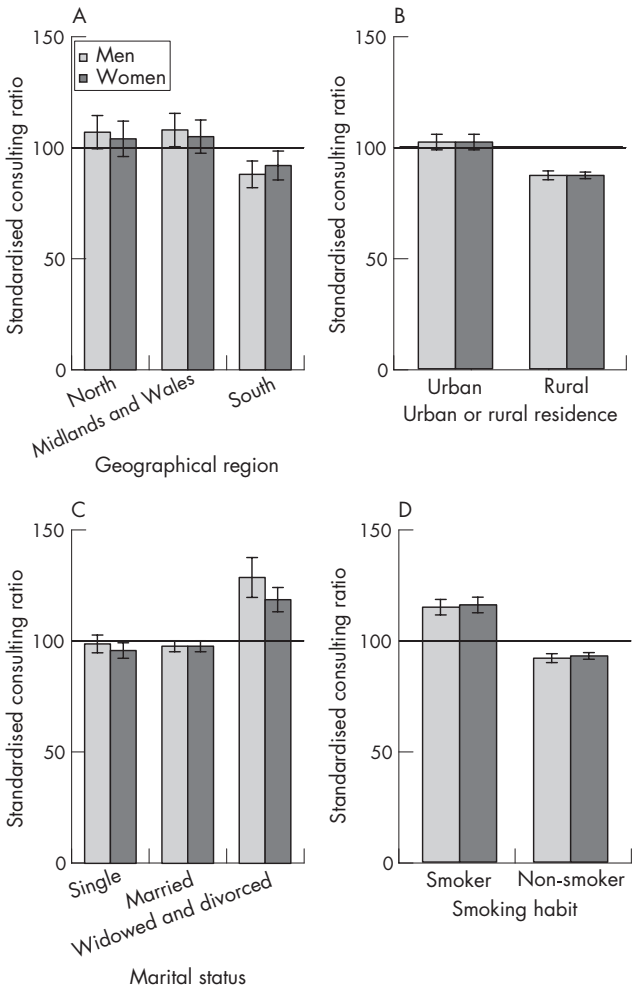


Figure 4.3.4 Standardised consulting ratios (general population = 100) for diseases of the digestive system in general practice in England and Wales, 1991–92 according to (A) region of England and Wales; (B) urban or rural residence; (C) marital status; (D) smoking habit in past week. Note: Standardised consulting ratio in the general population = 100. Vertical bars represent 95% confidence intervals. Source: McCormick *et al*, 1995.[485]

4.3.4 Procedures

Table 4.3.5 shows the total number of surgical procedures undertaken in England in 2000–01 for the different OPCS-4 chapters, as well as the total numbers of ''main procedures'' during a given episode, and the numbers of day case procedures.

Out of a total of 12.7 million procedures, 1.21 million (9.5%) were performed on the digestive tract and a further 128 886 (1.0%) on other abdominal (principally digestive) organs. Considering main procedures only, 1.03 million out of a total of 6.5 million procedures (16%) were performed on the digestive tract, and a further 97 102 (1.5%) on other abdominal organs (table 4.3.5).

A total of 5.8 million of the 12.7 million procedures (45%) were undertaken as day case admissions, including 59% of the procedures on the digestive tract and 11% of the procedures on the other abdominal organs (table 4.3.5).

Figure 4.3.9 shows the percentage breakdowns of surgical procedures on the digestive tract and other abdominal organs in England in 2000–2001 (A) for all surgical procedures and (B) for the main surgical procedure during the episode. Most procedures were performed as day case admissions for endoscopy examination. The other most common gastrointestinal procedures were excisions of gallbladders (42 013, 3% of all gastrointestinal procedures), emergency excisions of appendices (36 657; 3%), and destruction of haemorrhoids (21 720; 2%; fig 4.3.9).

A total of 17.4 million (17 364 212) bed days were associated with the total of 6.51 million main procedures. Of these, 2.6 million (2 629 352; 15.1%) were for procedures on the digestive tract, 1 389 613 on the upper digestive tract, and 1 239 739 on the lower digestive tract. An additional half a million (519 393) bed days were for procedures on the other abdominal organs.

Therefore, a total of 3.15 million bed days (18.1% of the total) were for gastrointestinal procedures, which was second only to procedures on ''other bones and joints'' (3.17 million) as the heaviest burden on hospital beds (fig 4.3.10).

Table 4.3.6 shows surgical procedures on the digestive tract with mean waiting times to admission in excess of 90 days in England in 2000–01. Eight of 69 procedures on the upper digestive tract, 10 of 52 procedures on the lower digestive tract, and 7 of 61 procedures on other abdominal organs had waiting times of 90 days or more.

4.4 Voluntary sector patient support groups

Voluntary organisations provide support for patients with coeliac disease, inflammatory bowel disease, irritable bowel syndrome, liver disease, and after bowel surgery. These organisations are listed in Appendix 1. The voluntary sector plays a major part in the care and support of patients with chronic gastrointestinal disorders and has conducted many surveys which document the considerable impact of chronic GI disorders on the physical, mental, social, and financial health of those affected.[494–497]

4.5 Costs to the NHS

As with non-NHS costs reported in section 3.7, a comprehensive costing of all NHS resources devoted to GI disease was not possible within the time and resource constraints of the present study. Several key cost areas such as GI cancers (recorded under cancer rather than GI disease) are not included. For others, cruder methods were used here than would have been the case in a more detailed costing exercise. Nevertheless the costs below give a general picture of costs in the relevant areas.

Hospital costs

Data on the number of FCEs in England for all HRGs for diseases of the digestive system were obtained from the Royal College of Physicians iLab using Hospital Episode Statistics. Activity data for each HRG were multiplied by the relevant NHS reference cost.[498] Table 4.5.1 below shows the total number of emergency, overnight elective and day cases in 2001–02 and the associated costs. Total hospital costs (England only) were £1400m.

Drugs

In 2002, 60 million prescriptions were issued for diseases of the gastrointestinal system (represented by therapeutic group 1 in the *British National Formulary*). The net ingredient cost of these drugs was £802m, of which £596m was for ulcer healing drugs and £51m for laxatives, which represents 7.9% of the total number of prescriptions issued in the UK and 9.5% of the total UK drug cost.[499] These reported costs are solely for the ''net ingredient cost'' of the drugs and do not include other cost items such as containers or dispensing fees.

Primary care

The Office of Health Economics has estimated the cost of general practitioner consultations in the UK in 2000–01 for

Table 4.3.3 Annual population based hospital admission rates (per 10 000 population) for ICD-10 chapters, based on numbers of finished consultant episodes (FCEs) and on numbers of people admitted in England, 1998–99 to 2001–02

ICD chapter	ICD-10 code	No of FCEs	Admission rate per 10 000 population	No of people admitted	Admission rate per 10 000 population
Certain infectious diseases:	A00-B99	596 468	30.5	511 032	26.1
Intestinal infectious diseases	A00-A09	160 160	8.2	143 536	7.3
Viral hepatitis	B15-B19	20 232	1.0	15 484	0.8
All other infectious diseases	A10-B14,B16-B99	416 476	21.3	352 012	18.0
Neoplasms:	C00-D48	5 317 876	271.8	2 367 584	121.0
Malignant neoplasms, digestive	C15-C26	987 680	50.5	274 792	14.0
Benign and other neoplasms, digestive	D00-01,D12-D13,D37	225 820	11.5	191 480	9.8
All other neoplasms	C00-C14, etc	4 104 376	209.8	1 900 792	97.1
Diseases of the blood and blood-forming organs	D50-D89	661 852	33.8	341 752	17.5
Endocrine, nutritional and metabolic disorders	E00-E90	590 408	30.2	379 100	19.4
Mental and behavioural disorders	F00-F99	326 748	16.7	246 500	12.6
Diseases of the nervous system	G00-G99	923 780	47.2	677 176	34.6
Diseases of the eye and adnexa	H00-H59	1 505 464	76.9	1 342 436	68.6
Diseases of the ear and mastoid process	H60-H95	371 340	19.0	351 500	18.0
Diseases of the circulatory system	I00-I99	4 273 688	218.4	3 083 240	157.6
Diseases of the respiratory system	J00-J99	2 945 864	150.6	2 266 772	115.8
Diseases of the digestive system	K00-K93	5 160 944	263.8	4 377 780	223.7
Diseases of the skin and subcutaneous system	L00-L99	1 050 452	53.7	905 000	46.3
Diseases of the musculoskeletal system and connective tissue	M00-M99	2 589 824	132.4	2 168 676	110.8
Diseases of the genitourinary system	N00-N99	3 087 232	157.8	2 576 980	131.7
Pregnancy, childbirth and the puerperium	O00-O99	908 180	46.4	812 756	41.5
Certain conditions originating in the perinatal period	P00-P96	96 748	4.9	82 824	4.2
Congenital malformations	Q00-Q99	321 192	16.4	24 9348	12.7
Symptoms, signs and abnormal findings	R00-R99	5 317 348	271.7	4 393 120	224.5
External causes of morbidity and mortality	V01-Y89	2 966 692	151.6	2 565 944	131.1
Total gastrointestinal diseases	A00-A09,B15-B19, C15-C26, D00,D01,D12,D13, D37,K00-K93	6 554 836	335.0	5 003 072	255.7
All diseases and conditions	A00-Y89	39 012 100	1993.7	29 699 520	1517.8

Sources: Department of Health, 2004[453]; Unit of Health-Care Epidemiology, Oxford 2004.[484]

diseases of the gastrointestinal system to be £136m. This represents 7.8% of the cost of all GP visits.

These three elements of NHS costs due to GI diseases give a total of under £2400m but it must be emphasised that this understates total NHS costs for the reason given above.

4.6 Problems with existing service provision

4.6.1 Access

Statistical data on actual usage of resources are covered in section 4.3 and 4.5. Many of the underlying problems concerned with rising demand and limited access are examined, providing a more comprehensive reflection than the brief summary given here. Although many studies give a passing mention to problems of access, only three studies were found to cover this topic for GI services in any significant detail. Indeed, as one would expect, there are clear concerns for a range of services including endoscopy,[500] outpatient management,[501] and open access gastroscopy,[502] with specific problems being excessive workload,[502] ways to restrict access as a means to control costs,[500 502] and the inappropriate use of services.[501] It seems that an extensive and systematic study on the problem of access for the delivery of GI services has yet to be carried out.

4.6.2 Inequalities

No significant publications were found on the problems of inequalities in the delivery of GI services. Only one study—a brief, opinion based commentary on the topic of the inverse care law—was found to highlight general issues of inequalities in the health service.[503] One likely reason for the lack of reliable evidence is that inequality is a much wider ranging concern, and is generally not confined to specific disciplines of medicine or health care. Readers concerned with this topic are therefore advised to consult other sources for an overview of this problem.

4.6.3 Waiting lists

Five studies were included in this section. Unsurprisingly, a literature review by Dunnill and Pounder[504] found that waiting times (whether for an appointment or in the outpatient department) form the bulk of patients' concerns. Guidelines set out by the Association of Coloproctology of GB and Ireland recommend that surgeons should expect to achieve waiting times of four weeks or less between making a diagnosis of colorectal cancer and the start of treatment.[505] But an audit by Duff *et al*[506] carried out in the north west of England found that the median time between referral from the surgeon and the start of radiotherapy was 40 days, while only four patients (6% of the sample) received radiotherapy within 28 days of referral.

For bowel cancer, Flashman *et al*[507] showed that most patients were not referred according to the two week standard set out by the Department of Health (that is, that all patients suspected by their GP of having bowel cancer should be seen by a specialist within two weeks). Clinics did not shorten the overall time to treatment or improve the stage of disease because the time lags before referral and after the outpatient appointment caused major delays. A brief report by Hellier[508] outlined the problems with meeting the two week standard in endoscopy clinics, and emphasises that in order to make it a realistic possibility and to avoid distorted referral practices, funding needs to be targeted at GI outpatient and endoscopy facilities.

4.6.4 Patient safety

Several papers have dealt with patient safety for the treatment of GI disease. These can be generally divided into the safety of methods of treatment (such as the use of NSAIDs and complementary medicine) and procedures (for example, endoscopy and surgery). A wide breadth of studies cover various aspects of treatment,[509–518] and are generally beyond the scope of this report. However, it is worth noting that the main concerns

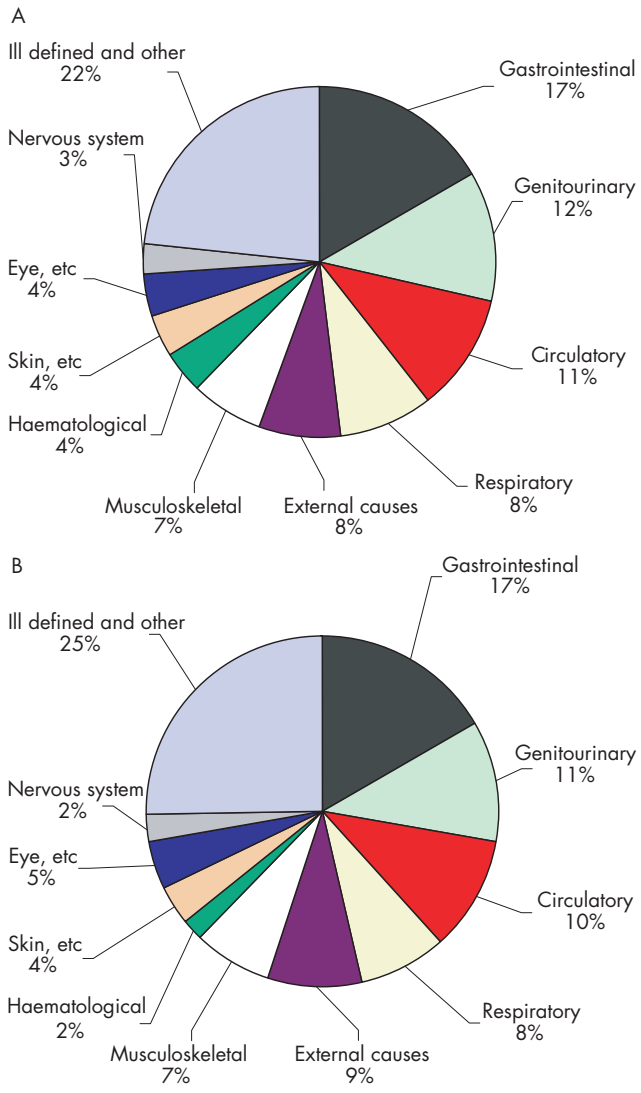


Figure 4.3.5 Percentage hospital admissions for major ICD-10 disease groupings in England, 1998–99 to 2001–02 (A) based on the number of finished consultant episodes (FCEs). Source: Department of Health, 2004[453]; (B) based on the number of people admitted. Sources: Unit of Health-Care Epidemiology, Oxford, 2004.[484]

in this area are focused on ensuring that sufficient evidence and research is carried out to assess the safety of new drugs and treatments for GI disease,[509 510 515] which include over-the-counter drugs,[513] unlicensed and off-label drugs,[511] prescription of NSAIDs,[512 514 516] complementary medicines used by children,[518] and endoscopic therapy for acute non-variceal upper GI haemorrhage.[517]

As far as the safety of procedures is concerned, most studies have generally found that upper GI endoscopies are safe regardless of age and where they are performed.[519–522] However, some caveats remain in the area of how the service is delivered, including a restriction of upper GI endoscopy in elderly patients (85 years and over) to cases of bleeding (overt and suspected) and anaemia in order to reduce costs.[522] There are also suggestions that simple diagnostic endoscopies can be performed safely in the primary care setting, leaving secondary care units to concentrate on those patients requiring sedation, who are acutely ill, and who require therapeutic procedures[519]—problems on location of care are covered in greater detail in section 5. Despite these positive findings, endoscopy does carry some risk. In a study by Quine *et al*,[521] out of 13 036 patients undergoing endoscopic endoscopy without any therapeutic intervention, there were seven deaths, and this was expected to have been an underestimate owing to the reliance on self reporting by doctors. Another study[520] reported significant complication and death from diagnostic oesophageal gastroduodenoscopy as 1 in 1000 and 1 in 10 000 procedures respectively, but that patients' sex, age, or preference for sedation or endoscopist did not affect the morbidity rate.

A report in 2004 from the National Confidential Enquiry into Patient Outcome and Death[523] identified a low mortality from therapeutic endoscopy, with the exception of percutaneous endoscopic gastroscopy (PEG), which had a mortality of 6%. The report made many recommendations to improve the structure and process of therapeutic endoscopy, including the importance of careful selection for PEG insertion and ERCP, and the importance of endoscopy for gastrointestinal haemorrhage being undertaken only by experienced endoscopists.

More complications can be found for GI related surgery, especially for older patients.[524 525] For malignant bowel obstruction, it is suggested that patients should only undergo surgery if their life expectancy is at least two months,[526] but endoscopic enteral stents for patients with this disease is a safe and cost effective alternative.[527]

4.6.5 Information to patients and practitioners

There seems to be widespread encouragement for initiatives aimed at improving the information flow between patients and practitioners.[511 513 528–534] Key issues include the need for nurses and doctors to give relevant and holistic information to patients undergoing gastroscopy at the right time[532]; information leaflets on drugs, illnesses, and diet[511 513 529–531]; and the need for practitioners to be more alert and vigilant in identifying the need to provide information.[528 533 534]

Studies also highlight specific problems due to poor communication. Sewitch *et al* found that a poor or ineffectual conversation between patients and practitioners increased the risk of intentional non-adherence to IBD drugs by patients.[535] It is also interesting to note that in a survey of around 800 patients undergoing colorectal cancer screening in the USA by Greiner *et al*,[536] 61% felt they had inadequate or no time to discuss colorectal cancer with their physician. It was suggested that new and creative methods are needed to satisfy patients' information needs and encourage discussion. In the UK, a study in 1997[537] highlighted that the opportunity to educate and inform patients about IBD in outpatient clinics is often wasted, as practitioners neglect to mention key information sources such as the National Association for Colitis and Crohn's Disease, especially to patients with long term chronic diseases. There is evidence that patients are more satisfied with the information given before and after endoscopy, when it is given by nurses rather than doctors.[523]

4.6.6 Speed of diagnosis and complications of care

Not surprisingly, a considerable number of reports have been published on diagnosis for GI disease. Thirty five studies examining the topic in great detail were included in this report. For the most part, these highlight the need for a quick and accurate diagnosis for a spectrum of GI illnesses, including IBD,[538 539] IBD in children,[540 541] IBS,[542 543] abdominal pain in the elderly,[544] coeliac disease,[174] gastro-oesophageal reflux disease,[545] dyspepsia,[546–548] disorders of the large bowel,[549] ultrashort bowel disease,[550] functional bowel disorders,[551] Crohn's disease,[552] and acute bowel ischemia.[553] Complementing these are studies which deal specifically with the diagnosis for GI related cancers.[554–561] Some research was also found on the use of diagnostic procedures (which were largely effective) such as

Table 4.3.4 Annual population based hospital admission rates (per 10 000 population) for different gastrointestinal diseases, based on numbers of finished consultant episodes (FCEs) and on numbers of people admitted in England, 1998–99 to 2001–2002

Diagnosis at admission	ICD-10 code	No of FCEs	Admission rate per 10 000 population	No of people admitted	Admission rate per 10 000 population
Diseases of the digestive system:					
Diseases of oral cavity, salivary glands, and jaws	K00–K14	700 664	35.8	669 884	34.2
Oesophagitis	K20	150 944	7.7	135 476	6.9
Gastro-oesophageal reflux disease	K21	227 032	11.6	208 516	10.7
Other diseases of oesophagus	K22, K23	211 860	10.8	161 348	8.2
Peptic ulcer	K25–K28	217 280	11.1	157 828	8.1
Gastritis and duodenitis	K29	339 248	17.3	308 424	15.8
Dyspepsia	K30	148 200	7.6	144 816	7.4
Other diseases of stomach and duodenum	K31	33 848	1.7	28 256	1.4
Appendicitis	K35–K37	146 476	7.5	138 136	7.1
Other diseases of appendix	K38	5 432	0.3	5 108	0.3
Hernia of abdominal cavity	K40–K46	635 620	32.5	596 204	30.5
Crohn's disease	K50	71 632	3.7	44 496	2.3
Ulcerative colitis	K51	89 620	4.6	67 140	3.4
Other non-infective gastroenteritis and colitis	K52	303 500	15.5	260 488	13.3
Diverticular of intestine	K57	211 688	10.8	182 284	9.3
Other diseases of intestines	K55,K56,K58–K63	752 812	38.5	632 892	32.3
Diseases of peritoneum	K65–K67	31 496	1.6	25 344	1.3
Liver cirrhosis	K70, K73, K74	81 080	4.1	46 200	2.4
Other diseases of liver	K71,K72,K75–K77	29 072	1.5	22 176	1.1
Cholelithiasis, cholecystitis, and other diseases of the gallbladder	K80–K82	363 620	18.6	263 420	13.5
Other diseases of biliary tract	K83, K87	37 820	1.9	25 800	1.3
Acute pancreatitis	K85	64 560	3.3	43 044	2.2
Other diseases of the pancreas	K86	33 644	1.7	19 212	1.0
Other diseases of the digestive system	K90–K93	273 796	14.0	191 288	9.8
Total gastrointestinal diseases	K00–K93	5 160 944	263.8	4 377 780	223.7
Malignant neoplasms of the digestive system:					
Oesophagus	C15	123 848	6.3	38 240	2.0
Stomach	C16	109 532	5.6	37 068	1.9
Small intestine	C17	8 612	0.4	3 156	0.2
Colon	C18	375 660	19.2	88 924	4.5
Rectosigmoid junction	C19	56 328	2.9	13 976	0.7
Rectum	C20	199 924	10.2	48 524	2.5
Anus and anal canal	C21	10 484	0.5	4 124	0.2
Liver and intrahepatic ducts	C22	20 660	1.1	9 200	0.5
Gallbladder	C23	3 708	0.2	1 516	0.1
Other and unspecified parts of biliary tract	C24	7 432	0.4	3 480	0.2
Pancreas	C25	62 064	3.2	22 796	1.2
Other and ill-defined digestive organs	C26	9 428	0.5	3 788	0.2
Total malignant neoplasms of the digestive system	C15–C26	987 680	50.5	274 792	14.0
Benign and other neoplasms of the digestive system	D00–01,D12–13,D37	225 820	11.5	191 480	9.8
Intestinal infectious diseases:					
Cholera	A00	40	0.0	40	0.0
Typhoid and paratyphoid fevers	A01	1 020	0.1	856	0.0
Other salmonella infections	A02	5 488	0.3	4 572	0.2
Shigellosis	A03	412	0.0	372	0.0
Other bacterial intestinal infections	A04	33 656	1.7	28 192	1.4
Other bacterial food borne intoxications	A05	632	0.0	536	0.0
Amoebiasis	A06	400	0.0	296	0.0
Other protozoal intestinal diseases	A07	1 316	0.1	1 160	0.1
Viral and other specified intestinal infections	A08	80 064	4.1	74 248	3.8
Diarrhoea and gastroenteritis of presumed infectious origin	A09	37 132	1.9	33 264	1.7
Total intestinal infectious diseases	A00–A09	160 160	8.2	143 536	7.3
Viral hepatitis	B15–B19	20 232	1.0	15 484	0.8
Total gastrointestinal diseases:	A00–A09, B15–B19, C15–C26, D00, D01, D12, D13, D37, K00–K93	6 554 836	335.0	5 003 072	255.7

Sources: Department of Health, 2004.[453] Unit of Health-Care Epidemiology, Oxford, 2004.[484]

colonoscopy and biopsy,[562] oesophago-gastroduodenoscopy,[563] imaging techniques (for example, computed tomography, ultrasonography, and MR scan),[553 558] push enteroscopy,[564] and molecular-pathological diagnosis.[565]

However, there is also evidence which points to the possible complications which may arise during the treatment of patients or due to the procedures mentioned above, or both. Lang *et al* suggest that resources and costs double for patients who develop complications after undergoing gastroenterological surgery.[566] For upper GI endoscopy, Quine *et al* warn of the risk of perforation during diagnostic and therapeutic procedures,[521] a problem which seems to be occurring at a significant rate owing to inexperienced practitioners. A similar concern is also voiced by a study by Schofield,[567] where alleged negligence comes from the activity of GPs, gynaecologists, and colorectal surgeons, and patients receive laparoscopic injuries such as

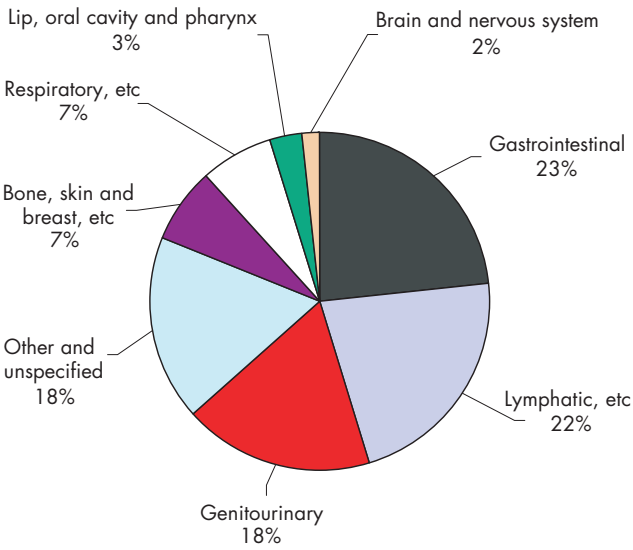


Figure 4.3.6 Percentage hospital admissions, based on number of FCEs, for major groupings of cancer in England, 1998–99 to 2001–02. Sources: Department of Health, 2004.[453]

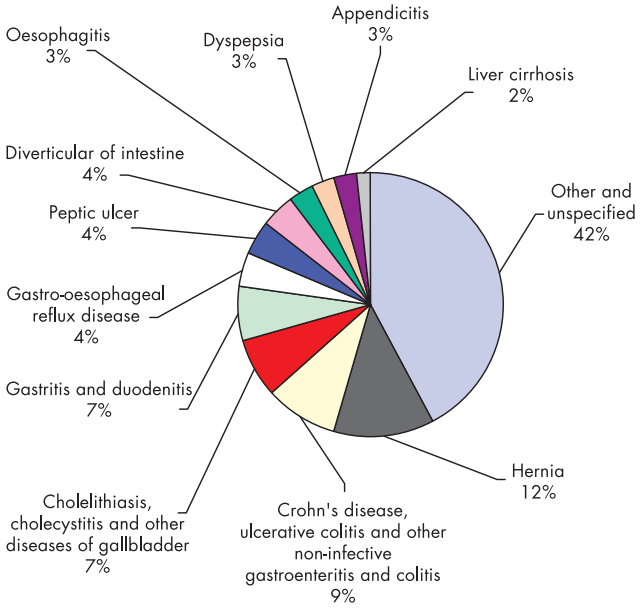


Figure 4.3.7 Percentage of hospital admissions, based on number of FCEs, for diseases of the digestive system in England, 1998–99 to 2001–02. Sources: Department of Health, 2004.[453]

bowel perforation, bleeding, and major vascular damage. In a small study of coeliac disease by Hin *et al*,[378] attention has also been given to problems of underdiagnosis and misdiagnosis.

Clearly, a strong body of evidence exists on providing adequate diagnostic services, which require appropriate training and stringent assessment to ensure patient safety. If this is achieved, the problem that remains is not one of effectiveness, but of ensuring that a sufficient level of service to support the inevitable rise in demand is available.

4.7 Drivers for change

4.7.1 New evidence and guidelines about best care

A plethora of literature can be found on a range of topics concerning guidelines for the care of GI diseases. A total of 45 studies were included for this section of the report, but only a brief summary will be given here owing to the sheer amount of information they cover; readers with a special interest in this area are advised to examine these and other related documents in greater detail. As with previous sections, evidence here can be broadly divided into two areas—treatment and procedures. Some examples include guidelines for the treatment of colorectal cancer,[505 556 568 569] bowel cancer,[507] other GI related cancers,[570–572] Barrett's oesophagus,[573] dyspepsia,[546 574–582] IBD,[583–585] *H pylori* eradication,[586–588], and other GI related diseases.[589–598] For procedures: colonoscopy,[599 600] endoscopy,[600–602] and coloproctology.[603] Despite the quantity of such studies, there remains a distinct lack of reference to service provision—in those where such topic was examined, only tentative suggestions are given, or where more substantial studies have been carried out, conclusions lack an evidence base.[574 576 578 598 604–606] In light of these findings, and the general lack of an evidence based framework for GI service delivery, there is clearly a pressing need for more research and planning of how services should be delivered and the resources required to meet the demand.

4.7.2 Changing incidence of cancer

Colorectal cancer incidence increased by about 20% among men and by 5% among women from 1971 to 1997. However, reflecting large improvements in prognosis over time, mortality rates fell by 20% among men and by 34% among women (fig 4.7.1A).

For cancers of the oesophagus, incidence and mortality both increased by about 60% in men 1971 and 1997, illustrating the poor prognosis associated with oesophageal cancers. Among women, incidence increased by about 40% and mortality increased by about a quarter (fig 4.7.1B).

The incidence of gastric cancer fell sharply by 40–50% in both men and women. Reflecting, improvements in diagnosis and treatment, mortality fell slightly more sharply than incidence; by about 60% in both men and women (fig 4.7.1C).

The incidence of pancreatic cancers fell by about one sixth in men from 1971 to 1997, but remained stable in women. With extremely poor prognosis for pancreatic cancers, annual mortality rates closely tracked incidence rates (fig 4.7.1D).

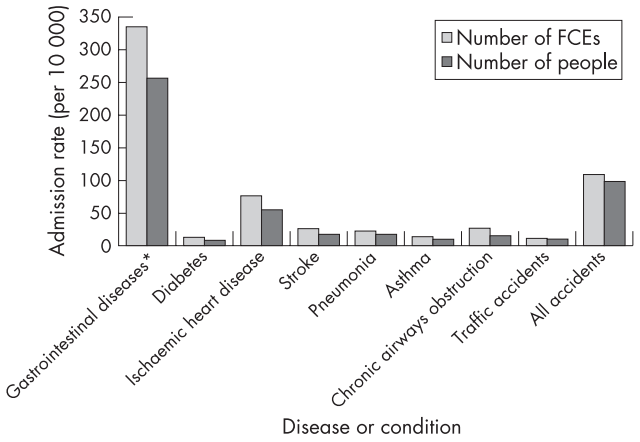


Figure 4.3.8 Annual population based hospital admission rates (per 10 000 population) based on numbers of FCEs, and on numbers of people admitted, for gastrointestinal diseases and for other selected diseases and conditions in England, 1998–99 to 2001–02.*Gastrointestinal disease includes diseases of the digestive system, malignant neoplasms of the digestive system, benign and other neoplasms of the digestive system, intestinal infectious diseases, and viral hepatitis. Sources: Department of Health, 2004.[453]

Table 4.3.5 Numbers of surgical procedures: all, main, and day case procedures according to OPCS-4 chapter in England 2000–2001

Surgical procedure	OPCS-4 chapter	OPCS-4 code	All procedures		Main procedures		Day case procedures	
			No	(%)	No	(%)	No	(%)
Nervous system	A	A01-A84	238 932	(1.9)	202 455	(3.1)	127 048	(2.2)
Endocrine system and breast	B	B01-B37	99 845	(0.8)	90 301	(1.4)	25 592	(0.4)
Eye	C	C01-C86	705 740	(5.6)	410 667	(6.3)	547 550	(9.5)
Ear	D	D01-D28	125 523	(1.0)	94 788	(1.5)	73 919	(1.3)
Respiratory tract	E	E01-E63	318 165	(2.5)	205 984	(3.2)	99 373	(1.7)
Mouth	F	F01-F58	28 0249	(2.2)	235 335	(3.6)	173 268	(3.0)
Upper digestive tract	G	G01-G82	635 154	(5.0)	561 572	(8.6)	403 190	(7.0)
Lower digestive tract	H	H01-H62	571 089	(4.5)	474 073	(7.3)	328 653	(5.7)
Other abdominal organs—principally digestive	J	J01–J72	128 886	(1.0)	97 102	(1.5)	13 678	(0.2)
Heart	K	K01–K71	295 807	(2.3)	195 351	(3.0)	93 205	(1.6)
Arteries and veins	L	L01–L97	293 139	(2.3)	182 761	(2.8)	86 426	(1.5)
Urinary	M	M01–M83	672 821	(5.3)	525 198	(8.1)	323 036	(5.6)
Male genital organs	N	N01–N34	112 939	(0.9)	97 304	(1.5)	74 337	(1.3)
Lower female genital tract	P	P01–P31	105 450	(0.8)	73 654	(1.1)	56 414	(1.0)
Upper female genital tract	Q	Q01–Q56	632 020	(5.0)	434 024	(6.7)	364 276	(6.3)
Female genital tract associated with pregnancy, birth, and puerperium	R	R01–R34	947 964	(7.5)	526 861	(8.1)	2 159	(0.0)
Skin	S	S01–S70	446 162	(3.5)	315 840	(4.9)	246 583	(4.3)
Soft tissue	T	T01–T96	436 789	(3.4)	306 272	(4.7)	128 271	(2.2)
Bones and joints of skull and spine	V	V01–V54	91 021	(0.7)	71 820	(1.1)	34 480	(0.6)
Other bones and joints	W	W01–W92	653 005	(5.1)	536 079	(8.2)	177 102	(3.1)
Miscellaneous and subsidiary operations	X	X01–X59	1 106 086	(8.7)	872 017	(13.4)	544 845	(9.4)
Subsidiary classification of operations	Y–Z	Y01–Z92	3 806 538	(30.0)	0	(0.0)	1 869 195	(32.3)
All operations	A–Z	A01–Z92	1 2703 240	(100.0)	6 509 426	(100.0)	5 792 598	(100.0)

Source: Department of Health, 2004.[453]

Figure 4.7.2 shows slightly updated trends up to 2002 for the incidence of each of the four main gastrointestinal cancers separately in England, Wales, Scotland, and Northern Ireland. They show little further trend for colorectal and pancreatic cancers, but further increases in the incidence of oesophageal cancers among men in Scotland and in Wales, and further reductions in gastric cancer among men and women in all four countries.

4.7.3 Changing incidence of other gastrointestinal and liver diseases

For a few gastrointestinal diseases, such as acute appendicitis and peptic ulcer in most age groups, there has been a fall in incidence in the UK in recent years. However, for most other gastrointestinal and liver diseases, there have been increases in incidence or prevalence over time (see earlier section 3.2).

These include, in particular, liver diseases such as liver cirrhosis, including alcoholic liver disease, non-alcoholic fatty liver disease, primary biliary cirrhosis and hepatitis C infection, which will have a major impact on health care in this area.

There have also been increases in the incidence of acute and chronic pancreatitis, gallstones disease, upper gastrointestinal haemorrhage, diverticular disease of the intestine, coeliac disease, irritable bowel syndrome, and Barrett's oesophagus.

For some gastrointestinal diseases, such as inflammatory bowel disease, there is little evidence of a discernible upward or downward trend in incidence in recent years, even sometimes after earlier increases during previous decades. However, because of improvements in treatment, care, and prognosis, the overall prevalence of these diseases continues to rise.

In summary, the overall burden of gastrointestinal and liver diseases has increased greatly in the past few decades, and will continue to rise in the future.

4.7.4 Screening programmes

A significant amount of research has been carried out into screening and surveillance methods for GI diseases. This is reflected by a total of 32 studies included in this report. On the whole, there is strong support for the development and use of widespread screening programmes for a wide variety of GI diseases, where the poor prognosis of GI cancers is mainly attributed to delays in diagnosis.[324] Most of the evidence relates to GI cancers[607–611] but also covers diseases such as Barrett's oesophagus,[573 612 613] *Helicobacter pylori*,[614] GERD,[615] and diarrhoea.[616] The main problems in this area are the economic costs associated with such programmes–that is, that they need to be adequately managed and feasible[608 610 614 615 617–623]; need to control and ensure high quality screening practices[573 607 612 613 624–628]; and need to provide a greater awareness of the effectiveness of existing and new methods for screening.[611 629–635]

Currently the British Society of Gastroenterology recommends colonoscopic surveillance of patients with inflammatory bowel disease[636] and colonic polyps.[636]

A national screening programme for bowel cancer is to start in England in 2006.[637] This will have significant implications for endoscopy services.

4.7.5 Genetics

Medical genetics, in the form of Cancer Genetics Services already impacts on the delivery of GI services, albeit to only a relatively small extent, for those patients, and their relatives, who are at increased risk of GI tumours owing to some form of genetic predisposition and hence require some form of GI surveillance, usually by colonoscopy.[638–640] Cancer genetics is a rapidly developing field, becoming increasingly sophisticated, and in the future, clinical genetics input is likely to extend to other common GI conditions—for example, IBD and coeliac disease.[641 642] Advances in genetics will improve not only the ability to predict who is, or is not, at risk of certain conditions, but also improve diagnosis, partly through molecular pathology.[643 644]

Medical genetics will also play a part in other areas of GI services—for example, predicting a person's responses to drugs,

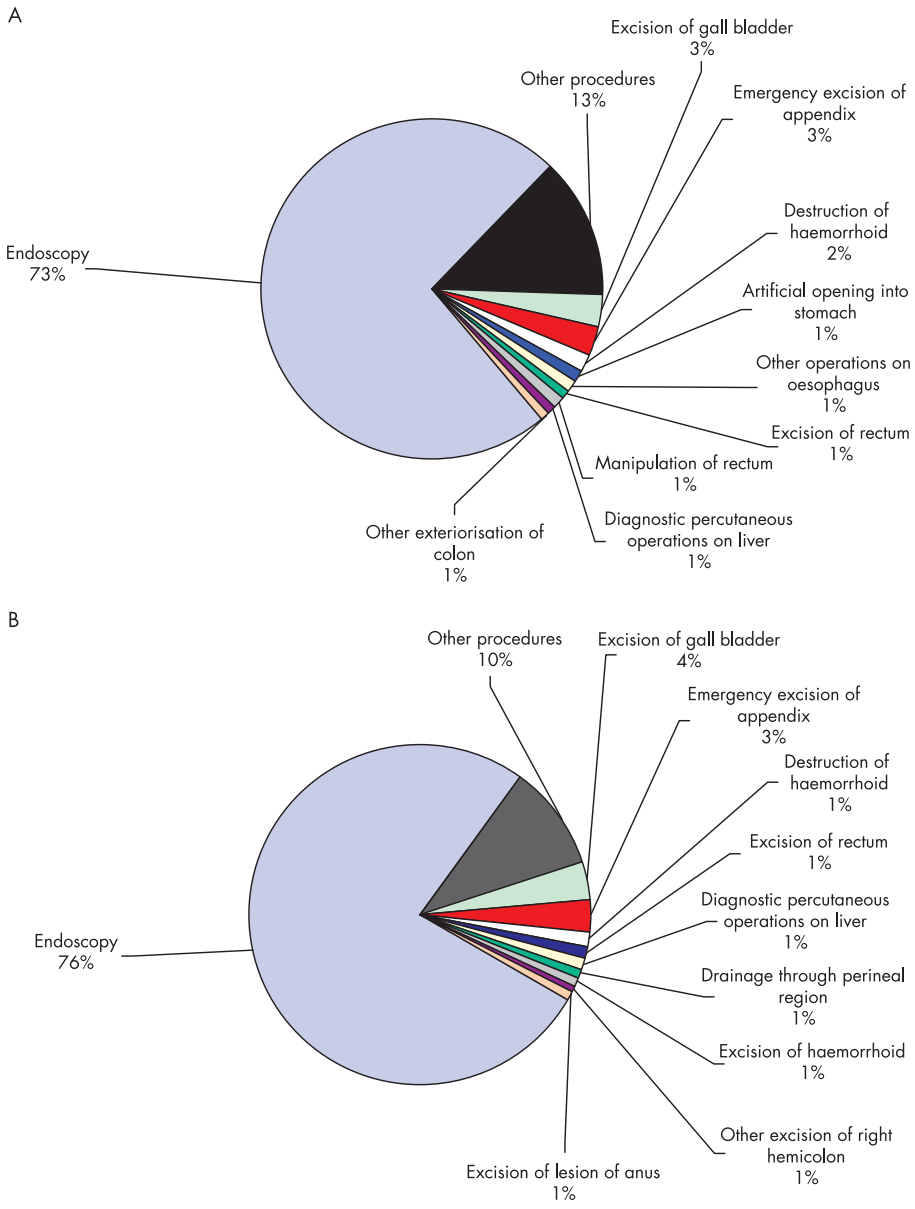


Figure 4.3.9 Percentage of different surgical procedures undertaken on the digestive tract, and on other abdominal organs in England, 2000–2001 for (A) all surgical procedures. Source: Department of Health, 2004[453]; (B) main surgical procedures. Source: Department of Health, 2004.[453]

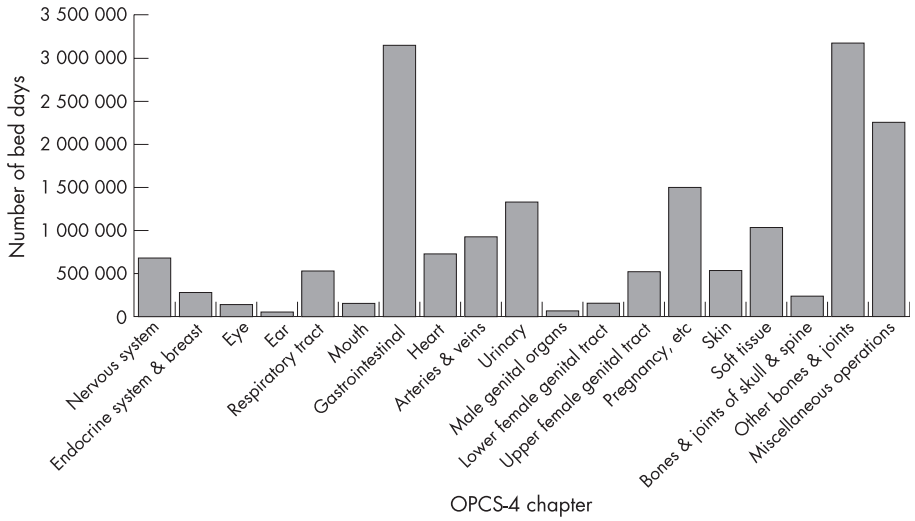


Figure 4.3.10 Total number of bed days for main surgical procedures in England, 2000–2001. Source: Department of Health, 2004.[453]

Table 4.3.6 Surgical procedures of the digestive tract and other abdominal organs with waiting times in excess of 90 days in England, 2000–01

Surgical procedure	Mean waiting time (days)	No of admissions	Surgical procedure	Mean waiting time (days)	No. of admissions
Plastic operations on stomach	319	214	Other connection of ileum	121	184
Connection of stomach to transposed jejunum	229	75	Excision of pilonidal sinus	121	5 684
Repair of gall bladder	217	11	Repair of diaphragmatic hernia	118	289
Antireflux operations	213	2 121	Open introduction of prosthesis into bile duct	118	34
Repair of liver	192	96	Revision of antireflux operations	116	107
Fixation of rectum for prolapse	172	357	Other open operations on gall bladder	115	29
Excision of haemorrhoids	167	9 177	Extirpation of lesion of jejunum	114	21
Excision of gall bladder	161	38 373	Excision of lesion of anus	111	7 792
Incision of gall bladder	157	179	Other abdominal operations for prolapse of rectum	110	660
Repair of anus	151	584	Intra-abdominal manipulation of ileum	107	237
Other open operations on bile duct	133	66	Other operations on pilonidal sinus	98	5 850
Open endoscopic operations on colon	126	50	Other operations on haemorrhoids	93	907
Perineal operations for prolapse of rectum	126	1 028			

Source: Department of Health, 2004.[453]

including adverse events (pharmacogenetics), and predicting response of tumours to treatment (somatic genetics, as opposed to germline genetics). It is likely that pharmacogenetics will impact first on avoiding adverse events, with individual tailoring of prescriptions following later.[641 642 645 646] Although the science of predicting response to treatment from an analysis of a tumour's genetics is in its infancy, certainly as far as GI medicine is concerned, it promises to deliver truly individualised treatment. A considerable amount of work needs to be done, however, to translate this into practice.[644 646–650] More widespread molecular genetic testing of tumours will also reveal more people who are genetically predisposed and thus warrant the attention of cancer genetics services.

4.7.6 Prevention

Studies on the prevention of GI diseases are not as prolific as might be expected. Only five studies were found to examine the subject in any significant detail,[512 651–654] and even in these varied in the topics and diseases covered. Among those included in this review, are the prevention of *H pylori*,[654] traveller's diarrhoea,[653] and NSAID related morbidity and mortality.[512] Muller and Sonnenberg emphasise the beneficial effects of endoscopy for reducing mortality due to colorectal cancer and cancers of the large bowel, and outline its crucial role as a preventative procedure.[652] Hulscher *et al* also discuss the role of interventions to increase preventative activities in primary care, and the need for more research to determine their effectiveness.[651]

4.7.7 Development of managed clinical networks

The complexity of some disorders has been a driver for the development of clinical networks that cover many disciplines across different healthcare organisations. The Calman-Hine report was the catalyst for clinical networks to support the care of patients with cancer and it has been proposed that similar networks be set up for liver disease and hepatopancreatobiliary surgery.[214]

4.7.8 Quality assessment of endoscopy

At present, there is no agreed national approach to quality assessment of endoscopy, but this is now being remedied, after the appointment of a national clinical lead for endoscopy by the Department of Health. The following activities are in progress:

- *Development of a global rating scale*

This is a scale that provides an indication of how a patient will experience having an endoscopy in an endoscopy unit. There are 12 items on the scale that reflect two dimensions: quality and safety of care, and customer care. A recent census in England using this scale was completed by >90% of endoscopy units. Further measurements will be done twice yearly. The scale has been underpinned with objective measures, and a web reporting system for the scale has been completed (http:www.grs.nhs.uk, accessed 18 January 2007). The scale is designed to support quality improvement and help inform patient choice as well as quality assure endoscopy units.

- *Ensuring the appropriateness of endoscopy and referral pathways*

This work aims at streamlining the patient pathway. It is likely that the ''Map of Medicine'' commissioned by the National Electronic Library for Health will provide an electronic framework for referral pathways linked to choose and book systems (http://www.mapofmedicine.com, accessed 21 December 2006).

Table 4.5.1 Number of finished consultant episodes and costs (£000) digestive system HRGs: England 2001–02

	Emergency	Elective admissions	Day cases
Total FCEs	648 000	250 000	839 000
Total costs	762 000	382 000	291 000
Overall total cost	1 435 000		

Source: HES activity data from iLab, NHS reference costs.

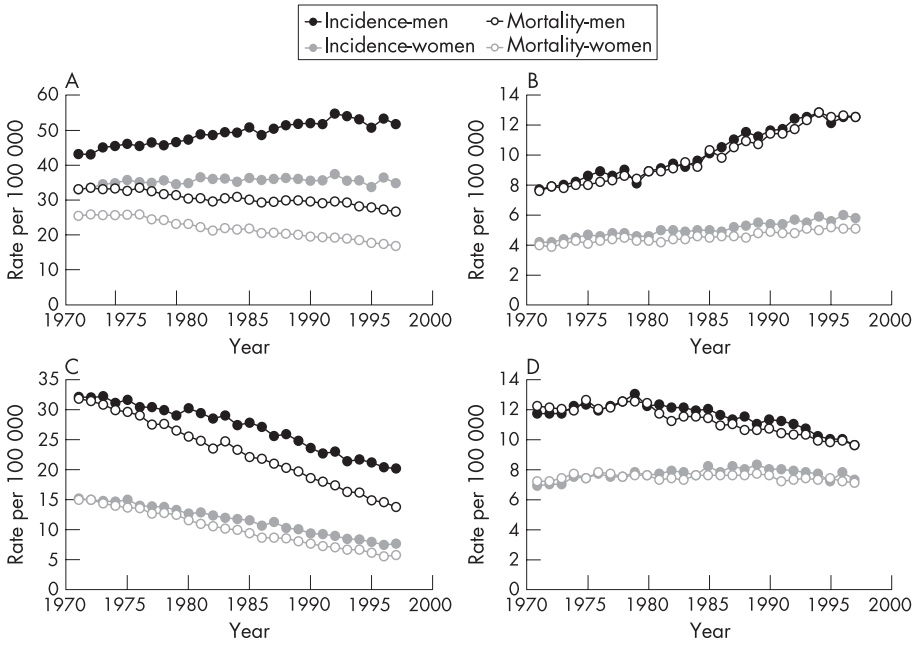


Figure 4.7.1 Trends in standardised incidence and mortality rates (per 100 000 population) for gastrointestinal cancers, among men and women in England and Wales, 1971–97 (A) for colorectal cancer; (B) for oesophageal cancer; (C) for gastric cancer; (D) for pancreatic cancer. Source: Quinn *et al*, 2001.[14]

- *Development of a competency framework*

A competency framework for all health professionals working in endoscopy is currently being prepared. This will form the basis of certification of trainee endoscopists and endoscopy assistants.

- *Re-validation of established endoscopists*

A re-validation methodology for established colonoscopists is currently being tested. Only those who have successfully completed this process will be allowed to perform colonoscopy on patients referred for colonoscopy through the bowel cancer screening programme which began in 2006.

- *Accreditation of endoscopy units*

A process for accreditation of endoscopy units is currently being designed and tested. This peer review type process will replace the self completed questionnaire accreditation process required

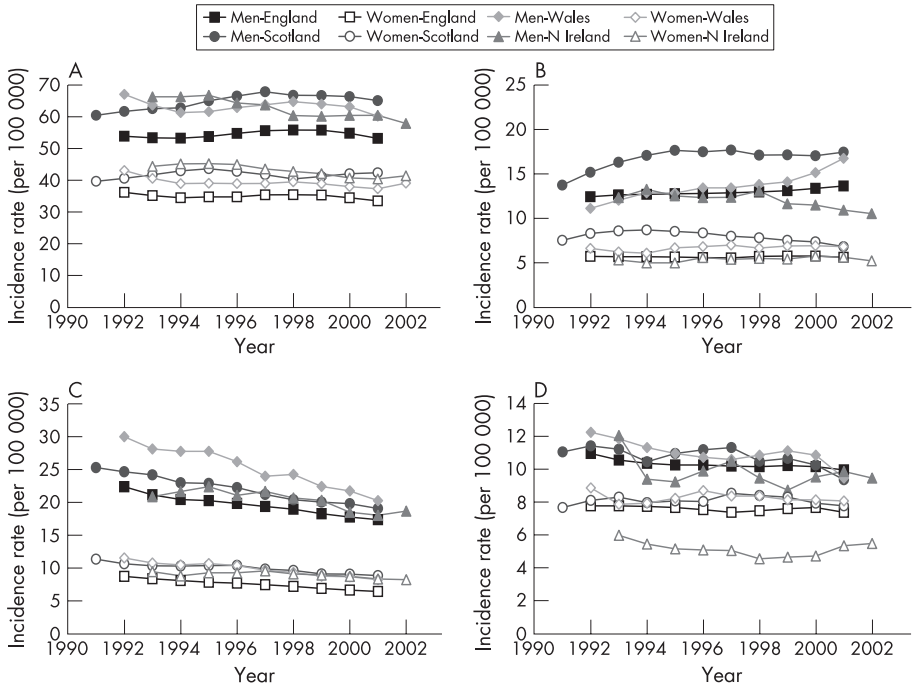


Figure 4.7.2 Trends in standardised incidence rates (per 100 000 population) for gastrointestinal cancers, among men and women in England, Wales, Scotland, and Northern Ireland, 1991–2002 for (A) colorectal cancer; (B) oesophageal cancer; (C) gastric cancer; (D) pancreatic cancer. Sources: England: National Cancer Intelligence Centre, Office for National Statistics; Scotland: Information and Statistics Division, NHS in Scotland. Wales: Welsh Cancer Surveillance and Intelligence Unit; Northern Ireland: Northern Ireland: Northern Ireland Cancer Registry.[215 454–456]

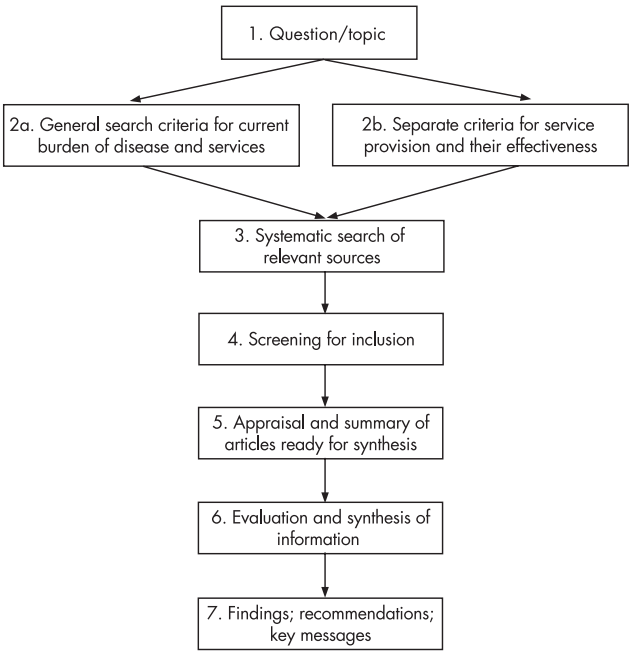


Figure 5.1.1 Conceptual map of the review protocol (adapted from Horvath and Pewsner[661] and Khan *et al*[662]).

by the JAG (Joint Advisory Committee on Gastrointestinal Endoscopy). Formal accreditation of units which began in 2006.

- *Development of quality and safety markers*

The BSG endoscopy committee is currently preparing quality and safety markers for endoscopy that will underpin the Global Rating Scale and the accreditation process.

5. MODELS OF SERVICE DELIVERY AND THEIR EFFECTIVENESS: OVERVIEW OF THE RESEARCH LITERATURE

5.0 Methods

5.0.1 Systematic review of evidence

To promote a reliable, consistent, and unbiased reflection of existing research is the principal idea behind the use of systematic reviews. The establishment of numerous organisations such as the Cochrane and Campbell Collaborations which provide up-to-date reviews in the area of health, educational, and social research, and of course, a proliferation of such reviews and associated methodology in the traditional academic arena, underlines the sort of attention directed towards them over the past decade or so. In comparison with conventional literature reviews, systematic reviews are designed to answer a specific question based on research evidence rather than to provide a general overview of a topic. Thus, the practical advantages of systematic reviews and the associated analyses are generally transparent—to deliver a holistic summary and synthesis of individual pieces of research evidence which together constitute a stronger body of evidence. However, the immense resources needed for the retrieval, appraisal, and synthesis of the relevant literature are a prominent drawback. Indeed, the inspection of literally thousands of publications is not uncommon in systematic reviews, all of which require careful screening for inclusion or exclusion, from which only a small percentage can be deemed appropriate for the research question.[655–657] Moreover, the processes undertaken during a review can be contentious, including claims that the review can be used as a means of exerting political control over new research; criticisms of the outcomes derived from it (with respect to relative importance and methods used); and the way in which users are to be involved throughout (see, for example, Davies[658] and Gough and Elbourne[659] for a more detailed discussion). Although these concerns are beyond the scope of this report, they represent real and substantial problems, which should be borne in mind throughout. What is clear, is that any critical evaluation of

Table 5.1.1 Keywords

A. Gastroenterology	B. Burden	C. Services	D. Evaluation/study type	E. Setting/population
1. Biliary	1. Burden	1. Colonoscopy	1. Appraisal	1. UK
2. Bowel	2. Delay	2. Community care	2. Assessment	2. UK
3. Digestive system	3. Epidemiology	3. Diagnostic	3. Audit	3. Britain
4. Dyspepsia	4. Load	4. Emergency	4. Benefit	4. England
5. Gastroenterology	5. Morbidity	5. Health maintenance organisation	5. Best practice	5. Ireland
6. Gastrointestinal	6. Mortality	6. Management	6. Cohort	6. Scotland
7. Hepatology	7. Need	7. Nurse practitioners	7. Cost	7. Wales
8. Intestine		8. Open access	8. Economic	
9. Liver		9. Organisation	9. Effectiveness	
10. Pancreatic		10. Pathway	10. Estimate	
11. Stomach		11. Planning	11. Evaluation	
		12. Postoperative	12. Evidence	
		13. Primary care	13. Experiment	
		14. Professional roles	14. Health promotion	
		15. Provision	15. Meta-analysis	
		16. Rapid access	16. Observation	
		17. Resources	17. Outcome	
		18. Role substitution	18. Qualitative	
		19. Secondary care	19. Review	
		20. Self care/management	20. Study	
		21. Self referral	21. Survey	
		22. Service(s)	22. Trial	
		23. Surgery	23. Volume	
		24. Tertiary care	24. Waiting (time, list)	
			25. Economic evaluation	
			26. Cost effectiveness analysis	
			27. Cost utility analysis	
			28. Cost benefit analysis	

literature should take into account the techniques used in systematic reviews so as to promote consistency and reliability and obtain an accurate reflection of the work that is already out there. For these reasons, particular attention was placed on the design and development of suitable review methods with which to conduct a literature review and synthesis for this report.

At the heart of any systematic review is its review protocol. This consists of explicit criteria for the retrieval of relevant literature, and includes factors such as keywords, sources of information (such as databases, periodicals, and reports), and systematic methods for conducting and managing the search to enable repeatability—that is, a search that can be performed as many times as necessary by any researcher using the same criteria. The final list of factors deemed appropriate for the task is often referred to as the inclusion and exclusion criteria, which clearly specify the types of study to be included in the final analysis, as well as how, where, and with what the search is to be carried out. These factors ultimately determine the shape of the literature search, and hence the final outcomes of the study. The protocol thus represents the methodology which underpins the research, and forms the basis for the evaluation of the data obtained. A crucial element in this report was therefore the design and implementation of a protocol which adheres closely to the established conventions of systematic reviews and one which could be applied with a high degree of repeatability and consistency using the available resources so as to enhance the quality of information for the final analysis.

Design aspects of review protocols[660] were taken into account to enable a reliable method of literature and data retrieval to be constructed, particularly for the central aspects of the investigation. It can also be seen later in this section that an extensive quality appraisal and grading of evidence was carried out to enhance the interpretation of the findings. The first subject to be examined was specification of the research question. This was deemed to be of two parts: (*a*) the current burden of GI disease and services (representing the general areas of the report), and (*b*) service provision and its effectiveness for GI disease in the UK (section 5). In order to tackle these areas, two sets of criteria for the protocol (such as those mentioned above) needed to be established. The first protocol would be used for sections dealing with general GI topics (the burden of GI disease), while the second would be developed to focus on service provision and its effectiveness for GI treatment. Figure 5.1.1 provides a map of the various stages of the protocol to be incorporated.

As can be seen in fig 5.1.1, the report follows the general structure of a systematic review, with the main difference being that a broad set search strategy is used for related topics of interest, while a separate criteria is used for the main area of study. This approach thus allows key points of interest to be reviewed systematically, and related areas to be incorporated into other sections of the review. The remainder of this chapter outlines the various components of the review protocol used in this study.

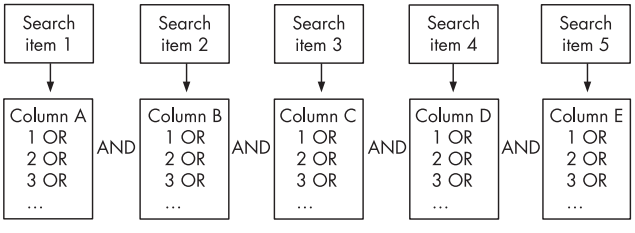


Figure 5.1.2 Search strategy.

General search strategy

The design of this search is to examine the current burden of GI disease and services in the UK. It was expected that a wide a variety of literature would be encountered during the study, which includes paper based and electronic articles, research articles, general reports, and systematic reviews. To determine the basis for inclusion and exclusion, a consideration was made of the following topics:

- *Relevance of content*

Searches in electronic databases were carried out using the keywords shown in table 5.1.1; only those which adhered to the aims of the report were included. Manifestly, it was not possible to incorporate every conceivable synonym under each subject heading as this would not only make the search process unmanageable but would probably also make the search too broad for the requirements of this report. Nevertheless, the words shown in table 5.1.1 were defined after thorough consultation with subject experts and librarians, and can be considered accurate for the purpose. Furthermore, terms used as part of medical subject headings (MeSH) produced by the National Library of Medicine were used where permissible (such as Cochrane) as a thesaurus to cover a broad range of keywords and synonyms. Although keywords, synonyms, and MeSH terms allow a considerable amount of literature to be retrieved, the specificity and appropriateness of content might require a more detailed examination because publications may or may not be relevant even with the presence of certain keywords. Consequently, an in-depth assessment of abstracts and, where required, the entire article or report, was carried out by researchers and subject experts where the appropriateness of content was uncertain. A more detailed description of this and actual search techniques can be found below.

- *Setting and population*

Although a comparison of results from other countries would have been useful, this was outside what could be realistically achieved in the given time frame. Publications were thus restricted primarily to those relevant to the UK, but no stipulations were made about the population studied (such as men and women).

- *Date of research*

Despite the emphasis on current issues pertaining to the burden of GI disease, older articles and reports are also of interest because they allow for interesting comparisons, particularly for the rate of development. As a consequence, no restrictions were placed on date (in the majority of databases used in this study, this would include studies published between 1966 to present), but primary focus was placed on more up-to-date literature.

- *Research methods*

No specific requirements were made of certain study types or experimental designs. The expectation was that a wide variety of publications would be obtained for general concerns of GI disease (owing to the breadth of the subject), including survey, evaluative, and experimental studies. All types of study design were thus included in the search criteria, and included those published in peer reviewed academic journals, relevant reports, and systematic reviews. Owing to the wide range of sources, an important concern was that of literature assessment with respect to the overall quality of the articles used (that is, the reliability of the results) and the grading of evidence (see below).

Table 5.1.2 Primary literature sources

Academic journals: hand searching; journal databases; reference lists; existing projects
Centre for Reviews and Dissemination (CRD—includes DARE database)
Cochrane Collaboration
Embase
Health management and policy database (HMIC)
Medline
National Institute for Health and Clinical Excellence (NICE)
NHS Service Delivery and Organisation (SDO); Department of Health
Other internet based sources—for example, Institute for Food Research; Gut Week
SIGLE (grey literature)

- *Language*

An inherent problem for any extensive literature review is that highly relevant articles and reports may be written in a language other than English. Given the report's primary focus on GI disease in the UK, this particular problem was not expected to be too important. Nevertheless, to guard against possible exceptions, and in particular, the obvious pitfall of excluding potentially relevant studies, the decision was made not to exclude on the basis of language. As far as resources permitted, the aim was to obtain and translate relevant foreign publications for the report where English titles and abstracts indicated potential relevance.

- *Inclusion and exclusion procedure*

After a systematic search of the relevant sources (a discussion of the criteria is given below), a detailed screening of the articles retrieved was required to determine final inclusion or exclusion. To maximise the consistency and accuracy of this process, a pilot test was undertaken in which two researchers (one of whom is a gastroenterologist) carried out inclusion and exclusion on the same set of articles. Although perfect agreement is difficult to achieve, discrepancies were examined, from which a standard protocol was developed. The final set of articles were then individually screened and categorised into one of two groups—include (including borderline cases with some degree of relevance) and exclude.

The next stage was thus the development of the actual search strategy to incorporate these various requirements. The crux of this process is defined by the terms set out in table 5.1.1. Although these help to increase the accuracy and specificity of the search, there are literally tens of thousands of combinations (that is, searches) possible by using a word from each of the five columns, making the workload virtually unmanageable. Despite this apparently colossal task, the use of Boolean operators (AND, OR, NOT) allowed the search to be conducted with greater efficiency. The fields in which individual terms were searched are article/report keywords, abstracts, title, and where possible, MeSH categories.

The configuration of Boolean operators and keywords is shown in fig 5.1.2. This procedure sets the specificity of the search, and can easily be broadened or narrowed, if necessary, depending on the quantity of articles retrieved. Should it be found, for instance, that a search combining all five columns in table 5.1.1 yields results which are too specific (exemplified by a low number of studies retrieved), the search can be broadened by combining terms from only four columns, and so on. Although great care must be exercised throughout (it might be the case that the paucity of studies is due to the fact that very little has been written about the subject in question, rather than an inherent problem with the search strategy), this iteration was employed during the search process until the team was satisfied that coverage and specificity were adequate.

The primary sources of literature are shown in table 5.1.2. Most of these are electronic databases available via the internet where the search strategy described above is implemented. Although these provide comprehensive coverage of relevant sources of information, further searches were carried out of other sources (such as general internet searching, citations from relevant articles, and articles identified by existing GI projects within the department) using the same stipulations on content as described above.

Search criteria for service provision

After the general search, a separate search strategy was developed for the key area of the report: the provision of services and their effectiveness for GI treatment. Among the criteria, attention was placed on specifying the literature with a more appropriate set of search terms. Inevitably, there would be a degree of overlap between this and the general search described in the previous section owing to certain similarities in the nature of content. But because search strategies are rarely foolproof and do not find all the desired material, this search helped to identify a greater number of relevant articles.

The definition of new keywords for the key area was established by using those shown in table 5.1.1 and after a further consultation with subject experts. The revised search terms shown in table 5.1.3 are similar to those for the general search, with the differences being four columns as opposed to five (the burden of disease is excluded, thus making this search broader than the previous one), and four additional keywords relating to the subject of effectiveness. This aside, all other stipulations are the same as those described in the previous section: characteristics of literature; use of keywords from each of the four columns with Boolean operators (as before, the number of columns can be reduced to allow coverage to be broadened as necessary); literature sources; and the process of inclusion and exclusion. The new search strategy was brought together using the technique shown in fig 5.1.2.

Quality assessment and grading of evidence

Techniques of quality assessment are commonly applied to gain insight into the credibility and reliability of studies being examined. Although the measurement of quality (in this case, the likelihood of the methods generating unbiased results) is inherently difficult,[657] numerous techniques have been developed to enable the quality of research methodology to be gauged with better clarity (see Verhagen *et al*[663] for discussion). Given the time frame and resources permitted for this study, it was decided that an extensive examination of quality would not be feasible. Nevertheless, it was deemed necessary that a tool be adopted to analyse and ensure that the literature used is of an acceptable level of quality during the synthesis of evidence. In addition to quality, there was also a need to establish a means of grading the evidence (for example, systematic reviews, cohort studies, and expert opinion) in order to measure the overall strength of recommendations. Used together, the two techniques allowed studies to be assessed independently irrespective of study design, and graded collectively for the purpose of formulating clear and evidence based recommendations for GI service delivery. The following two subsections outline the methods used in this study.

Quality assessment

The purpose of this exercise is to provide a quantitative assessment of the quality of studies irrespective of their study design. Given that some study types are generally considered to be more reliable than others (for instance, systematic reviews are generally regarded as more reliable evidence than, say,

Table 5.1.3 Keywords for key areas of report

A. Gastroenterology	B. Services	C. Effectiveness/study type	D. Setting/population
1. Biliary	1. Colonoscopy	1. Appraisal	1. UK
2. Bowel	2. Community care	2. Assessment	2. UK
3. Digestive system	3. Diagnostic	3. Audit	3. Britain
4. Dyspepsia	4. Emergency	4. Benefit	4. England
5. Gastroenterology	5. Health maintenance organisation	5. Best practice	5. Ireland
6. Gastrointestinal	6. Management	6. Cohort	6. Scotland
7. Hepatology	7. Nurse practitioners	7. Change	7. Wales
8. Intestine	8. Open access	8. Conventional	
9. Liver	9. Organisation	9. Cost	
10. Pancreatic	10. Pathway	10. Economic	
11. Stomach	11. Planning	11. Effectiveness	
	12. Postoperative	12. Estimate	
	13. Primary care	13. Evaluation	
	14. Professional roles	14. Evidence	
	15. Provision	15. Experiment	
	16. Rapid access	16. Future	
	17. Resources	17. Innovation	
	18. Role substitution	18. Health promotion	
	19. Secondary care	19. Meta analysis	
	20. Self care/management	20. Observation	
	21. Self referral	21. Outcome	
	22. Service(s)	22. Qualitative	
	23. Surgery	23. Review	
	24. Tertiary care	24. Study	
		25. Survey	
		26. Trial	
		27. Volume	
		28. Waiting (time, list)	
		29.Economic evaluation	
		30. Cost effectiveness analysis	
		31. Cost utility analysis	
		32. Cost benefit analysis	

consensus opinion—see next section), it was important that each study included in this report be assessed for its individual quality, rather than its design. The benefit of this approach is that extra weighting (if indeed justified) can be assigned to studies which are regarded as of a lower level of evidence, but which are nevertheless carried out with sufficient rigour to justify the findings carrying greater significance. The result is that the true quality of the evidence can be captured with greater clarity and the interpretation of recommendations can be enhanced.

Possible instruments available for this purpose include the Maastricht, Delphi, and Jadad lists (designed predominantly for randomised controlled trials (RCTs) and experiments), and the AGREE tool (for the assessment of clinical practice guidelines developed by the Appraisal of Guidelines Research and Evaluation Collaboration[664]). These are typically measurement/rating scales which share broad themes in an examination of the appropriateness, transparency, relevance, and hence quality, of the chosen methodology for the research question. Of those instruments suitable for this report, the AGREE tool seemed to be the most appropriate. Designed as a generic and relatively compact scale, it measures the quality of reporting and recommendations of clinical guidelines, and has been used by a wide range of medical institutions for evaluative purposes. Similar to tools such as the Delphi and Jadad lists, it covers various aspects of quality concerning clinical research. Some of the advantages of this tool include a concise 23 question/item scale as compared with the 40-plus items in the Delphi list[665] and the comparatively simplistic three item Jadad list[666], a wide range of general components (as opposed to strict requirements on specific study designs such as RCTs), and its easy modification to suit the requirements of this study. Statistical tests conducted by Cluzeau *et al*[667] also found a good level of reliability for individual sections and of the scale as a whole (Cronbach's α between 0.64 and 0.88, which exceeds or is close to the recommended value of 0.7[668]).

Table 5.1.4 Hierarchy of evidence

Level of evidence	Type of evidence
1	High quality or well conducted meta-analyses, systematic reviews of randomised control trials (RCTs), or RCTs with a low risk of bias and direct topic relevance
2+	High quality or well conducted case-control or cohort studies with a low risk of confounding, bias or chance and a good probability that the relationship is causal; RCTs without direct topic relevance
2−	RCTs, case-control, cohort studies, or surveys with a risk of confounding bias, or chance that the relationship is not causal
3	Non-analytic studies (for example, case reports, case series)
4	Expert opinion, formal consensus, and policy documents
Guidelines	Guidelines set by clinical groups (for example, NICE, BSG, AUGIS)—see quality assessment for an appraisal of these

Table 5.1.5 Classification of recommendations

Class	Evidence
A	• At least one meta-analysis, systematic review, or RCT rated as 1, and directly applicable to the target population, or • A systematic review of RCTs or a body of evidence consisting principally of studies rated as 1, directly applicable to the target population and demonstrating overall consistency of results • Evidence drawn from a NICE technology appraisal.
B	• A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results, or • Extrapolated evidence from studies rated as 1
C	• A body of evidence including studies rated as 2−, directly applicable to the target population and demonstrating overall consistency of results, or • Extrapolated evidence from studies rated as 2+
D	• Evidence level 3 or 4, or • Extrapolated evidence from studies rated as 2−, or • Formal consensus
D (G)	• A body of evidence from guidelines published by clinical groups (for example, NICE, BSG, AUGIS).

The AGREE tool evaluates quality via questions within each the following sections:

(a) Scope and purpose
(b) Stakeholder/participant involvement
(c) Rigour of methodological development
(d) Clarity and presentation
(e) Applicability and relevance
(f) Editorial independence.

As can be elicited from the above, all parts of the tool can be made directly applicable through minor adjustments of terminology for a quality appraisal of the literature used in this report. Through a consultation with subject experts and those with relevant expertise, such as statisticians and questionnaire designers involved with the project, appropriate modifications, mostly involving minor changes to words and phrases to make them relevant to literature, were made: the final instrument consists of 22 questions/items, and can be found in Appendix 2. The decision was made to use a three point Likert scale to measure the agreement, disagreement, or undisclosed information (such as methodology) for each item: 0 = not specified (little or no evidence); 1 = disagree (some evidence); 2 = agree (good or strong evidence). A total score for each article was then calculated to obtain an indication of overall quality.

As a means of piloting the tool for validity and consistency, 20 articles were chosen at random and appraised by two project researchers. Scores for each item were assigned after reading the articles in detail and further discussion, and then total scores were calculated for each article included in the report; this score was simply a percentage calculated as the sum of scores for each of the 22 items divided by the maximum possible score, 44—thus, a paper with a total score of 22 obtained 50%. The next step was to determine how these scores could be usefully interpreted as an indication of quality. Although there are no clear guidelines for this, the general observation was that the higher the score, the greater the rigour and quality of the article, and hence the following intervals were used as a general indicator of quality (S = score):

- $S \leqslant 45\%$—generally poor quality of evidence; falls short in a few key areas of quality (see (*a*) to (*f*) above)
- $45\% < S < 65\%$—generally reliable quality of evidence; falls short in one or more key areas of quality
- $S \geqslant 65\%$—good quality of evidence; falls short only in a few items of quality.

Next, Cohen's κ[669] was calculated in SPSS (Statistical Package for the Social Sciences) to determine the degree of agreement between the two assessors. Interrater reliability between two assessors was 0.894 for the 20 articles, indicating a strong degree of consistency. Because of resource limitations, the decision was then made for one assessor to appraise all the remaining articles in the study.

Grading of evidence

In addition to quality assessment, a means of classifying the evidence needed to be established in order to reflect the strength and type of evidence that has been used to formulate recommendations. The appropriateness of this approach, however, depends on the study question. Evidence hierarchies typically used for this purpose, being focused on effectiveness, may not fully acknowledge the validity of other studies which, despite taking into account a much wider range of issues, may be considered to be of a lower level.[670] As this study focuses on service delivery, which encompasses a broad range of subject matter, which cannot always be measured or assessed easily by intervention studies of effectiveness, it would not be a complete surprise to find that the evidence collected for it reflects those studies which are placed lower down in the hierarchy, hence reducing the overall grades of recommendation. Nevertheless, it was thought that used in conjunction with quality appraisal, the grading of evidence would help to provide a wholesome reflection of existing research, and would provide a conventional framework within which to proceed.

The hierarchy used in this study is based on that documented in the Centre for Reviews and Dissemination (CRD)[660] and NICE.[671] But in light of the issues raised above, some minor modification (mainly to reduce the number of groups in the hierarchy) was made to allow for a wider range of studies to be graded with greater ease (table 5.1.4).

Using this hierarchy, recommendations can be classified by the strength of evidence on which they were based (see table 5.1.5—adapted from CRD[660]; NICE[671]). However, in this document conclusions have been drawn, but recommendations have not specifically been made.

5.0.2 Focus group with patient and carer representatives

A discussion session with the Patient and Carer Network was held at the Royal College of Physicians, London, on 8 December 2004. Its aim was to highlight some of the key problems associated with the delivery of services in gastroenterology based on the review of evidence described above, and to get views on these from patients and carers which could be reflected in this report. Three researchers from the project team

attended and designed the objectives for the session—JGW (observer/GI expert), HS (facilitator), and BI (scriber). After the review of evidence described above, four main topics for discussion were identified and presented by the facilitator for discussion. These were:

1. Greater self management by patients
2. Endoscopy outside hospitals
3. Should endoscopy be carried out by nurses or doctors?
4. Where should services be located—for example, primary, secondary, tertiary, specialist care?

A total of 11 patient and carer representatives were present on the day, and gave permission for the discussion to be recorded electronically for transcription. Two independent observers were also present, but did not partake in the debate. Discussions on each topic lasted for around 20 minutes, and participants were encouraged to raise their views. It was felt by the research team that a number of important concerns were raised in this session, and these have been incorporated into the results sections of this report.

5.1 Results

5.1.1 Literature search and synthesis

Using the methods described in section 5.0.1, a total of 5039 articles (1830 for search 1 and 3209 for search 2) were identified by the literature search for potential inclusion in the report. Further screening by two project researchers for inclusion and exclusion (see section 5.0.1) reduced the final number of articles included to 394. A further 38 articles and reports were identified through hand searching of related sources (such as reports, the internet, and periodicals), which gave a final total of 432 for the main sections of the document. Articles obtained but not used are given in table A.14 in Appendix 4.

Given the broad nature of topics covered in the report, and that some articles cover many subjects, the next stage was to categorise each article into its main areas of relevance. This was performed by one researcher who, for each included article, skim-read and recorded the topics covered (for example, incidence, mortality, quality of life). From here, the recording of evidence was compiled by assigning each of the articles to an appropriate section of the report, and then into summary tables. Details of each article (such as topics covered, quality score, grade of evidence, and key findings) were recorded so that an overall synopsis (or where appropriate, a recommendation) of the main topics could be derived.

5.1.2 Economics of GI services

A total of 153 articles were identified which dealt with some aspect of the economics of GI disease. The review was limited to studies undertaken in the UK, partly to keep the number of studies manageable but also because of recognised problems in transferring cost and cost effectiveness results between countries.[672]

The main overall message from the review is that there is a paucity of high quality economic studies in this area. The evidence for the economic burden of gastrointestinal disorders, and the cost effectiveness of treatment is summarised in section 5.5. Articles obtained but not used are given in table A.15 in Appendix 4.

5.2 Developments in service delivery

Shared care

Both the Department of Health[673 674] and the British Society of Gastroenterology jointly with the Royal College of Physicians[489] recommend that high quality services should be delivered locally whenever possible, with blurring of the traditional primary/secondary care divide, and should aim at promoting independence and self management when appropriate. An analysis of routine data suggests that more efficient use of services would result from greater integration between primary and secondary care,[675 676] and this is recommended by the Royal College of Physicians of London, Royal College of General Practitioners, and the NHS Alliance for the improved management of chronic disease.[677] The evidence for this, however, is from a study which examined the 11 leading causes of bed use—that is, it did not focus on GI disease. Two studies included an economic component for palliative care schemes for patients with cancer. Neither showed a difference between control and intervention groups.[517 621]

A rapid review of strategies to facilitate transferring specialised care into the community found some evidence to support moving diagnostic testing and outpatient follow-up to primary care, but the studies did not deal with GI disorders.[678]

For inflammatory bowel disease, there is a strong evidence that patients benefit, and there is less demand on conventional services when comprehensive patient education is combined with easy and rapid access to specialist care when needed,[679–683] although overall costs are broadly unaffected.[679 682] Possibly, these findings could be extrapolated to other chronic gastrointestinal disorders, particularly irritable bowel syndrome.[684] The particular problems faced by adolescent people with inflammatory bowel disease and the need for support in the transition from paediatric to adult care has been emphasised by the National Association for Colitis and Crohn's Disease (NACC).[685]

Total parenteral nutrition can be delivered at home[686] and is a safe alternative to early surgery in complicated Crohn's disease. It can also be cheaper,[687] but increased resources will be needed if it is to be implemented for inoperable cancer.[688] There are no economic evaluations of home parenteral nutrition for malignant disease and AIDS.[687]

Treating patients at home is not a cheaper alternative to inpatient care. The evidence for this, however, is from studies that did not focus on GI disease. Further research is needed, and treatment at home as an alternative to inpatient care cannot, at the present time, be recommended.[689]

The Royal College of Pathologists set recommendations on specimens of limited or no clinical value, which might lead to a reduction of pathology workload,[603] but the cost effectiveness of this remains to be assessed.

Table A.1 summarises the articles examined for shared care.

Primary care

NHS policy supports the development of the concept of general practitioners with special interest,[690] though endoscopy is the only facet of gastroenterology that is covered in the recommendations.[691] However, although 16% of GPs were already providing specialist interest services in 1998,[692 693] there is currently no evidence to support the cost effectiveness of these changes.[693 694]

Few studies have examined the economic implications for primary care of *H pylori* testing and eradication.[695] It is unclear whether such a strategy would be cost effective as an initial management strategy in primary care.[696]

Outreach educational interventions have been shown to improve appropriateness of referral to secondary care of patients with dyspepsia.[580] However, before it is more widely used, further investigation is required to assess the overall cost effectiveness of this expensive intervention.[697] A self help guidebook has been shown to reduce the number of primary care consultations for IBS, with cost savings.[681]

There is a high level of patient satisfaction with those units that currently offer endoscopy in primary care.[698] Currently, no evidence exists to support the clinical and cost effectiveness of such roles,[693 699] and the professional view is that they should be additional to, rather than a substitute for, secondary care.[699]

More research is needed. The problem of training[136 700 701] and governance[702 703] will need to be examined carefully.

There is, as yet, no published evidence for the safety, clinical or cost effectiveness of undertaking endoscopy or minor gastrointestinal surgery in diagnosis and treatment centres. Research is needed.

Table A.2 summarises the articles examined for primary care.

Secondary services

A review of the literature published between 1980 and 1998 found a paucity of high quality studies that dealt with the effectiveness of specialised care in general hospitals.[704] However, there is some evidence that patients admitted with gastrointestinal bleeding, acute pancreatitis, and acute liver disorders fare better when looked after by appropriate specialists.[704–707]

article, do not drop –>

Six studies looked at access to specialist care; there is a serious underprovision of a colonoscopy service in most NHS hospitals. Training in colonoscopy is often inadequate and improved practice should result from better training. Unless there is a dramatic increase in manpower and resources available for lower GI investigations, the introduction of a national screening programme would rapidly overburden already inadequate facilities.[556] A shortage of resources for coloproctology also exists[708]; some assessments of resource needs have been performed in cancer services.[709] Although there is very little evidence on the cost effectiveness of CT colonography, this technique is widely available in the UK, although experience and throughput vary considerably. Limited CT scanner facility is the major barrier to further dissemination.[710] There is also some evidence that greater access to specialist paediatric gastroenterology services for children with a suspicion of IBD should be sought.[576] None of the above literature included proper economic evaluation, apart from the MINuET study of nurse endoscopy, which concluded that there would be no cost benefit, when compared with doctors.[491]

Notwithstanding the absence of cost benefit, there is now strong evidence that there should be a shift from doctors to nurses for diagnostic upper and lower GI endoscopy in hospitals.[491 560 711–715] Other studies with an economic component which have examined the role of the nurse in undertaking tasks traditionally performed by doctors include upper GI endoscopy,[174 529] managing children with GI disease,[103] screening for colorectal cancer,[716] running dyspepsia clinics,[542] and administering propofol during endoscopy.[717] Again, none included a proper economic evaluation. Research to evaluate the clinical effectiveness of other professionals in roles traditionally filled by doctors, such as dietician-led coeliac clinics, is needed. The need for governance and accountability issues to be examined as roles change has been emphasised by the BSG.[718]

Long term follow-up of patients with extensive ulcerative colitis, or patients receiving immunomodulators, or patients with Crohn's disease is appropriate.[584] Colorectal cancer complicating ulcerative colitis is most commonly identified in patients who have been lost to hospital follow-up.[719 720]

Table A.3 summarises articles examined for secondary services.

Tertiary services

The Senate of Surgery of Great Britain and Ireland recommends that surgical care should be provided locally, but that patients should be moved to a centre of excellence for further specialist care when appropriate.[721] It is the view of professional societies that complex hepatology, hepatobiliary surgery, and liver transplantation should also be delivered in specialist, tertiary centres.[214 722] For complex hepatology the expert opinion is that this should be supplemented by clinical networks of specialists in secondary care.[214]

Many individual studies suggest that complex surgery for cancer, including upper[723 724] and lower gastrointestinal,[559 560 725] hepatobiliary,[373 726–728] and pancreatic malignancy,[716 729–732] should be performed at specialist centres which look after larger numbers of patients with these diseases. A systematic review by the NHS Centre for Reviews and Dissemination confirms this view.[557] However, an analysis, also from the NHS Centre for Reviews and Dissemination, points out that the evidence comes from methodologically weak studies which do not sufficiently take account of differences in case mix, and thus probably overestimate the impact of volume of activity on the quality of care. It also highlights the fact that there is very little research (and none in the UK) that directly evaluates the effects of mergers on costs.[733] An international literature review suggests that it is not possible, on present evidence, to define the optimal configuration of services for oncology.[734] A retrospective analysis of routinely collected data by surgeons in a district general hospital concluded that pancreatic surgery could be performed safely in such locations with good short and long term outcomes.[735] Conversely, there is no clear evidence that distance from specialist services is associated with poorer outcomes.[733]

The implications for district hospitals of increasing concentration of specialist services in tertiary centres have not been formally modelled and a detailed review of concentration and choice warns of increasing costs without proven improvements in quality for all patients.[733] Other evidence shows that after adjusting for prognosis and treatments, cost-volume relationships become U-shaped, reflecting more active intervention by higher volume doctors along with little activity and long stays for low volume doctors. This non-linear relationship between cost and volume suggest that highly concentrated cancer care might lead to inefficient resource allocation.[716] Furthermore, it may denude secondary care of the expertise needed to manage less serious gastrointestinal and hepatic disorders.[733] A systematic review of more than 100 studies in the international literature found little evidence to suggest that merging hospitals will result in better patient outcomes.[736]

Thus the optimum configuration of secondary and tertiary services remains uncertain on present evidence, and it cannot be assumed that improvements in outcome or efficiency will be achieved by increasing the number of patients seen by a unit or individual practitioner through concentration of specialised skills on a single site. An equally valid conclusion is that improvements are derived from better training and experience of practitioners, with access to well trained colleagues in other disciplines, and supported by adequate facilities. An overwhelming conclusion is that high quality research is needed, and that either radical change should await the findings, or be rigorously evaluated as it is implemented.

Table A.4 summarises articles examined for tertiary services.

5.3 Patient perspectives on service delivery

Topics discussed at the patients' workshop centred on four subjects identified from the review of policy and research evidence as of current concern (the brief sent to the participants is attached in Appendix 3):

- Greater self management by patients
- Provision of endoscopy services outside hospitals
- Changing roles: should nurses or doctors carry out endoscopies and care of patients with chronic conditions?
- Location of services: specialisation versus local care.

Greater self management by patients

Workshop participants were generally positive about the idea of greater self management, which would bring the benefits of a greater sense of control, and reduce anxiety about wasting the time of health professionals. Information and access to services when needed were felt to be key.

> ''As long as people are informed…[they] are very happy to self manage their conditions; they don't want to keep going off to hospitals, GPs etc, which are all getting more difficult to see these days anyway (participant 14).
> For the access to services, it's all very well saying ''if you're unwell, give us a call and arrange an appointment'', but if you do that you may not be able to get in through the door.'' (participant 21)

Ability to self care was seen as more than simply being informed, however, and concern was expressed about those people who may agree to look after themselves but may not actually be able to achieve this without some support.

> ''The consultation is 10 or 20 minutes in hospital, how are you able to assess if the person is suitable for self management?'' (participant 21)

Flexibility and continuity of care were considered important, with different patients having varying levels of need for support, and a perception that in a self management model, patients may be more likely to be treated by new professionals when they seek care than in a traditional model.

> ''Continued care is totally lost and frustration comes in for the patient, especially endoscopies. You know, different people doing endoscopies at different visit and giving different information to the patients'' (participant 27)

Further to this, concern was expressed that GPs or others coming into contact with a patient attempting to achieve a greater level of self management may not understand the patient's level of control and may undermine the model.

> ''I find that difficult because when you go into the hospital you have your plan of treatment and what your input is, and you go to your GP and you don't get the same level of interaction.'' (participant 21)

Provision of endoscopy services outside hospitals

Primary concerns expressed by participants in the workshop centred around risk and safety.

> ''There's obviously a risk factor. The one concern is there's got to be the backup to deal with that and the safety issues that come with it.'' (participant 12)
> ''I have great concerns about this. There are GPs with special interests operating and carrying out endoscopy in smaller hospitals and patients are not offered sedation because, leaving out whether it is safe or not, they don't have resuscitation facilities.'' (participant 14)

Participants were quite cautious about this model, and questioned whether, again, continuity of care would be adversely affected. There was a feeling that it might take time for patients to develop confidence in a system outside hospital.

> ''just because when you go into an endoscopy unit… it gives you that little bit of reassurance. I suppose it's just that you're not used to going down to the GP to have that done, but maybe over time people will get more used to it. There's bound to be lots of hesitation.'' (participant 21)

Some benefits were mentioned, related to local access and quality of facilities:

> ''I think location has quite a bit to do with it because there are some parts of the country where hospitals are a long way away, whereas the local centre may be down the road. That would affect you and your ability to get to hospital when there's no public transport and you don't have a car.'' (participant 11)
> ''Most people that I talk to really accept the diagnostic centres and …think they are excellent because most people do not want to go into hospital and don't like the atmosphere of hospitals. They find the centres to be more accessible, attractive, comfortable to be in…'' (participant 23)

A distinction was made between minor, routine procedures that could be done locally and more complex investigations that needed to be carried out by specialist staff. There was concern that the most important thing was that the operator had the appropriate training and expertise.

> ''Is there not a difference between what are fairly minor things and very major things where I think most people will travel to a centre of excellence but for a slightly lower level of access? If I had cancer I would want to go to a centre of excellence.'' (participant 23)
> ''Things like screening could be done at GPs for convenience, but anything more than that… needs expertise…in an ideal situation, then yes, I would like the endoscopy done near my home…but under the prevailing conditions, I think it would be dangerous to have a blanket statement saying that it's safe to do endoscopies in GPs surgeries.'' (participant 27)

Changing roles: should nurses or doctors carry out endoscopies and care of patients with chronic conditions?

There was cautious support for changing roles in relation to endoscopies and aftercare, with an emphasis again on training, safety, and continuity of care. The importance of management of the ''whole'' patient was emphasised, whether this be done by a nurse or doctor.

Although some participants were positive:

> ''I want to support the role of nurses because they have a good track record in specialist roles in diabetes, cancer.'' (participant 25)

there was still some anxiety about the safety of care by nurses:

> ''Presumably the nurses would have a backup of a doctor within the vicinity while this was taking place should something go wrong? That would be my worry.'' (participant 19)

One participant seemed to sum up the feelings of the group:

> ''At the end of the day the label's pretty irrelevant in some ways. I could go to a doctor and get really good care and say doctors are brilliant, but you go to the doctor and not be happy. Or you could go to a nurse and it's brilliant. The label is irrelevant so long as the standard of training is equal to what they are doing.'' (participant 21)

Location of services: specialisation versus local care

Views on this topic were mixed, and participants referred to their own experiences of specialist or local care to illustrate associated problems. This was clearly a complex topic, with many considerations and varied personal preferences.

> ''I think local expertise is important to me… the family has to be involved, it should be easier for them to visit, and should be nearby. For those reasons I am prepared to put up with slightly less expertise, but adequate and safe enough.'' (participant 27)
> ''I've had a complicated gastric operation that had to be in [remote specialist centre]. That causes me a lot of problems because I'm isolated from my family and friends and that worries me.'' (participant 24)

On the other hand, specialist care was valued by others, even at a distance:

> ''On a personal level, I'd be happy to go to the specialist centre because I have a specialised condition and I have confidence in the unit that I go to. So I'm prepared to travel rather than go local.'' (participant 19)

It was seen as an important subject that may be eventually decided through local and national policy rather than on the basis of research evidence.

> ''It's such a major debate, not just for GI… on the whole because the people for local hospitals are so vocal in their campaign, that I think it is going to happen. And that may mean that there won't be those centres of excellence that there should be. It's a huge issue which, at the end of the day, will be decided politically.'' (participant 23)

Participants understood the complexity of the debate:

> ''I don't think taking expertise away from hospitals is a good thing because you are narrowing down the number of people who can get access. Locality is important.''
> ''I think I'd support that view in terms of access, because if you have to have emergency access and go by ambulance, you may not be able to go to the specialist centre… [but] to the [local] hospital. So if they didn't have that expertise, it would be a disadvantage, but I agree that complex surgery needs to be done at specialist centres.'' (participants 21, 25)

There was concern that some may benefit at the expense of others, with increased specialisation of services.

> ''I think it's got the potential of affecting people differently. You take somebody who's got a diagnosis of mental health, learning, old age, whatever—there's less likelihood of early diagnosis. The issue of having somebody to support them in hospital may be more of an issue. My concern is that …selection out of particular groups because you have a highly specialised service which doesn't actually want them…is a price paid by the minority of the population for having a better service for other people.''

Summary of key findings from the patient workshop

Greater self management by patients

- Cautious support was expressed for greater self management—as long as care was taken to assess the ability of patients to self manage, continuity of care could be maintained, and services could be accessed when required.

Provision of endoscopy services outside hospitals

- Views were mixed, with benefits of local access being recognised but concerns expressed about safety and continuity of care.

Changing roles: should nurses or doctors carry out endoscopies and care of patients with chronic conditions?

- Participants agreed that appropriate training and skill level were more important than who delivers care, and the policy was supported if nurses were able to manage the ''whole'' patient safely.

Location of services: specialisation versus local care

- Little consensus was reached across the group, with some participants expressing a preference for local care and others valuing specialist care, even at a distance. The needs of minority groups were emphasised.

5.4 Economic burden of GI disease

Studies which attempted to estimate the burden of GI disease tended to focus on individual conditions or on specific elements of the total burden. Only one study[483] attempted a comprehensive costing of GI disease. It estimated the total burden in 1997 to be roughly £8000m, which included £3000m to the NHS and personal social services.

A further 20 studies attempted specifically to cost GI conditions: IBD,[737 738] IBS,[739–741] GI cancer,[324] upper gastrointestinal disease (UGI),[697 742–744] traveller's diarrhoea,[653] non-specific abdominal pain,[745] colic,[746] GERD,[16] and dyspepsia.[747 748] A further paper examined the economic consequences of waiting time for gallbladder surgery.[749] Estimated costs are not presented here because of wide variations in the methods used and in the quality of the studies. Even the better studies, such as that on dyspepsia,[747] pointed out the limitations of the study's external validity.

Modelling exercises dominated. Studies which extrapolated local results to the UK as a whole failed to deal with the geographical differentiation across the country. Most used a prevalence based approach, whereas an incidence based approach would have sought to estimate the lifetime costs of managing a cohort of patients first diagnosed in a given year. Most studies were merely ''snapshots'' based on national statistics and aimed only at indicating the possible scale of the problem without claiming precision. Suggestions for future research focused on ways to improve the quality/accuracy of routinely collected data, and on the need for prospective cohort multicentre studies to confirm results from modelling exercises.

Table A.5 summarises the articles examined for economic burden of GI disease.

5.5 Cost effectiveness of GI services

One hundred and twenty seven articles examined the cost effectiveness of alternative forms of service delivery. As with the burden of illness studies, these were also of varying quality.

Primary care

Fifteen studies looked at management of GI disease in primary care.

Few studies have examined cost effectiveness and no studies of sufficient power have yet been performed in general practice populations to investigate the role of *H pylori* and the implication for primary care.[582] No attempt has been made to measure quality of life after eradication therapy in patients with peptic ulceration. Further research is needed to quantify the risks and to test the value of screening elderly patients for *H pylori* before using NSAIDs. To determine whether or not a subgroup of patients with *H pylori* related chronic gastritis and non-ulcer dyspepsia would benefit from eradication therapy a longer follow-up period is needed. Until this is determined, the treatment of non-ulcer dyspepsia with eradication therapy should remain a research activity.[582]

The available clinical and economic information about NSAIDs is limited, and the publication of numerous poor quality studies has corrupted the knowledge base. However, there does seem to be enough evidence to indicate that expenditure on NSAIDs could be considerably reduced and adverse effects avoided if practitioners were persuaded to change their behaviour.[514] A growing body of evidence suggests that information provision on its own does not lead to substantial changes in practice. More active strategies, such as ''academic detailing'' using evidence based educational outreach, show promise, but their cost effectiveness has not yet been evaluated rigorously.[514]

Educational intervention concerning GPs' management of patients with dyspepsia, to control dyspepsia costs without increasing demand for endoscopy, could lead to a £25m saving each year.[750] However, proper multicentre RCTs are needed to support the cost effectiveness of this approach.

It is unclear whether a strategy to test for *H pylori* and then eradicate it is as cost effective as initial management strategy in primary care. Future trials should evaluate the cost effectiveness of this strategy compared with empirical prescribing.[751]

The remainder of the studies, although they investigated the management of GI patients in primary care, were mainly based on either qualitative or review work exploring the safety of endoscopy performed in primary care, the effect of guidelines for the management of IBD, the development of GPwSI (GPs with special interests in gastroenterology); a survey of GPs requirements for support from secondary care; the effect of bulletin findings on patient's management; and the effect of *H pylori* testing results on referral rate. None of the studies included an economic measurement.

Table A.6 summarises the articles examined for primary care.

Specialist care

Nine studies looked at access to specialist care; there is a serious underprovision of colonoscopy service in most NHS hospitals. Training in colonoscopy is often inadequate and improved practice should result from better training. Unless there is a dramatic increase in manpower and resources available for lower GI investigations, the introduction of a national screening programme will rapidly overburden already inadequate facilities.[752] There is a shortage of resources for coloproctology[753]; some assessment of resource needs has been performed in cancer services.[754] Although there is very little evidence on the cost effectiveness CT colonography, this techniques is widely available in the UK; however, experience and throughput varies considerably. Limited CT scanner facility is the major barrier to further dissemination.[755] There is also some evidence that greater access to specialist paediatric gastroenterology services for children with suspected IBD should be sought.[756]

None of the above publications included a proper economic evaluation.

Table A.7 summarises the articles examined for access to specialist care.

Role of nurses

Four studies with an economic component examined the role of nurses in performing a variety of GI services, including upper GI endoscopy,[712] managing children with GI disease,[757] screening for colorectal cancer,[758] running dyspepsia clinics,[759] administering propofol during endoscopy.[717] Again, none included a proper economic evaluation. A multicentre RCT comparing nurses and doctors undertaking diagnostic upper and lower GI endoscopy has shown that doctors are more cost effective than nurses in carrying out these procedures.[491]

Table A.8 summarises the articles examined for the role of nurses in GI services.

Home parenteral nutrition

Two studies[760 761] looked at the cost effectiveness of home parenteral nutrition (HPN). There is some evidence that home parenteral nutrition (HPN) is a cheaper alternative than hospital care. No economic evaluations of HPN for malignant disease and AIDS have been made.[760]

Table A.9 summarises the articles examined for HPN.

Surveillance programmes

Nine articles with an economic component were identified. Intensive follow-up after resection for colorectal cancer was shown to be more effective and more cost effective than conventional follow-up,[601] producing an incremental cost for each life year saved of £3402 over conventional follow-up. This is very low compared with other life extending interventions, indicating that on economic grounds, intensive follow-up after curative resection for colorectal cancer should become normal practice. Large RCTs are needed to evaluate the cost effectiveness of specific surveillance tools.

A number of economic modelling exercises have examined population screening/eradication programmes for *H pylori*. One modelling exercise estimated that a programme to screen for and eradicate *H pylori* in a population of one million 45 year olds would produce an incremental cost for each life year saved of £14 200,[614] which again is low compared with other life extending programmes. Another[619] showed that population screening for *H pylori* was a cost effective way of preventing gastric cancer and peptic ulcer disease, producing an incremental cost for each life year saved at age of 40 of £5860, but this result was sensitive to *H pylori* prevalence, the degree of opportunistic eradication, the discount rate, the efficacy of eradication on gastric cancer risk, the risk of complicated peptic ulcer disease and gastric cancer associated with *H pylori* infection, and the duration of follow-up. Many assumptions are required in modelling exercises of this type. However, when these assumptions were varied in sensitivity analyses, the incremental cost for each life year saved rarely exceeded £20 000 over an 80 year follow-up, although it did for shorter periods. Population *H pylori* screening may be cost effective in the long term (over 25 years). However, before it can be recommended further evidence is needed to resolve some of the uncertainties, particularly about the efficacy of eradication on risk of gastric cancer, the risk associated with complicated peptic ulcers, and the effect of more widespread opportunistic testing of patients with dyspepsia. The long duration between the age of screening and the incidence of gastric cancer means that screening does not become cost effective for several

decades. Before screening can be recommended on economic grounds further evidence is needed to resolve some of the uncertainties, particularly with regard to the time horizon and the discount rate.

Table A.10 summarises the articles examined for surveillance programmes.

Dyspepsia and endoscopy

Quite a few studies examined endoscopy. One used modelling to examine a wide range of different situations in which endoscopy is given for patients with dyspepsia.[34] Results showed that endoscopy is not cost effective in patients with low risk of malignancy, but targeting had major impacts on cost effectiveness ratios. Restricting endoscopy to those with continuous epigastric pain or symptoms of less than one year's duration, or both, improved the incremental cost for each life year saved from £50 000 to £8400. Estimates of incremental cost per life year saved for men of various ages ranged from £454 000 at age 40 to £15 779 at age 70. Results for women showed similar reductions at older ages, which provides good evidence of the need to restrict endoscopy in younger age groups.[34] When the initial strategies for managing dyspepsia were examined, a comparison of early endoscopic investigation with acid suppression showed that the cost of additional endoscopies was offset by a significant reduction in the number of PPIs prescribed and outpatient attendance. The overall management cost of prompt endoscopy was £420 compared with £340 for empirical management.[697]

Table A.11 summarises the articles examined for dyspepsia and endoscopy.

This review shows that economic evidence on the delivery of GI services is patchy and of variable quality. Very few studies were full economic evaluations and the limited economic evidence they produced—for example, of potentially large cost savings to be gained by changing from one model of service delivery to another—emphasises the need for comprehensive economic evaluations in this area.

Summary points

- Multicentre studies are needed
- Studies should take the societal perspective
- Methodological problems/challenges of economic evaluations of primary/secondary care interphases have been highlighted
- Insufficient evidence is available to support a positive correlation between volume and patients outcomes. This relationship needs further assessment.

Table A.15, Appendix 4, lists the references not used for the economic review and the reason why.

5.6 Information infrastructure

The requirements for information and IT support for gastroenterology have been published by the British Society of Gastroenterology.[762] This describes the need for patient focused records that will provide access to appropriate information in the increasingly wide variety of contexts in which patients will receive health care, including self management. The most pressing immediate need is for universal support for the widespread introduction of systems to support gastrointestinal endoscopy. The requirements include booking, patient information, consent, results, reporting, and quality assurance. A survey of gastrointestinal units in 2001 found that one third of respondents from the UK were still using paper reporting systems.[763] Many other aspects of gastroenterology need better information support, including all contacts with professionals and specific clinics, where acquisition of data should be used to monitor quality of care. It is hoped that patient focused systems will be developed in the future, which will enable support for patient care through a wide variety of situations in which the patient receives care.

There is presently no national dataset to enable comparative monitoring of activity and performance in gastroenterology. There are concerns about the quality of routinely captured data.[11] Common standards for records and for data collection are needed to improve this,[764] and to enable performance monitoring, monitor quality and training, inform service developments, and enable high quality clinical and health services research.[765] There is evidence that routinely captured clinical data would enable health technology assessment by RCT if the data were more widely available and of improved validity.[766 767] The data required to support gastrointestinal endoscopy are available on the British Society of Gastroenterology website (http://www.bsg.org.uk, accessed 26 December 2006), and requirements are being developed for other areas of the specialty.

6. DISCUSSION

6.1 Strengths and weakness of methods used

As detailed in the methods chapter and at the start of each chapter, four main methods of data collection were used to gather evidence for this review: review of published evidence; use of routinely available data; patient workshop; and consultation with professionals in gastroenterology. The strengths and weaknesses of each of these methods are considered below, with implications for strength of recommendations made in this report assessed in section 6.2.

Review of published evidence

As we applied currently defined and accepted standards to the review of effectiveness of service delivery, this section of the report is comprehensive and systematic. Validated tools were used to assess the quality of papers and level of evidence provided, with more than one reviewer independently grading papers. Full details of the search and of papers retrieved are presented through search results and tables. Other sections of the report are comprehensive and have retrieved key data and publications, although the methods used to identify sources have relied to some extent on existing knowledge and collections of materials. With extensive feedback sought from a variety of specialist professional and patient groups it is unlikely that key sources have been either overemphasised or overlooked.

Routine data

Several main sources of routine data were used in compiling this report: cancer surveillance and registry units across the UK; the Office of National Statistics (ONS) and its predecessor, the Office of Population Censuses and Surveys (OPCS); the Department of Health; and communicable disease surveillance units across the UK. In addition to well described generic limitations of routine data, the different data sources have their own particular strengths and weaknesses.

Limitations of cancer surveillance and registry data include concerns about variability in case ascertainment and completeness of registrations over time and between different registry regions. The major limitation of mortality data from the ONS and the OPCS is that it is based on underlying cause of death alone, and therefore underreports true mortality for many gastrointestinal diseases; major concerns have also been raised about the accuracy and completeness of hospital episode statistics from the Department of Health. The main limitation of data on hepatitis B and C infections from communicable disease surveillance units is that they are based on reported laboratory diagnoses only. As most people who are infected

with these viruses are undiagnosed, the reported laboratory data are thought to account for only about one quarter of all cases.

Despite these limitations, these are the best data that are available for portraying the burden of gastrointestinal disease in the UK. Coverage is national, with standardised definitions and inclusion criteria agreed. They have provided the empirical basis for many publications in scientifically acclaimed international clinical journals, as well as National Service Frameworks and other policy documents.

Patient workshop

The limitations of the focus group carried out with patient representatives recruited from the RCP volunteers are acknowledged. The views reported in this document can only be taken to represent a flavour of the views of patients. Participants included patients and patient representatives, who were perhaps unusually articulate and able to interact as members of a group. Nevertheless, the findings complement the review findings, presenting a different side of the picture on the problems of service delivery arrangements that are currently undergoing change, which were discussed at the workshop.

Consultation with professionals from within the specialism of gastroenterology

Feedback has been sought through the BSG membership, and other societies, and has been collated from individual responses as well as from a wide range of specialty and patient groups that support the care of patients with GI disorders. Only that feedback which was supported by further evidence has been incorporated.

6.2 Strengths and weaknesses of evidence presented in report

Using a mixed methods approach in this review has allowed any weaknesses inherent in one method to be complemented by the strengths of another approach.

The systematic review of effectiveness of models of service delivery has been enriched through contextualisation, with the national policy agenda described; presentation of data describing burden of disease, current activity, economic costs, and workforce implications; and the views of patients and professionals represented. This has allowed a comprehensive document to be developed. Some aspects of the review—such as the perspective of patients to current developments in service delivery—would be more comprehensively and rigorously pursued through primary research, and the data presented in this report can only be taken as a taster of views. This has resulted in recommendations for further research, as existing evidence is thin. Indeed, an overwhelming conclusion of the report is that the evidence base for the development of services needs to be strengthened before further investments are made in shaping the delivery of services.

6.3 Research in gastroenterology

Although over 900 references have been used to inform this review, the evidence identified has often been weak and there are many gaps in areas where evidence is needed. The annual reports of the Health Technology Assessment and NHS Service Delivery and Organisation Research Programmes document relatively few studies in gastroenterology.

A coordinated approach to clinical and health services research in gastroenterology, such as the one being introduced for cancer, in gastroenterology would improve the identification of research questions and priorities, funding strategies, patient and carer involvement, and the research infrastructure. It is hoped that the UK Clinical Research Collaboration will promote and enable more research into the diagnosis, treatment, and care of patients with GI and hepatic disorders.

7. CONCLUSIONS

7.1 Burden of disease

- The burden of gastrointestinal and liver disease is heavy for patients, the NHS, and the economy (sections 3.2–3.4, 3.7, 4.3–4.5, 4.7.2, 4.7.3, 5.5).
- Gastrointestinal disease is the third most common cause of death, after circulatory and respiratory disease (section 3.3).
- Gastrointestinal cancer is the leading cause of death from cancer (section 3.3).
- Gastrointestinal disease is the most common cause of admission to hospital for both the total number of people admitted and the total number of episodes of care (section 4.3).
- There have been large increases in the incidence of liver diseases, such as alcoholic liver disease, non-alcoholic fatty liver disease, biliary cirrhosis, and hepatitis C infection, which have major implications for future healthcare needs (section 3.2).
- There have also been increases for most other gastrointestinal diseases—in particular, for oesophageal and colorectal cancers, acute and chronic pancreatitis, gallstone disease, upper gastrointestinal haemorrhage, diverticular disease, and Barrett's oesophagus (section 3.2).
- Chronic gastrointestinal disorders such as dyspepsia, gastro-oesophageal reflux disease, and irritable bowel syndrome are highly prevalent; and coeliac disease is far more common than previously considered (section 3.2).
- Socioeconomic deprivation is linked to a number of gastrointestinal diseases, including increased risks of gastric and oesophageal cancers, hepatitis B and C infections, liver cirrhosis, peptic ulcer, upper gastrointestinal haemorrhage, and poorer prognosis for colorectal, gastric, and oesophageal cancers (section 3.6).
- There is substantial variation in the incidence and prevalence of many gastrointestinal disorders in the UK. For example, peptic ulcer, *Helicobacter pylori* infection, upper gastrointestinal haemorrhage, alcoholic liver disease, acute pancreatitis, and oesophageal cancers are all more common in Scotland and northern England than in southern regions (section 3.5).
- Impact on patients is neither fully nor accurately reflected in statistics describing mortality and activity (sections 3.3, 4.3).
- The burden on patients health related quality of life has been found to be substantial for their symptoms, activities of daily living, and employment (section 3.4).
- Conditions with a high level of disruption to patients' lives include: gastro-oesophageal reflux disease (GORD), dyspepsia, irritable bowel syndrome, anorectal disorders, GI cancers, and chronic liver disease (section 3.4).
- Overall, the burden of GI disease on health related quality of life (HRQoL) in the general population seems to be high, although the burden is not systematically nor comprehensively described (section 3.4).

7.2 Service delivery

- An extensive and systematic study of the problem of access for the delivery of GI services has yet to be carried out (section 4.6.1; level of evidence: 2− at best).

- There is a lack of significant literature relating to inequalities in the delivery of GI services (section 4.6.2; level of evidence: 4).
- Waiting times form the bulk of patients' concerns. There seems to be great difficulty in meeting government standards for referral and treatment (section 4.6.3; level of evidence: 2− at best, and guidelines by the Association of Coloproctology of GB and Ireland).
- Most studies show that GI related drugs and procedures are safe. There is a need for more research on the safety of patient initiated drugs and procedures for the treatment of GI disease (section 4.6.4; level of evidence: 1).
- There is a need to increase awareness and the implementation of initiatives aimed at improving the information flow between patients and practitioners (section 4.6.5; level of evidence: 2− at best).
- There is a strong body of evidence on diagnostic services, and the need to develop and implement appropriate training and stringent assessment to ensure patient safety (section 4.6.6; level of evidence: 2+).
- There is a substantial amount of work detailing guidelines for care, but there is a distinct paucity of rigorous, evidence based studies dealing with service provision (section 4.7.1; level of evidence: 1).
- There is strong support for the development and use of widespread screening programmes for a wide variety of GI diseases. These need to be properly researched to determine how they are managed, their effectiveness, and their cost effectiveness (section 4.7.4; level of evidence: 1, section 5.5).
- Emphasis should be given to developing interventions to increase preventative activities in primary care, and more research to determine their effectiveness and cost effectiveness (section 4.7.6; level of evidence: 1).
- More research is needed to establish a robust evidence base for models of service delivery (section 5.2).
- Overall there remains a paucity of cost effectiveness evidence particularly from multicentre studies in GI service delivery (section 5.5).
- There is strong evidence for a shift in care towards greater patient self management for chronic disease in appropriate circumstances, and supported by adequate circumstances and access to services (section 5.2; level of evidence: 1).
- The development of GPs with a special interest in gastroenterology is supported in primary care but the clinical and cost effectiveness needs to be researched (section 5.2).
- In hospital, patients with gastrointestinal disorders should be looked after by specialists (section 5.2; level of evidence: 2+).
- More diagnostic endoscopy should be undertaken by trained nurses, although such procedures are not more cost effective than when carried out by doctors (section 5.2; level of evidence: 1).
- Complex surgery for gastrointestinal and hepatobiliary cancer should be performed by specialists who operate on large numbers of patients (section 5.2; level of evidence: 2+).
- There is insufficient evidence to support a greater concentration of specialists in tertiary centres. More research is needed, especially on the impact on secondary services, before further changes are implemented (section 5.2; level of evidence: 2+).
- The solution proposed for hepatology is to combine tertiary specialist centres for complex liver disease and transplantation with a network of specialists in secondary care, but we found no evidence for the clinical or cost effectiveness of this approach (section 5.2; level of evidence: 4).
- There is an urgent need for better IT and information support for clinical care in gastroenterology (section 5.6; level of evidence: 2−).

7.3 Workforce

- Consultant gastroenterologist numbers need to increase to about 1900 posts (1625 WTE). Six consultants are required to provide full services and emergency cover for a typical district general hospital population of 250 000 (section 4.2; level of evidence: 2−).
- Gastroenterology teams led by consultants, but including appropriate non-consultant career grade staff, dieticians, and specialist nurses, need to be developed in all hospitals, with integrated specialist training where appropriate (section 4.2; level of evidence: 4).
- More nurses should be trained to undertake upper and lower diagnostic endoscopy (section 5.2; level of evidence: 1).

7.4 Future research

More research is needed into delivery and organisation of services for patients with gastrointestinal and liver disorders, in particular:

- The clinical and cost effectiveness of GPs with a special interest in gastroenterology and endoscopy (section 5.2).
- The clinical and cost effectiveness of undertaking endoscopy or minor gastrointestinal surgery in diagnostic and treatment centres (section 5.2)
- The reconfiguration of specialist services and the potential impact on secondary and primary care and on patients (section 5.2)
- The clinical and cost effectiveness of clinical networks (section 5.2).
- The relationship between volume and patient outcome needs further assessment (section 5.2).
- To account for geographical differences, future research should be based mainly on multicentre studies.

The establishment of the UK Clinical Research Collaboration will provide an opportunity to increase clinical and health services research in gastroenterology. It is important that the investment that is being made supports the growth of research into the care of diseases which are responsible for high morbidity and mortality, and are a significant burden on the patient, the NHS, and the economy (section 6.3).

8. ANNEX: SUMMARY OF ARTICLES USED

Note on methodology – rationale for presentation of results in tables

The review of evidence of effectiveness of service delivery arrangements followed the CRD methods for systematic reviewing, with the primary literature search designed to identify papers concerned with service delivery. Results of the search are presented in section 5.2. All papers identified through this search were screened, and those that were relevant to any section of the report were summarised and graded. Papers cited in section 5.3, concerned with effectiveness of models of service delivery, are matched with tables (A.1–A.11) which provide further details of the research setting, study design, and key results, as well as their AGREE score and grading for level of evidence where relevant.

Additional papers for other sections of the report were identified through topic-specific searches (burden of disease; quality of life; health economics of GI) and through existing

Table A.1 Developments in service delivery: summary of articles examined for shared care

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Key results and conclusions	Level of evidence	Quality score (AGREE) (%)
Kennedy *et al*[683]	UK (1999–2000)	RCT	700 Patients	Impact of a guidebook for self care	A whole systems approach to self management using a guidebook developed with patients and with physicians trained in patient centred care improves clinical outcomes and leads to cost effective use of NHS services. This method should receive more widespread use in chronic disease management, and seems likely to improve patient satisfaction and reduce health expenditure without evidence of adverse effect on disease control. Evidence suggests that further attention needs to be placed on self referral and access arrangements and a redistribution of control to patients through increased adherence to patient centred norms on the part of consultants	1	93
Williams *et al*[679]	UK (1995–96)	RCT	180 Patients	Open access follow-up for IBD	Open access follow-up delivers the same quality of care as routine outpatient care and is preferred by patients and GPs. It uses fewer resources in secondary care, but total resource use is similar. Better methods of ensuring urgent access to outpatient clinics are needed	1	73
Robinson *et al*[681]	UK (2001)	RCT	203 Patients	Guided self management and patient directed follow-up	Self management of ulcerative colitis accelerates treatment provision and reduces doctor visits, and does not increase morbidity. This approach could be used in long term management of many other chronic diseases to improve health service provision and use, and to reduce costs. Nursing staff, appointment clerks, and secretarial teams need to be willing to assist with implementation of changes, and one person from the medical team needs to be available for patients to contact for advice	1	66
Shepperd and Iliffe[689]	International (1996–2001)	Systematic review	16 Trials	Hospital versus home care	This review does not support the development of hospital at home (active treatment by healthcare professionals in the patient's home) as a cheaper alternative to inpatient care. Providing that the views of carers are taken into account, early discharge schemes for patients recovering from elective surgery and elderly patients with a medical condition may have a place in reducing the pressure on acute hospital beds	1	66
Kennedy *et al*[682]	UK (1999–2000)	RCT	700 Patients	Self management in IBD	Adoption of guided self management was generally popular with both patients and clinicians, reduced use of hospital services without burden to primary care, and increased quality of care without an adverse effect on disease control at the same time as reducing cost. More widespread adoption of this programme for patients with IBD and other chronic medical disorders, particularly those with relapsing remitting patterns, now seems indicated	1	75
Ham *et al*[675]	Comparison between UK and USA practice (2000–01)	Analysis of routine data	Hospital episode data for 2000 and 2001; data from Kaiser and Medicare systems	Comparison of hospital bed use	There is scope for hospital beds to be used in a different way in the NHS; primary and secondary care should be integrated to give priority towards self care; the NHS can learn from the Kaiser approach	2−	66
O'Hanrahan and Irving[688]	UK (1992; data taken between 1977 and 1991)	Analysis of routine data	400 Records	Role of HPN	Recent reports have highlighted the palliative benefits of HPN, and the way in which it facilitates compassionate home care for carefully selected patients with inoperable malignant bowel obstruction. However, it is unlikely that the current financial constraints within which the NHS operates could cope with the demand associated with HPN	2−	66
Evans *et al*[686]	Canada (1996–2000)	Analysis of routine data	15 Patients	Home total parenteral nutrition (HPN)	Patients receiving HPN benefit from reduced stress on the family, increased independence, and ability to perform normal work and study activities. All patients preferred HPN to hospitalisation and reported good or excellent quality of life. HPN is a safe alternative to hospitalisation or early surgery of patients with the complication IBD	2−	61
Kennedy *et al*[684]	UK (2003)	Survey of patients	147 Responses	Development of self help book for patients with IBS	Guided and practical ways of support are required for people with IBS who want to self manage their condition. Patient information is essential for shared decision-making, but most information is not patient centred and often does not involve the patient at all. All information should include patients at each development stage	2−	57
Robinson[680]	UK (2004)	Expert commentary	NA	IBD and patient empowerment	Self care is a normal human function and accounts for the management of three quarters of all episodes of ill health. More formalised applications include patients and doctors working collaboratively to develop a set of guidelines which patients use to manage their chronic disease themselves. Clinicians may be reluctant to pass control of treatment changes to patients, particularly the use of steroids. There are indications that passing ownership of management back to patients may improve compliance as patients realise their own responsibilities for remaining well	3	59

Table A.1 Continued

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Key results and conclusions	Level of evidence	Quality score (AGREE) (%)
DoH[674]	UK, NHS (2004)	Strategy and commentary	NA	Improving chronic disease management	A key approach to managing chronic disease is to support people to take an active role in managing their own care, specific conditions, and approaches that prevent these conditions from getting worse. This is linked with the development of GPwSI to provide patient centred care	3	39
RCP and RCGP[677]	UK, NHS (2004)	Report/commentary	NA	Service provision	There should be active support for the development of GPs with special interests	4	67
BSG and RCP[489]	UK (2003)	Expert commentary and recommendations	NA	GI service provision	Services and high quality care for patients and their families should be delivered locally whenever possible. Emphasis should be placed on integrating primary and secondary care, and moving hospital services closer to the patient	4	43
DoH[673]	UK, NHS (2004)	National framework and commentary	NA	Outline of plans for national standards	Emphasis on the importance of improving the whole experience of patients, with particular attention to tailoring services to patients with long term conditions, promoting independence for older people, and supporting self care and the expert patient	4	36

collections of publications. These papers are included, where relevant, in various sections of the report, and where identified through the primary literature search are matched in summary table A.12. Table A.13 summarises the articles examined after consultant feedback.

Table A.2 Developments in service delivery: summary of articles examined for primary care

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Key results and conclusions	Level of evidence	Quality score (AGREE) (%)
Rubin *et al*[136]	Northern England; UK (2000)	Survey of clinical records	135 723 Patients	Epidemiology of IBD	GPs have expressed interest in shared care with gastroenterologists; need for GP training in the management of IBD in primary care	2−	73
Jones and Bartholomew[701]	UK (2002)	Survey of clinicians	398 Responses	Survey to elicit views on GPwSI	This survey indicates that substantially more GPs than are required in the NHS plan are already providing clinical specialist sessions. There is, however, something of a mismatch between the clinical topics listed in the plan and those in which GPwSI are currently delivering their services. Strategic thinking at regional and PCG/T level is patchy, making the recent policy initiatives of the RCGP and the RCP of London particularly timely. Many GPwSI are likely to have developed a particular skill or expertise during hospital training, others after vocational training. These activities provide an important source of variety and stimulation, and there is evidence that recruitment and retention of GPs is enhanced by offering ''mixed portfolio'' job descriptions, and that patient outcomes may be improved. For example, the Primary Care Society for Gastroenterology has demonstrated a level of safety comparable to hospital endoscopy, associated with better access and very high levels of patient satisfaction	2−	70
Littlewood *et al*[700]	UK (2000)	Survey of GPs	153 Survey responses	Study of GPs' research interests	GPs show interest in updating their practice and carrying out research; there is a difference in emphasis on health issues and research interests between GPs in diffe rent inner city trusts	2−	64
Nocon and Leese[699]	UK (2004)	Commentary and recommendations	NA	The role of GPwSI	It is not clear that GpwSIs are cost effective. What is clear is that they are additional to, rather than a substitute for, secondary care; allocations to secondary care can rarely be reduced as a result of GPwSI provision. Were any such reductions to be considered, the objections raised by hospital consultants would probably be so strong as to jeopardise their support for GPwSI schemes. In any case, a key driving force behind GPwSI policy is the reduction of waiting times. Evidence of cost effectiveness may be less important than policy objectives and professional interests	3	73
Kernick[693]	UK (2003)	Commentary and recommendations	NA	Developing intermediate care with GPwSI	Although the development of GPwSI services is being encompassed within formal governance and professional development frameworks, and 16% of GPs are already providing services outside their core commitments, there is currently no evidence to support the effectiveness or cost effectiveness of these changes. In many areas, GPwSI development will build on existing historical services that may have actually encouraged inefficient use of resources. Developing GPwSI services is one of a range of options open to PCOs for developing the NHS modernisation agenda. This initiative forms part of an overall process of healthcare integration that sees the patient at the centre of a pathway of care. Although the move towards unified PCO budgets may facilitate this development, GPwSI service shifts may have a better chance of success when additional resources are available, rather than financing them from the removal of existing resources	3	73
Gerada and Limber[703]	UK (2003)	Commentary and recommendations	NA	The role of GPwSI	The development of GPwSI is an exciting opportunity for GPs to develop their interests and widen their clinical horizons. However, it is important that PCOs and clinicians understand that if patient safety is not to be jeopardised, these services should be underpinned by robust clinical governance frameworks. The RCGP together with the NHS Modernisation Agency is currently developing frameworks in a number of clinical areas together with guidance for PCOs in developing this service further	3	66
PCSG[698]	UK (2001)	Survey, commentary, and recommendations	27 Primary care units	Endoscopy in primary care	The data suggest a very high level of patient satisfaction' the overall assessment of 98% was very good or excellent. This also highlights how sensitive patients are about waiting for appointments or waiting within the unit as their answers here are clearly at variance with the rest of their assessments. No official body has yet pronounced on the thorny issue of the maintenance of endoscopy skills, and knowledge. Three areas need to be examined: (*a*) number of endoscopies performed each year; (*b*) supervision of practical skill level; (*c*) maintenance of knowledge base. Although an endoscopist may make the actual examination, the nursing team resource the process from beginning to end. This ensures continuity and support for the patient, a safe and efficient endoscopy room, and well cared for and reliable equipment	3	55

Table A.2 Continued

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Key results and conclusions	Level of evidence	Quality score (AGREE) (%)
Gerada and Harris[702]	UK (2003)	Commentary and recommendations	NA	GPwSI	The development of GPwSI requires clear clinical governance, which includes appraisal and revalidation criteria, in order to maintain a good standard of care	3	53
NHS[690]	UK (2003)	National guidelines, commentary, and recommendations	NA	Setting up GPwSI services	This guide focuses on the provision of a clinical service to patients by GPwSI. However, we acknowledge that this is only one aspect of the role of GPwSI. Equally important are the roles of GPwSI as a trainer, educator, and coach of other healthcare professional colleagues in raising overall standards of care. The GPwSI may also play a significant part in the strategic planning of services across a health economy	Guideline	59
DoH and RCGP[691]	UK (2002)	Commentary and recommendations	NA	Implementing GPwSI	Progress to date suggests the introduction of GpwSI brings real and sustainable benefits for patients and the NHS. They are providing localised services, in familiar surroundings, with easier access and speedier care for patients. In addition, this role will help support GPs in their professional development and allow GPs with specialist experience and expertise to apply their skills and knowledge to best effect for the benefit of patients and local services. It will also improve management of workload between primary and secondary care and enhance the quality of referrals to consultants	Guideline	45

Table A.3 Developments in service delivery: summary of articles examined for secondary services

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Key results and conclusions	Level of evidence	Quality score (AGREE) (%)
Provenzale *et al*[P04]	International (1980–98)	Literature review	2157 Articles; 10 included	Specialised and general GI care	Gastroenterologists may provide better care than other provider types for certain disorders	1	80
Williams *et al*[491]	UK (2001–04)	RCT and cost effectiveness study	1800	Nurse endoscopy	Nurses are clinically as effective as doctors but preferred by patients	1	
Delaney *et al*[P24]	UK (1995–98)	RCT	442 Patients	Cost effectiveness of endoscopy for patients over 50	Initial endoscopy in dyspeptic patients over 50 years of age might be a cost effective intervention	2+	77
CRD[560]	UK (2004)	Commentary; review of evidence	Around 190 articles	Management of colorectal cancers	Nurse endoscopy (predominantly flexible sigmoidoscopy) is not uncommon and levels of satisfaction among patients using nurse-led endoscopy clinics are consistently high. Where accuracy of diagnosis is reported, GPs and nurses who have received appropriate training perform as well as surgeons and gastroenterologists. A survey found that nurses carried out endoscopy in 43% of 176 units. The comparison between endoscopy performed by doctors and nurses showed equally good outcomes. Complications were not reported in any of these studies	2+	59
Pathmakanthan *et al*[P11]	UK (2000)	Survey of clinicians	176 Responses	Nurse endoscopists in the UK	Nurse endoscopy is widely practised in the UK and is not limited to one procedure or carried out solely for diagnostic purposes. Perceived benefits include the reduction of waiting lists, reported good patient acceptability, improved care and safety. Most clinicians foresee a role for nurse endoscopy in the provision of endoscopic services, albeit in a limited capacity	2−	70
Aly *et al*[P05]	UK (1999)	Survey of clinicians	538 Responses	Non-compliance with guidelines	It was clear in this study that the practice of hepatobiliary and pancreatic (HBP) specialists was more in keeping with UK guidelines than the practice of non-specialists. Non-specialists for whom guidelines might have most to offer by providing an easily accessible source of accumulated evidence and conclusions seem to have taken least heed of the advice offered. These results have implications for the rationale of creating guidelines, and for the strategies associated with their introduction	2−	66
Smale *et al*[P12]	UK (2000–01)	Analysis of routine data; survey	3489 Patients	Upper GI endoscopy performed by nurses	Experienced nurses perform routine diagnostic gastroscopy safely in everyday clinical practice and with as little discomfort and as much patient satisfaction as medical staff	2−	66
Quirk *et al*[P07]	USA (1994–95)	Retrospective study; analysis of routine data	124 Patients	Physician specialty	Patients admitted to hospital under the care of a gastroenterologist had shorter hospital stays that were less costly than patients under the primary care of general internists or surgeons	2−	64
Bohra *et al*[P06]	Dublin, UK (2000)	Analysis of routine data	242 Cases	Analysis of GI services	We recommend that patients are seen at the initial consultation by a registrar/fellow in most cases, and at a follow-up consultation before discharge. Specialisation helps to improve quality of care, stimulates thought, aids training of junior doctors, and leads to cost savings, but constitutes a substantial workload for the gastroenterologist owing to endoscopic procedures and patient follow-up	2−	57
McKinlay *et al*[P13]	UK (2003)	Expert commentary and recommendations; survey of clinicians	28 GI units; 67 GI consultants	Modernisation of the gastroenterology service in Scotland	A rapid expansion of the specialist GI nurse numbers mix is required to include endoscopy training where locally important to case mix. A large number of units in Scotland would like to employ more specialist nurses, particularly in the management of IBD. There is no doubt that nurses already make a significant contribution, particularly to the provision of upper GI endoscopy, which frees consultant sessions for more technically difficult procedures such as colonoscopy and ERCP	3	52

Table A.4 Developments in service delivery: summary of articles examined for tertiary services

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Key results and conclusions	Level of evidence	Quality score (AGREE) (%)
Ferguson *et al*[733]	UK, NHS (1997)	Review of evidence and recommendations	NA	Concentration and choice of hospital services	Specialisation has important implications for service configuration—a small trust may need to employ more consultants to provide the required skills. There is no compelling reason to believe that further concentration of hospital services will improve efficiency or clinical outcomes. In consideration of the negative effects of concentrated access and utilisation, the implications for disadvantaged groups (for example, smaller departments with low funding) should not be overlooked	1	83
Sowden[736]	International (1995; literature taken between 1985 and 1994)	Systematic review	Over 100 studies	Relationship between volume and quality of health care	There is little evidence as to whether merging hospitals to create larger units will result in a change of outcomes. Owing to this uncertainty, caution should be exercised in using research literature to justify policies of reorganisation of healthcare delivery. The main recommendation is that policy makers should be cautious when invoking the assumed improvements in outcome achieved by volume as a key argument for centralisation of services	1	75
Grilli *et al*[734]	International (1980 onwards)	Literature review	47 Papers	The impact of specialised services	The impact of specialised cancer care has been poorly assessed. It is not possible through existing studies to define an optimal configuration of health services for oncology	1	73
Bachmann *et al*[730]	England and Wales (1996–97)	Cohort follow-up study	782 Patients	Specialised care for pancreatic cancer	Specialisation of pancreatic cancer care in hospitals was associated with longer survival. Patients referred to less specialised doctors and hospitals were less likely to be investigated thoroughly. A concentration of pancreatic cancer care into higher volume hospitals is likely to improve survival even among patients with incurable disease	2+	73
Bachmann *et al*[723]	Southwest England (1996–97)	Analysis of routine data	1512 Patients	Analysis of specialised GI cancer care	Lower mortality is associated with more specialised care; the concentration of cancer care in the UK is supported	2+	72
CRD[557]	UK, NHS (2000)	Commentary; review of evidence	Around 230 articles	Management of upper GI cancers	There is evidence for each type of GI cancer that treatment in hospitals which manage larger numbers of these patients, and/or by clinicians who see larger numbers, leads to better outcomes. There should be clearly documented policies for patient referral between hospitals, and for the processes by which clinicians seek advice from specialist treatment teams about the management of patients for whom referral may not be appropriate	2+	66
CRD[559]	UK (1997)	Commentary; review of evidence	Around 130 articles	Management of colorectal cancers	An American study found that trained nurses were as likely to discover cancers by sigmoidoscopy as gastroenterologists; patients were more willing to return for a repeat procedure after examination by a nurse. There is some evidence that volume of activity and specialisation may be associated with better surgical technique or practice	2+	59
CRD[560]	UK (2004)	Commentary; review of evidence	Around 190 articles	Management of colorectal cancers	Six systematic reviews and a number of more recent primary studies were consistent in showing evidence that for rectal cancer at least, higher patient volumes and greater specialisation among surgeons were associated with much better outcomes, lower surgical complication rates, decreased local recurrence, lower colostomy rates, and improved survival	2+	59
Senapati *et al*[726]	UK (2003)	Survey of clinicians	583 Survey responses	Surgical management of cholelithiasis	Management of cholelithiasis in patients with acute biliary pancreatitis in the UK remains suboptimal. Moreover, only a minority of surgeons offer patients presenting with acute cholecystitis the benefits of early laparoscopic cholecystectomy. The management of acute biliary disease might be improved if these cases were concentrated in the hands of surgeons with upper GI/hepato-pancreato-biliary interest and those who perform laparoscopic cholecystectomy regularly	2−	73
Bachmann *et al*[716]	Southwest England and south Wales (1996–97)	Cohort follow-up study	2294 Patients	Costs of GI cancer care and specialisation	A greater concentration of specialised hospital cancer care will cost more; doctors' specialisation is as important as hospital specialisation for the effectiveness of cancer care	2−	73
Parks *et al*[729]	Scotland (1993–97)	Analysis of routine data	2794 Patients	Benefits (or otherwise) of specialised GI cancer care	Surgically treated patients with pancreatic cancer are likely to fare better when managed by specialist pancreatic surgeons, or clinicians with an interest in this field. Specialisation and concentration of cancer care has major implications for service delivery	2−	68

Table A.4 Continued

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Key results and conclusions	Level of evidence	Quality score (AGREE) (%)
Neoptolemos *et al*[731]	UK (1995–96)	Survey	1026 Cases	UK survey of specialist pancreatic units	The data argue strongly in favour of concentrating pancreatic surgery into specialised units, and a higher referral rate from gastroenterologists exclusively to such units should be encouraged	2−	64
McKiernan *et al*[873]	UK (1993–95)	Analysis of patient data; survey	93 Cases	Biliary atresia	Biliary atresia is a rare but important condition and this study confirms that outcome is better if surgical management is done in centres with experience. Throughout the study period referral to surgical centres appeared to be on broadly geographical grounds without any other obvious selection criterion. With this information the major challenge in the future management of biliary atresia will be to ensure that surgical management is rationalised to fewer centres. The need to facilitate the concentration of medical and surgical expertise, junior surgical training, and development of support services has received general acceptance in other areas of paediatric specialist practice. The data presented here suggest to us that children with biliary atresia should be managed in centres with a caseload of more than five cases annually to ensure a better outcome	2−	64
Davenport *et al*[727]	England and Wales (1999–2002)	Analysis of routine data	148 Patients	Management of biliary atresia	Early results indicate that improvements in treatment and overall survival of biliary atresia can be achieved nationally through a centralisation of care to supraregional centres	2−	59
Hutchins *et al*[735]	UK (1992–98)	Retrospective study; analysis of routine data	65 Patients	Pancreatic surgery in a district general hospital	Compared with specialised pancreatic centres, pancreatic surgery can be performed safely in general district hospitals with low mortality and morbidity, and good long term outcomes. This workload should be undertaken with a dedicated surgeon with the necessary ancillary facilities	2−	55
Williams[722]	UK (2004)	Survey	34 Liver centres	Provision of specialist liver services	The survey showed substantial deficiencies in staffing levels, particularly of consultant hepatologists and specialist nurses. Of the various bottlenecks identified in support services, lack of expansion in radiological facilities was the greatest. The failure to provide dedicated beds for hepatology services and sufficient numbers of general and specialist outpatient clinics, as well as the waiting times in many of the centres, contribute to major limitations in service provision. Increasing the number of transplant centres would be one way of enhancing the level of provision of liver services generally	2−	52
Duxbury *et al*[725]	UK (1999–2000)	Analysis of routine data	211 Patients	Management of colorectal cancer	This study found striking variation in practice within one hospital in Devon. Colorectal specialists were more likely to conform to best practice guidelines, involve the colorectal nurse specialists to a greater extent with patients with rectal cancer, and perform more extensive lymphadenectomy in rectal cancer surgery. Formal involvement of the colorectal specialist nurse further improves the opportunity for patient information	2−	48
Majeed and Price[728]	UK (1997–2002)	Analysis of service delivery	615 Patients	Resource and manpower calculations for hepatobiliary surgical services	A centralisation of hepatobiliary surgical services is supported. We estimate that a minimum of two full-time specialist hepatobiliary surgeons with appropriate ancillary support is required for a typical population of two million people in the UK	3	64
Andren-Sandberg and Neoptolemos[732]	International, with emphasis on UK (2002)	Literature review	96 Articles	Pancreatic cancer	In the UK, pancreatic surgery must be concentrated into regional centres ideally serving catchment areas of 2–4 million. Smaller district hospitals will have the role of determining provisional diagnosis and stages. It seems highly likely that regionalisation of pancreatic cancer surgery will be adopted	3	45
Senate of Surgery of GB and Ireland[721]	UK, NHS (2004)	Expert commentary and recommendations	NA	Configuration of healthcare services	Where appropriate, clinical care should be provided locally, but patients should be moved to a centre of excellence for further specialised care	4	32
BASL, BSG, AUGIS[214]	UK (2004)	Expert commentary and recommendations	NA	National plan for liver services in the UK	Best clinical outcomes for hepato-pancreato-biliary surgery can only be achieved at specialised centres. A planned approach is needed to develop expertise within specialised units. Many patients with liver disease are managed by GPs, but there is a gradual shift towards involving gastroenterologists and nurse specialists	4 (Guideline)	50

Table A.5 Summary of articles examined for economic burden of GI disease

ID and Authors	Research setting and year of study	Study design	Sample size	Topic of document	Key results and conclusions	Comments
Bassi *et al*[108]	UK (2004)	A six month cohort study	307 Cases of ulcerative or undetermined colitis and 172 cases of Crohn's disease	Profile, determinants and scale of cost of IBD in UK	Inpatient services were required by 14% of the sample but accounted for 49% of secondary care costs. Drug costs accounted for less than a quarter of total costs. Individual patient's costs ranged from £73 to £33 254. Mean cost per patient were £1256 (CI 988 to 1721) for colitis and £1652 (CI 1221 to 2239) for Crohn's disease. The corresponding average cost for the ambulatory was respectively £516 (CI 452 to 618) for colitis and £539 (CI 497 to 589) for Crohn's disease. For the hospitalised group the mean costs were £6923 (CI 5415 to 8919) for colitis and £7658 (CI 5693 to 10561) for Crohn's disease. The mean cost of an "incident" was respectively, £2662 (CI 1006 to 5866) for colitis and £2111 (CI 1488 to 3078) for Crohn's disease. Survey suggested that the average costs for six months were <£30 per patient for primary care visits, and the median loss of earnings was £239 for colitis and £299 for Crohn's disease. The mean (range) for out-of-pocket expenses, prescription charges, OTC drugs, etc, was £40 (0–250) and £66 (0–750) for colitis and Crohn's disease	Level and profile of healthcare costs for IBD in Britain is remarkably limited. Robust CEAs data for rival treatments are lacking as few studies incorporated the prospective collection of resource data. Furthermore, the cost inputs for modelling exercises have relied on subjective cost estimates rather than real patient data. Diagnostic information is not routinely collected for most ambulatory care episodes. Also, there is no requirement to record patient borne costs.
Wells *et al*[39]	UK (1995)	Review	NA	The burden of IBS	The study used the prevalence approach to estimate the NHS resource use. The number of GP visits was estimated on the Office of Population Census and Surveys, study of morbidity in general practice in England and Wales (1995) and indicated that 846 349 visits a year in the UK are IBS related. This represents about 10% of the total primary care workload for GI diseases and results in an expenditure of £13.1m per year. Prescriptions for all medicines for IBS were estimated using the DIN-LINK database; a total number of 1.7 million prescriptions were written for IBS in 1995. This figure multiplied by the average net ingredient cost for each prescription for gastrointestinal medicines (£5.1) and including an average of £1 per prescription yields a total expenditure on GP-prescribed medication for IBS of £10.5m. This figure was then adjusted to £12.5m to account for the difference between the prevalence estimated from the database used and the general practice survey. Cost in secondary care (outpatient and inpatient stays) were estimated at £16.4m. In addition it was estimated that 3600 people are admitted to hospital, generating a total of 18 000 beds days for a total of inpatient costs of £3.4m. Hence, the total cost to the NHS of 45.4 million a year	The authors give a warning about the accuracy of the estimates—the prevalence approach method relies on *ICD coding*. In those diseases where an unambiguous definition of the condition exists and which have a unique identification number in the ICD, it is a straightforward process. This is not the case for IBS, although one ICD number does refer to irritable colon, it is uncertain how accurately the volume of resource utilisation coded under this heading reflects the true magnitude of IBS
Akehurst *et al*[40]	UK (6 GP surgeries in the Trent Region) (1999)	A case-control study	374	Impact of irritable bowel syndrome on time off from work, utilisation and cost of health services and HRQoL	Patients with IBS had considerably lower HRQoL than controls. They scored worse in all dimensions of the SF-36 and the EQ-5D. The IBS group had 0.2 (95% CI −2.1 to 2.6) more days off than the control group; this difference did not reach statistical significance. A significantly higher number in the control group had no time off from work in the previous three months, and more people in the IBS group had more than a week off in the previous three months. On average, the patients with IBS cost the NHS £123 (95% CI 35 to 221) more each year than people in the control group ($p=0.04$). The cost figures show that even using a conservative estimate of 9% of IBS prevalence, the total cost for the UK exceeds £200m a year, and for a 25% prevalence rate would rise to £600m a year	It is estimated that only about 30% of these are referred on to specialists. Further research would be needed to determine the impact of IBS on the quality of life of those affected who do not present to their GP
Creed *et al*[41]	UK (northern England) (1998)	Cross sectional survey	257 Patients (from secondary and tertiary GI clinics) who did not respond to the usual treatment and were recruited for a trial of psychological treatment	To determine whether the severity of bowel symptoms and psychological symptoms directly influence HRQoL and healthcare costs	Global severity and somatisation contributed to the physical component score of the SF-36, but only psychological scores were associated with disability due to ill health. These variables did not predict healthcare costs ($R^2=9.3\%$). Resource use costs were collected prospectively; these were $1743±2263 and included $1338±2107 for secondary care costs, $410±424 for primary care costs, $2.7±30.8 for alternative treatments; $63.5±260 in patient borne costs; and $334±1052 from loss of productivity	This study is only representative of patients with IBS whose management is difficult because of refractory symptoms, marked disability, and high care utilisation. Further work is needed to assess what leads to high healthcare costs in these patients

Table A.5 Continued

ID and Authors	Research setting and year of study	Study design	Sample size	Topic of document	Key results and conclusions	Comments
Lewison[483]	UK (1997)	Use of existing data from ONS (and counterparts in Scotland, NI) and from the DSS on work related data	NA	Burden of GI disease study	Cost of lost productivity due to early death from GI disease = £2.2 billion, from long term disability = £0.8 billion, from short term disability = £2.0 billion, NHS costs = £3.0 billion (45% in patient cost, 27% drugs). Total burden of disease = £8 billion (1997)	Crude estimate. There is a great debate on how sickness absence should be costed (human capital *v* friction cost method) as these methods give very different figures. NHS costs, especially drug costs, are here more reliable. Much debate on value of burden of illness studies
Keighley[324]	UK (2003)	Review		GI cancers in Europe	Crude statements about what the main cost components are for the treatment of a variety of GI cancers. Most detail given for colorectal cancer. Average cost of treating a case of colorectal cancer in the UK estimated at €12 630	Crude estimates. Interesting for intercountry comparisons, but very inaccurate
Belsey[516]	UK (2001–02)	Modelling exercise based on Hospital Episode Statistics of England.	109 000	Prescribing practice	Of a population of 109 000 patients in the UK in 2001–02 waiting for knee and hip replacement, around 637 had upper GI bleeding linked to NSAID treatment, with between 51 and 89 deaths resulting. Based on the cost of £3000 (estimated by Moore *et al*, 1999) for every admission for an NSAID related GI bleed. The additional 637 events identified in this analysis will therefore account for an expenditure of £1.9m	A critical review of prescribing practice is required, in order to reduce reliance on agents with a tendency to trigger upper GI ulceration
Moore and Phillips[709]	UK (1999)	Modelling exercise	NA	The burden of NSAID related gastrointestinal disease	The burden of NSAID adverse effects to the NHS was calculated for the UK population on the basis of an average PCG with a population of 100 000. The average cost per year was estimated as: (*a*) low cost mix = £241 (10% coprescriptions); (*b*) middle cost mix = £266 (15% coprescriptions), and high cost mix =£308 (20% coprescriptions). The UK inpatient costs related to UGI bleeding were estimated at £35m (£7.7 per patient). Because aspirin and ibuprofen are OTC drugs, the total burden is likely to be greater	Most of the information on presription rate was collected from the USA. There is a high variation of prescribing mix in the UK, which we could not account for in detail. Given the high cost of coprescribing, a systematic survey is needed urgently
Duggan[743]	UK (1998)	Modelling exercise	NA	Cost of management of UGI disease	The cost per patient (prescription costs, GP surgery visits, and outpatient services) were as follows: IGPCG = £157, Hp testing for all = £175, Hp testing and endoscopy for all = £236, Hp testing for ulcer = £172, Hp testing and endoscopy for ulcer = £219, endoscopy for all = £404, endoscopy for patients aged over 45 = £335, and endoscopy for patients aged over 45 presenting for the first time = £218. All the guidelines modelled here would result in a significant increase in the number of patients presenting for endoscopy. The scenario involving endoscopy for all patients aged over 45 would require a 13-fold increase in the provision of endoscopy services. A one year period was chosen because of the lack of studies with a longer follow-up. Hospitalisation costs could not be included because of insufficient published data to quantify any differences between differing drug treatment regimens. Because the IGPCG did not include gastric cancer, this was also excluded in the five scenarios	Bearing in mind the limitations of any modelling exercise, this study used robust data sources
Morant *et al*[744]	UK (Scotland) (1989–95)	Population based observational cohort study	17 244 New users of aspirin, each with 10 matched comparators	To determine the cost to the NHS of prescribed low dose aspirin	Aspirin use cost an additional £49.86 a year, made up of £1.96 for aspirin tablet (4%), £5.49 for dispensing costs (11%), £24.60 for UGI complications (49%), and £17.81 for renal complications (36%). These results projected to Scotland would give an estimate of £3 m (fastidious analysis) or £11 m (pragmatic analysis) a year for newly treated patients. If we assume that the antiplatelet trial meta-analysis is an accurate assessment of the benefits of aspirin, then the cost for preventing one vascular event lies between £62 500 (primary prevention) and £867 (secondary prevention—patients without history of UGI or renal problems)	A large number of sensitivity analyses were performed and they all confirmed the original results

Table A.5 Continued

ID and Authors	Research setting and year of study	Study design	Sample size	Topic of document	Key results and conclusions	Comments
Haycox *et al*[697]	UK (1996)	Modelling exercise	NA	The resource demand placed on general practitioners by patients following the many different management strategies available for UGI disease	The average cost incurred in primary care by patients with symptoms of UGI is £165; however, there was a wide variation across patients (range 10 to 989). The IMS database indicated that an average of 4.4 prescriptions a year is currently provided to patients presenting to GPs with UGI complaints. Implementing the IGPCG algorithm it reduces the number of prescriptions to an average of 1.9, with 70% of patients treated in accordance with the algorithm receiving long term (more than six months) symptom relief from their course of treatment. This would save £70 m out of current total drug cost of £488 m. Such cost reductions arise mainly from improving diagnosis and symptomatic management of patients and the more intensive eradication of *H pylori* infection	Although the results were confirmed by an extensive number of sensitivity analyses, the authors consider the study a preliminary analysis because refinement of the model is still continuing
Haycox *et al*[742]	Europe and USA (1996)	Modelling exercise	4 Countries	The extent to which economic analyses can be transferred across national borders	Assuming UK = 100 (£174), the cost of managing UGI for some of the other countries was respectively: Sweden = 179(£311), Germany = 101(£176), Switzerland = 163(£284) In all major cost categories the cost of treating a patient in the UK and Germany is significantly lower than treating the patient in Sweden and Switzerland	The fact that the pound sterling was comparatively strong compared with the other currencies might have contributed to the lower comparative costs identified in the UK. Further research is required to identify in more detail the factors influencing such variations and their impact both upon patients and public expenditure
Thomson and Booth[653]	UK (1996)	Modelling	NA	The resource implication of TD (traveller's diarrhoea)	The incidence approach is used, the incidence of TD is assumed to be 8, 15, and 56 in low, intermediate, and high risk countries, respectively. The cost varied from £78m (prophylaxis) to £17m (treatment)	These calculations are rough and reflect the poor state of knowledge in this area
Ellis[768]	UK (1989/ 1990)	Observational study	3975 Usable data	Assess the contribution of the most frequently performed procedures to surgical workload and evaluate the financial implications	The patients incurring the greatest costs were those who had undergone large bowel surgery, vascular reconstruction, or amputation. The top five procedures in order of frequency were upper GI endoscopy, inguinal hernia repair, cystoscopy, tranurethral resection of the prostate, and surgery for long saphenous varicosities. Upper GI endoscopy in 420 patients (352 as day cases) cost £149 630. The cost of hospital stay for patients with large bowel surgery for carcinoma was £38 529 for 12 patients	The accuracy of coded discharge data on inpatient care is still a problem; 18% of the records had to be excluded because they were imprecise, ambiguous, or not present at all. The article fails to compare its results with others and fails to assess the external validity of the findings
Beard *et al*[769]	UK (Costing data) (1990–98)	Literature review and modelling exercise	NA	Cost of liver resection	Based on the average costs from the Royal Hallamshire Hospital, Sheffield, the total treatment costs with resection were £6402. The cost of the alternative pathway of care (chemotherapy, Gramont regimen) is estimated at £6669. Hence the marginal cost saving of resection is £267. However, if patients have recurrence, the resection would only delay the chemotherapy by one year. Hence it would be cost saving only with no recurrence (patient remained free of tumour). Excluding any savings that may be made through avoided chemotherapy, and assuming no differences in salvage treatment of relapses, the cost per LYG ranges from £2134 to £3945. Even if 50% of the patients were found unsuited for surgery, or only received palliative resection, the survival benefits for the remaining patients are likely to cost around £6078 per LYG (undiscounted five year survival)	The study results might be highly sensitive to Sheffield unit characteristics. Moreover, some of the data are based on anecdotal evidence. There are no RCTs which directly compare the role of liver resection against treatments for liver metastases
Sheridan *et al*[745]	UK (1991)	Prospective cohort study.	100 Patients aged between 15 and 35 admitted with lower abdominal pain to one general surgical firm	To audit the extent of the problem of NSAP (non-specific abdominal pain). To assess resource implications	67 Patients were disgnosed as having NSAP; GI disorders were one of them. The total cost to the NHS of these patients was £54 115. On the basis of this, it is calculated that NSAP might be responsible for a total of 7708 emergency general surgical admissions per year in Wales, using 31 757 bed days and costing the NHS in Wales 6.4 million. Extrapolating these figures to the UK as a whole, the annual cost of NSAP to the NHS may be over £100m a year	The study provides a crude estimate of the NHS costs, in particular the extrapolation from one DGH to the country as a whole

Table A.5 Continued

ID and Authors	Research setting and year of study	Study design	Sample size	Topic of document	Key results and conclusions	Comments
McLoughlin *et al*[746]	Europe (2002)	Literature review	10 Countries	The burden of coeliac disease	In England it was estimated that 120 000 patients are affected by the condition and the test and treatment costs were £120m and £216m, respectively	This is a short article to provide a ''snapshot'' of coelic disease. No formal assessment of the robustness of the data sources is offered
Mahmood and McNamara[16]	UK (Ireland) (2003)	Modelling exercise. Using the Swedish model of cost analysis recently published in *Pharmaeconomics 2002*, the authors applied the same model to calculate the burden of the disease in different countries across Europe	6 Countries	Burden of GERD (gastro-oesophageal reflux disease)	The UK prevalence was estimated as 24% giving the following costs: direct costs (million euro) = 2591; indirect costs = 1610; drugs = 1532; cost of sick leave = 1358; and other costs = 1239	It is difficult to calculate the economic burden of GERD or peptic ulcer disease as most studies have used the broader term ''dyspepsia'' in their calculations. The study uses the prevalence approach, and there is insufficient information on the data sources for costing and how the summary figures are arrived at
Moayyedi and Mason[747]	UK (2001)	Article review	8473 Individuals participating in the HELP study. To identify NHS costs, 5056 primary care notes were reviewed for 1992–94	Clinical and economic impact of dyspepsia	Dyspepsia was costing £21 per person per year—hence about £1000m each year in the UK. Within primary care dyspepsia was costing £11.25 per person per year, which represents £500m each year in the UK. Although based on patients in the Leeds HELP study, the study is very robust. The authors do point out that the national figure is representative as long as the cohort is representative of all the population	Cost effectiveness management strategies and treatments are urgently required. Strategies for managing dyspepsia have focused on attempting to reduce the endocscopy workload, although this procedure accounts for only a small proportion of the total costs of dyspepsia. Future approaches should also examine the drug used, as this might result in more cost savings
Logan and Delaney[748]	UK (1999)	Review article	NA	Implications of dyspepsia	At any one time 4% of the population are thought to be taking drugs prescribed for dyspepsia. Drugs for dyspepsia account for 10% of drug expenditure. The number of gastroscopies performed each year is also rapidly increasing; 450 000 tests were performed in the United Kingdom in 1996	This is a short article and the author does not provide any information on the data sources
Somasekar *et al*[749]	UK (Wales) (1999–2000)	Retrospective study and model exercise	156 Patients who underwent elective cholecystectomy from a DGH	The economic burden of patients waiting for cholecystectomy admitted with recurrent gallstone related symptoms	The mean (SD) waiting time for surgery was 12 (3) months. 37 patients were admitted as an emergency owing to gallstone related symptoms and complications while waiting. The cost for each episode was £946 and the total cost of treating the 37 patients was calculated to be £44 462. Performing early laparoscopic cholecystectomy for acute cholecystitis may help to reduce costs by preventing recurrent emergency admissions of these patients	Crude estimate. A small analysis of the effect of comorbidities is also made

Table A.6 Cost effectiveness of GI services: summary of articles examined for primary care

Authors	Research setting and year of study	Study design	Sample size	Topic of document	Key results and conclusions	Comments
Jones[770]	UK (1996)	Review	NA	GI disease in primary care	Conclusions mainly in the form of a research agenda	Although only 1996, this report is already dated. Main conclusion is that the statement ''there is little evidence on which guidelines can be based'' is no longer true
Delaney[582]	1990s	Review	NA	This review aims to summarise the evidence on the role of *H pylori* in dyspepsia from the perspective of the primary care, to suggest a strategy for managing dyspepsia, including peptic ulcer disease	The two UK studies suggest that eradicating *H pylori* in patients with proven peptic ulceration who are receiving long term treatment (the entry criteria were conservative in defining ''long term'' treatment) might produce savings of up to £41 000 per 100 000 population a year, or save up to £20m a year in the UK spending of £90m a year on H_2 antagonists, based on the figure for 1990	The studies referred by the author have a small number and they do not seem to be proper cost effectiveness studies
Bloor and Maynard[514]	UK (1994)	Review	NA	Prescribing of NSAIDs	NSAIDs accounted for about 1 in 20 prescriptions. Switching patients so that ibuprofen accounts for 50% of prescriptions and reducing all the other brands accordingly would reduce overall drug expenditure by £45m (26%). In addition, serious adverse reactions could be reduced by 12.5% (to 440 a year) and GI reactions by 16.5% (to 263 a year)	This is an excellent review. However, by the authors' own admission, it has to be considered an exploratory work
Delaney *et al*[751]	UK (1998)	RCT	478 Patients aged under 50 and presenting with dyspepsia for longer than four weeks	To determine the cost effectiveness of near patient testing for *H pylori* and endoscopy for managing dyspepsia	Costs effectiveness was determined from the NHS perspective, and based on improvements in symptoms and use of resources at 12 months. Quality. Costs were higher in the intervention group (£368 *v* £253) per patient. The test and endoscopy strategy was less cost effective than usual management	It is unclear whether a policy to test for *H pylori* and then eradicate it is cost effective as an initial management strategy in primary care. Future trials should evaluate the cost effectiveness of this strategy compared with empirical prescribing
Banait *et al*[580]	UK (north west England) (1997)	RCT	114 GP practices (57 control, 57 intervention group)	To test the effectiveness of ''educational outreach'' as a strategy for facilitating the uptake of dyspepsia management guidelines in primary care	The proportion of appropriate referral was higher in the intervention group in the six month post-intervention period. In this study, the dissemination of clinical practice guidelines using educational outreach proved to be more effective than passive guideline dissemination alone. However, the intervention also produced unintended outcomes, notably an increase in prescribing expenditure	Before it is more widely used, this strategy requires further investigation to confirm that changes in GP behaviour do improve patient outcomes and to assess the overall cost effectiveness of this expensive intervention
Galloway *et al*[519]	UK (2000)	Questionnaire based survey	28 General practices performing endoscopy	To examine whether endoscopy in primary care can be considered a safe procedure	Endoscopy in primary care seems to be safe. This good safety record is probably attributable to careful case selection and minimal use of intravenous sedation	The economics of service provision have not been investigated within this survey, but data have been published showing that rigid sigmoidoscopy performed outside secondary care is not necessarily a cheaper option
Valori *et al*[750]	UK (England) (1995)	Controlled trial	123 GPs covering a population area of 325 000 and 250 000 for intervention and control group, respectively	To determine whether a multifaceted educational strategy for general practitioners aimed at improving quality of dyspepsia management can control dyspepsia costs without increasing demand for endoscopy	After the intervention, drug costs declined and then stabilised in the intervention group. The overall cost in the intervention group was reduced by 57.9 pence per head of population per half year in comparison with the control group. This difference was maintained for three consecutive years, resulting in a cumulative savings of £1.13m. The estimated cost of the intervention was £6600. If the intervention were carried out across the country the estimated national savings would be £25m a year	There are two limitations to this study: the study was not an RCT and important outcomes, such as symptoms and GP consultations, were not measured
Read *et al*[771]	UK (England) (1995)	Before-and-after study	487 GPs in Leicester HA and gastroenterology teams within the hospitals	To study whether the introduction of consensus guidelines would encourage a movement towards care in the community for patients with stable disease, and hence speed up new consultation rates	The guidelines did not reduce the period between initial referral and first consultation in outpatients	Response rate was quite low: 106 (21%) and a further 52 (total 32%) after a reminding letter. In an ideal world such guidelines should be evidence based, but when this is unavailable a consensus view on diagnosis and management can be valuable, although it may not produce the best answers

Table A.6 Continued

Authors	Research setting and year of study	Study design	Sample size	Topic of document	Key results and conclusions	Comments
Kernick[693]	UK (2002)	Review	NA	The economic perspective of intermediate care in GI	Although 16% of GPs are already providing specialist interest services,[692] there is currently no evidence to support these changes for increased effectiveness or cost effectiveness	This article is a good review, but it does not include a proper economic evaluation.
Moody *et al*[772]	UK (Leicestershire) (1991)	Postal questionnaire survey	259 (41% response rate)	Care of chronic GI disorders and patients with IBD. What do GPs want from local GI units?	GPs desire a more specialist education (that is, regular bulletin on the management of both IBD and chronic GI disorders). 60% wanted a telephone hot line to senior GI personnel, with direct dialling for immediate advice. 80% wanted shared care with hospital consultants	The article includes no economics
Parry *et al*,[564]	UK (2002)	Retrospective case series	51, mean age 60 (range 31–84)	To determine the number of patients referred to a DGH, the indication, enteroscopy with or without histological diagnosis, and to compare findings with other series from tertiary referral centres or outside the UK	Indications (obscure GI bleeding), most common findings (small bowel AVMs), and ''missed'' lesions within reach of a gastroscope were in keeping with other series. The current need for push enteroscopy in a DGH is small (about 1 per 8000 population a year). Criteria for enteroscopy should be developed and refined. It may be that enteroscopy does have a place in the routine procedures carried out in selected DGHs, but this will have resource and training implications that need to be measured	The study does not include a proper economic evaluation
Hungin *et al*[773]	UK (south Tees DHA) (1990)	Cohort study. Patient management in the year before open access was compared with the year after	715	To determine the impact of open access gastroscopy in general practice and in particular, the value of a normal result	Open access is associated with a rationalisation of drug treatment, reduced consultations, and a low hospital referral rate	The study did not include a proper economic evaluation of the resource consequences. The authors point out that one of the main limiting factors of the study design was the accuracy of the general practice records. However, although details of clinical symptoms were variable and only briefly recorded, recording of drug prescribing was consistently good
Parry *et al*[578]	UK (northwest region of England) (1998)	GP survey	177	To describe how awareness of patient *H pylori* status changes the practice of GPs who do not currently use *H pylori* testing and/or eradication in their management of dyspepsia	Until the use of *H pylori* tests in primary care has been evaluated in appropriate RCTs, advocates of testing as a means to reduce endoscopy referrals should be cautious about its potential impact on service workload	This article is dated as more RCTs have been performed since. However, it did not include any economics
Parry *et al*[774]	UK (1999)	RCT	136 GP randomised to receive effectiveness matters and 126 who did not receive effectiveness matters (control group)	To investigate the impact of distribution of a printed summary of research findings on GPs' self reported management of peptic ulcer disease and dyspepsia	Distribution of a single, printed summary of research findings in isolation from other interventions is unlikely to have an impact on patient management	The study did not include an economics component
Smith *et al*[775]	UK (2004)	Cross sectional observational study	486 Patients (recruited via an advert in the newspaper)	Frequency, duration, and severity of symptoms. HRQoL of patients managed in primary care compared with patients managed in secondary care	Patients managed solely in primary care do not have less ''severe'' IBS. Thus the overall impact of IBS on society may be much greater than currently estimated	There might have been problems of self selection. Further study to evaluate the effects of patients' symptoms and HRoQL over time is also merited. The study did not include an economic component

Table A.7 Cost effectiveness of GI services: summary of articles examined for access to specialist care

Authors	Research setting and year of study	Study design	Sample size	Topic of document	Results and conclusions	Comments
Association of Coloproctology of Great Britain and Ireland[753]	UK (2000)	Postal survey	Replies from 75 centres covering 26.5 million	The number of staff needed for coloproctology	Extra staff (full time equivalent) required for the UK were: 170 surgeons; 18 histopathologists; 72 oncologists; 42 radiologists; 60 palliative care nurses; 98 colorectal cancer nurses; 140 stomatherapy nurses; and 760 other colorectal specialist nurses. Some solution to this shortage can be offered by involving more GPs and endoscopy nurses	A good mapping of needs; it does deal with the most cost effective ways to reach the target
South Wales Cancer Network[754]	UK (Wales) (2002)	Review	NA	Service development plan	By end of 2004: Reflect local workforce and skill mix required. Examine the training requirements Undertake a mapping exercise to establish current availability and future needs of specialist nursing workforce. By end of 2005: Agree long term service model in response to NICE guidelines	Mainly a research agenda document
Guillou *et al*[776]	UK (1996)	Review	NA	Minimal access GI surgery	Evidence on cost effectiveness of laporoscopic *v* conventional cholesystectomy too thin to report	Most evidence is from the USA, where charges rather than costs are used. Authors (quite rightly) warn about this
MacKenzie *et al*[97]	UK (1999–2001)	RCT	552 Intervention group; 565 control Group	Method of investigating large bowel symptoms	NHS and patient borne costs were included. The study had a three month follow-up. Total costs per patient were £307 (consultant led) and £203 (open access), respectively. The difference was not statistically significant	SD and ranges of cost figures were not reported. Further research is required to identify the reasons for non-attendance
Bowles *et al*[752]	UK (England) (2002)	Cross sectional study (4 months follow-up)	9223 colonoscopies across 68 hospital units (5 teaching hospitals, 18 DGH, 7 private hospitals, and 1 paediatric unit)	To study the availability and the quality of adult and paediatric colonoscopy in three NHS regions	There is a serious underprovision of colonoscopy service in most NHS hospitals. Only 17% of colonoscopists had received supervised training for their first 100 coloscopies and only 39.3% had attended a training course	The study did not include an economic component
Burling *et al*[755]	UK (2003)	Observational study	138 Departments	The provision of CT colonography in UK radiology departments	CT colonography is widely available in the UK, with about one third of respondents offering a service. Experience and throughput varies considerably. Limited CT scanner facility is the major barrier to further dissemination	The paper does not include an economic dimension. Although there is little evidence on the cost effectiveness of the technique, this is widely available
Sawczenko *et al*[756]	UK (1998–99)	Prospective population based survey	739 new IBD cases across 3247 paediatricians, adult gastroenterologists, and surgeons in the UK	Variation in the management of children with newly diagnosed IBD	This study suggests that in many, if not the majority, of institutions there is no designated care pathway for the management of childhood IBD. Current specialist provision, and initial investigation and treatment of IBD, are heterogeneous	There is no economic analysis
Kennedy *et al*[683]	UK (2003)	RCT	700 Patients (297 intervention, 403, control) across 19 hospitals in northwest England	Explore models for training health professionals in methods to promote and support self care, study long term effect, and assess whether faster treatment reduces the duration of relapses in IBD	After one year, the intervention resulted in fewer hospital visits, without change in the number of primary care visits (2.01 *v* 3.22). The total average costs for the groups were respectively £922 and £1070. Patients felt more able to cope with their condition. The intervention did not reduce quality of life and did not raise anxiety. The intervention group reported fewer symptom relapses, and 74% of the patient wanted to continue the system. CE analysis favoured self management over standard care. Standard care was associated with slightly better QALYs profile (QALYs gain of 0.00022) and an increase in cost per patient of £148. This is likely to be far in excess of values currently deemed acceptable to healthcare founders. The authors also estimated that the burden of IBD ranges between £75m and £85m a year	An excellent study. Future research is recommended to evaluate the operating systems within secondary and primary care that would allow self managers to self refer and to keep them informed of new treatments, also to explore self care methods, to study long term effects of self management in chronic disease. There is little evidence on long term effects. This study looked at one year, but it is likely that significant morbidity and mortality effects will take several years to determine. There is a need to establish how well open access works over a long period and whether clinic and patients revert to a system of fixed appointments
Moayyedi *et al*[77]	UK (1999)	Discrete Choice Experiment	354 Patients (mean age 47)	Eliciting patient preferences for gastroenterology clinic reorganisation	Four key attributes were identified: waiting time from the GP's referral, waiting time in the clinic, consultation time with the specialist, and waiting time for the investigation. Our data suggest that patients value waiting for investigations as highly as time spent on a waiting list, as a reduction in either will lead to a more rapid diagnosis.	Discrete Choice Experiment (DCE) is a technique recently introduced to ascertain patients' preferences in the delivery of health care; hence, the results need to be confirmed by other studies

Table A.8 Cost effectiveness of GI services: summary of articles examined for the role of nurses in GI services

Authors	Research setting and year of study	Study design	Sample size	Topic of document	Results and conclusions	Comments
Maule[758]	UK (1994)	Prospective cohort study	1881 Patients (examined by nurses) and 730 (examined by physicians	Screening of colorectal cancer by nurse endoscopists	Nurses can carry out screening by flexible sigmoidoscopy as accurately and safely as experienced gastroenterologists	The paper did not include a proper economic evaluation
Melleney and Willoughby[759]	UK (England) (1999–2000)	Case series study	100 Patients	To audit a nurse endoscopist based one stop clinic	The system was popular with patients as most of them (70%) were dealt with at a single hospital attendance. However, the one stop clinic as currently formulated is open to the criticism that its productivity is low, and moreover, the overload of minor disorders increased the waiting time	The study does not include a proper economic evaluation
Smale *et al*[712]	UK (2000)	Retrospective and prospective cohort study	3009 Patients (retrospectively) 480 (prospectively)	To determine the effectiveness, patient comfort, and attitude towards future development of endoscopy performed by nurses	Experienced nurses perform routine diagnostic gastroscopy safely and as with as little discomfort for patients and as much patient satisfaction as medical staff	A good study, but it did not include any economic evaluation
Burnett *et al*[757]	UK (1998–2000)	RCT	102 Patients	To evaluate the effectiveness of a nurse led clinic (NLC) compared with a consultant led paediatric GI clinic (PGL) in the management of chronic constipation	Results suggest that an NLC can significantly improve follow-up of children with intractable constipation, and highlight the important role for clinic nurse specialist in management of children with GI disease	The study suffers from small numbers and it did not include any economic evaluation

Table A.9 Cost effectiveness of GI services: summary of articles examined for home parenteral nutrition

Authors	Research setting and year of study	Study design	Sample size	Topic of document	Results and conclusions	Comments
Richards *et al*[760]	NA (1980–85)	Systematic review	NA	What evidence exists for the cost effectiveness of HPN? What questions could be answered with additional research?	Two cost utility analyses (CUAs) were identified (one in Canada and one in the UK). The marginal cost per QALY varied from Canadian $14 600 to UK £69 000. The most recent estimate of cost to the NHS was £45 000 for the first year and £36 000 for subsequent years. The studies showed that HPN was 65–80% cheaper than the alternative hospital treatment. However, patients and community costs were not measured. There are no economic evaluations of HPN for malignant disease and AIDS	Patient referral patterns for HPN treatment are inconsistent; some regions in the UK have very few patients receiving HPN. However, there are several large centres in the UK where HPN is considered as an essential, life-saving treatment. What methodological issues need to be dealt with in future: 1. Up-to-date registries 2. A more in-depth description of episodes of care should be in place 3. patient long term monitoring should be laid down 4. Large multicentre RCTs should be carried out to evaluate alternative models of care
Puntis[761]	UK (1998)	Literature review	NA	Cost-utility appraisal of HPN	The effectiveness of HPN is about 65% greater than hospital care	This article reviewed most of the articles included in the previous article[760]

Table A.10 Cost effectiveness of GI services: summary of articles examined for surveillance programmes

Authors	Research setting and year of study	Study design	Sample size	Topic of document	Results and conclusions	Comments
Renehan *et al*[518]	UK NHS perspective but based on five studies from Finland, Denmark, Italy, Sweden, and Australia (2004)	Modelling exercise based on the results of a previous meta-analysis of five RCTs performed by the authors	1342 Patients	Patient follow-up	Based on the five trials the life years gained were 0.73, and the adjusted net (extra) cost for each patient was £2479 and for each life year gained was £3402. NHS perspective. The main predictor of incremental cost effectiveness ratios was surveillance cost. Based on the available data and current costs, intensive follow-up after curative resection for colorectal cancer should be normal practice	Large RCTs are needed to evaluate the efficacy of specific surveillance tools. These studies should include CEAs and quality of life assessments. Also, costs beyond the five years' initial treatment need to be considered as a proportion of patients with recurrences undergoing salvage treatment will have delayed second recurrences. Also a societal perspective should be taken as travel and time off work might be relevant in cancer surveillance
Maule[758]	UK (1994)	Prospective cohort study	1881 Patients (examined by nurses) and 730 (examined by physicians	Screening of colorectal cancer by nurse endoscopists	Nurses can carry out screening by flexible sigmoidoscopy as accurately and safely as experienced gastroenterologists	The paper did not include a proper economic evaluation.
Mathew *et al*[778]	UK (England) (2000–02)	Case series study	2382 Patients	This study aimed to identify the percentage of patients aged <45 who undergo flexible sigmoidoscopy for rectal bleeding and compare the incidence of colorectal cancers and polyps above and below this age	The incidence of colorectal cancers and adenomatous polyps in patients aged <45 years with rectal bleeding is very low	There is no real economic analysis
Atkin[622]	UK (1998)	Review	NA	Flexible sigmoidoscopy as mass screening tool	Flexible sigmoidoscopy as mass screening tool No economics evaluation. The authors simply hypothesise that FS screening ''would cost only marginally more than is currently spent on treating the disease'' and describe a continuing trial set up to test that hypothesis. Nothing in here about cost for case detected (cf FOB test, RS, etc) or cost for each life year gained	The economic analysis of the study is flawed
Pignone *et al*[519]	USA, UK, and others (1993–2001)	Systematic review	–	To assess cost effectiveness of colorectal cancer screening for the US Preventive Services Task Force	Seven articles were identified. Compared with no screening, cost effectiveness ratios for screening with any of the commonly considered methods were generally between $10 000 and $ 25 000 for each life year saved. No one strategy was consistently found to be the most effective or to have the best ICER. Currently available models provided insufficient evidence to determine optimal starting and stopping ages for screening.	No studies considered patient time cost associated with attendance for screening, diagnostic, or surveillance procedures or for treatment of cancer
Smith *et al*[573]	UK (1997)	Postal questionnaires to clinicians (members of the society of gastroenterology)	152	To determine the practices that clinicians employ in the management of Barrett's oesophagus in the UK	Wide disparity in surveillance for Barrett's oesophagus. A recent UK study quoted £120 for each examination (£80 for endoscopy with £40 for historical assessment), giving a cost of about £49 000 per each detected cancer	No proper economic analysis. A prospective trial is needed to determine whether screening is beneficial
Mason *et al*[514]	UK (2002)	Markov model extrapolating results of an RCT	n=8407 in an RCT	Population screening for gastric cancer using *H pylori* testing and eradication	Cost difference overall favoured intervention group but did not reach statistical significance. Cost difference was statistically significant for men. For women there was no difference. Modelling estimated that population screening/eradication for population of one million 45 year olds would save £6m and 1300 life years. Cost for each life year saved was £14 200, which is good value for money	Very useful subject to usual caveats about modelling, but the ''base case'' (producing figures in the previous column) was conservative—that is, a lower limit of 95% CI for cost savings and only 10% efficacy of *H pylori* eradication in reducing mortality from distal gastric cancer and peptic ulcer disease

Table A.10 Continued

Authors	Research setting and year of study	Study design	Sample size	Topic of document	Results and conclusions	Comments
Duncan[616]	UK (1992)	Case study	9 Patients	The importance of identifying self induced diarrhoea by self administration of laxatives	For eight patients in whom the diagnosis was unsuspected, an average of £2807 (range £60–10 709) was spent on investigations, which would have been avoided had an early laxative screening been performed. In comparison, the cost of performing a laxative screen on all patients presenting with diarrhoea can be estimated at £600 for each laxative abuser identified (assuming a prevalence of 4% and a laxative screen cost of £24).	The economic analysis is not fully described
Roderick *et al*[79]	UK (2002)	A discrete event simulation model	NA	To evaluate the cost effectiveness of population screening for *H pylori*	The cost/life years saved (LYS) at age of 40 was £5860 at a discount of 6%. The outcomes were sensitive to *H pylori* prevalence, the degree of opportunistic eradication, the discount rate, the efficacy of eradication on gastric cancer risk, the risk of complicated peptic ulcer disease and gastric cancer associated with *H pylori* infection, and the duration of follow-up. In sensitivity analysis the cost/LYS rarely exceeded £20 000 over an 80 year follow-up, but did for shorter periods. Two critical determinants of cost effectiveness are time horizon and discount rate. Screening does not become cost effective for several decades, which largely reflects the long duration between the age of screening and the incidence of gastric cancer. A lower discount rate for benefits makes screening appear more cost effective	A very good study

Table A.11 Summary of articles examined for dyspepsia and endoscopy

Authors	Research setting and year of study	Study design	Sample size	Topic of document	Results and conclusions	Comments
Delaney *et al*[579]	UK (2004)	Review and modelling exercises		Dyspepsia	Endoscopy not shown to be cost effective in patients with low risk of malignancy. Restricting endoscopy to those with continuous epigastric pain and/or symptoms of <1 year's duration would reduce cost/life year gained from £50 000 to £8400. Discrete event simulation used to compare 70 combinations of investigation and prescribing strategies. 61 eliminated by dominance—including all strategies involving endoscopy. Extra cost for each extra month dyspepsia-free shown for remaining 9. Conclusion is that endoscopy needs to be targeted. Markov modelling used to estimate cost/life year saved from endoscopy in men by age (£454 000 at 40 to £15 779 at 70, but by restricting endosopy for those over 70 to those at high risk it falls to £8398). Incremental cost effectiveness ratios for men over 55 and at high risk are all favourable. For women aged 40 = £158 823 and aged 70 = £22 062. Strong conclusion of need to restrict demand for endoscopy in younger age groups	Very good economics. Assumptions spelled out. Sensitivity analyses conducted
Moayyedi *et al*[780]	UK and non-UK studies	Cochrane review		To review the effectiveness of six classes of drugs in the improvement of both the individual or global dyspepsia symptom score and quality of life scores.	It is estimated that £450m is spent on dyspepsia drugs in the UK each year. There is evidence that anti-secretory treatment is effective in a small proportion of patients with NUD. The evidence is strongest for PPI as the studies were generally of higher quality and the funnel plot did not show any publication bias	We did not identify any economic analysis; this information is important as patients will often need to take drugs long term
Bodger *et al*[596]	UK (1994)	Prospective observational study (4 month period)	257 Consultations (150 patients)	Prescribing patterns for symptomatic dyspeptic patients.	The drug cost for each patient varied from £2 to £60 a month. Management guidelines may help to promote a more consistent and selective use of newer treatments, and promote more cost effective patient care	The practice sampled represented a reasonable cross section of doctors, though arguably biased towards more ''rational'' prescribers
Paterson *et al*[781]	UK (1998–99)	RCT pilot study	60	The effects of adding treatment of acupuncture or homeopathy to current treatment	Total mean (SD) cost of acupuncture per patient was £175 (52) and total mean cost for homeopathy per patient was £105 (33)	This study suggested important changes for the design of a full scale study
Bate *et al*[782]	UK (England) (1998)	Cohort study	90 Patients with symptoms suggestive of GERD	To assess the diagnostic value of a therapeutic trial of omeprazole 40mg in a dyspeptic population	We conclude that omeprazole can be used as a clinically effective tool in the initial management of GERD and that it is of diagnostic value in patients who present with typical symptoms, such as heartburn, when the diagnosis is based on assessment of symptoms alone	The cost of patients who might have been misdiagnosed was not part of the study. The quality of the economic evaluation was poor
Delaney *et al*[579]	UK, USA, Canada, and others (2004)	Cochrane review	19 RCTs	Management strategies (combination of initial investigation and empirical treatment) for dyspeptic patients	It is unlikely that early endoscopy would reduce overall economic costs of managing dypspsia over only one year. It is more likely that an initial excess cost would be incurred that might be recouped in some prescribing and consultation reduction in subsequent years. The point at which early endoscopy might become cost neutral cannot be determined from these trials. Delaney reported a full exploration of costs. The additional endoscopies were offset by a significant reduction in PPI prescribing (equivalent to a month's prescribing), outpatient attendance was also reduced from 0.45 to 0.22 per patient. Overall management by prompt endoscopy cost £420 compared with £340 for empirical management	The rest of the studies did not include a proper economic evaluation

Table A.12 Summary of articles identified through systematic search by section

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Level of evidence	Quality score (AGREE) (%)
Section 3.1 Spectrum of disease						
Jenkins[541]	UK (2001)	Commentary, review of evidence	NA	Paediatric IBD	3	52
Cumberland *et al*[858]	UK (not specified—circa 2003)	Survey and follow-up	85 Practices; over 1000 cases	Infectious intestinal disease in England	2−	73
Dominitz *et al*[783]	USA (not specified—circa 2002; data between 1987 and 1996)	Analysis of routine data	Sample taken from 746 130 births	Infants born to mothers with IBD	2+	66
Sheridan *et al*[745]	UK (1990)	Analysis of routine data; survey	100 Patients; 52 clinicians	Abdominal pain and resource implications	2−	73
De Lillo and Rose[784]	International (2000)	Commentary; appraisal of evidence	Around 50 articles	Bowel disorders in geriatric patients	3	57
Hislop and Heading[785]	UK (2000–01)	Survey and analysis of routine data	53 clinicians	Impact of alcohol related disease	2−	61
Lunniss *et al*[859]	UK (data taken between 1995 and 2002)	Analysis of patient data	629 Patients	Faecal incontinence	2−	66
McKiernan *et al*[873]	UK (1993–95)	Analysis of patient data; survey	93 Cases	Biliary atresia	2−	64
Plevris *et al*[786]	International, with emphasis on UK (1998)	Commentary; review of evidence	Around 120 articles	Management of acute liver failure	3	61
Morris[787]	International (1991)	Commentary; review of research	Around 80 articles	Non-ulcer dyspepsia	3	59
AGA[788]	USA (2001)	Review of evidence; expert commentary	Over 125 articles	Prevalence and costs of GI diseases	2+	68
De Dombal[544]	International; emphasis on UK (1994)	Commentary; review of evidence	Around 7 articles	Acute abdominal pain	3	57
Section 3.2 Incidence (includes prevalence)						
Jenkins[541]	UK (2001)	Commentary; review of evidence	NA	Paediatric IBD	3	52
Cumberland *et al*[858]	UK (Not specified—circa 2003)	Survey and follow-up	85 Practices; over 1000 cases	Infectious intestinal disease (IID) in England	2+	73
Bodger[737]	International, with emphasis on UK (2002)	Commentary; appraisal of evidence	Around 60 articles	Cost of illness of Crohn's disease	3	66
Hislop and Heading[785]	UK (2000–01)	Survey and analysis of routine data	53 Clinicians	Impact of alcohol related disease	2−	61
Gut Week[103]	UK (2004)	Public information leaflets; commentary	NA	Digestive health in the UK	3	36
Lunniss *et al*[859]	UK (data between 1995 and 2002 taken)	Analysis of patient data	629 Patients	Faecal incontinence	2−	66
Ghanchi and Rembacken[789]	UK (2003)	Review of evidence; commentary	Around 130 articles	IBD	3	70
Morris[787]	International (1991)	Commentary; review of research	Around 80 articles	Non-ulcer dyspepsia	3	59
Mamula *et al*[790]	International; emphasis on USA (data between 1977 and 2000 taken)	Analysis of routine data	82 Patients	IBD in children under 5 years of age	2−	70
AGA[788]	USA (2001)	Review of evidence; expert commentary	Over 125 articles	Prevalence and costs of GI diseases	2+	68
McNamara *et al*[681]	International; emphasis on USA (2000)	Review of evidence; expert commentary	Around 70 articles	Non-ulcer dyspepsia (NUD)	2−	64
Wong *et al*[791]	China and Hong Kong (2002)	Survey of Chinese population	2209 Survey responses	Gastro-oesophageal reflux disease (GERD)	2−	80
Pimentel *et al*[792]	USA (not specified—circa 2000)	Survey; analysis of patient data	448 Patients	Small intestinal bacterial overgrowth (SIBO) and IBS	2+	66
De Dombal[544]	International; emphasis on UK (1994)	Commentary; review of evidence	Around 7 articles	Acute abdominal pain	3	57
Loftus[102]	International (2004)	Review of evidence	Around 170 articles	IBD	2−	59
Russel[793]	International (2000)	Review of evidence; commentary	Around 50 articles	Incidence of IBD	3	55
Moum and Ekbom[794]	International (2002)	Review of evidence	Around 90 articles	Incidence of IBD	3	55
Wilson *et al*[153]	International (2003)	Systematic review	15 Articles	Prevalence of IBD	1	66
Farrokhyar *et al*[795]	International (literature between 1950 and 1999 taken)	Review of evidence	Around 200 articles	Epidemiology of IBD	1	66
Lapane *et al*[796]	USA (data between 1992 and 1996 taken)	Analysis of patient data	133 839 Patient records	Effect of NSAID use	2+	68
Chiang *et al*[797]	Australia (2001)	Analysis of patient data	167 Patients	Acute pancreatitis management	2+	68
Fass *et al*[798]	USA (1992–95)	Analysis of patient data; survey	505 Patients	Functional bowel disorders (FBD) and sleep disorders	2−	73
Parry *et al*[799]	UK (2000–01)	Case-control study	482 Patients	IBS and bacterial gastroenteritis	2+	75
Bernstein *et al*[800]	Canada and USA (data between 1984 and 1996 taken)	Analysis of data	Not specified, but a large number	Extra-intestinal diseases in IBD	2−	59
Payne and Saul[801]	UK (data between 1994 and 1998 taken)	Survey and analysis of data	12 239 Responses	Common disorders in long term illnesses	2−	61
Ruigomez *et al*[802]	UK (1994)	Analysis of data	2956 Patients	Follow-up of patients with IBS	2−	50
Sanders *et al*[174]	UK (1999–2001)	Cross sectional intervention	1200 Participants	Diagnosis of coeliac disease	2+	70
Waddell and Hislop[357]	UK (not specified—circa 1999 onwards)	Analysis of patient data	390 Patients	Impact of alcohol related disease	2−	59
BSG[574]	UK (2002)	Guidelines	NA	Guidelines for dyspepsia management	2−	45
ONS[803]	UK (2001)	National data	Cancer trends between 1950 and 1999	Cancer trends in England and Wales	2+	66
Kennedy and Jones[22]	UK (Not specified—circa 1997–2000)	Cross sectional survey	3179 Survey responses	Prevalence of gastro-oesophageal reflux symptoms	2−	64
Watson *et al*[144]	UK (data between 1980 and 1999 taken)	Retrospective study of patient data	107 Patients	IBD in children	2−	57
Rockall *et al*[91]	UK (1993)	Analysis of patient data	4185 Cases	Incidence and mortality from GI haemorrhage	2−	57

Table A.12 Continued

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Level of evidence	Quality score (AGREE) (%)
Metcalf *et al*[843]	UK (data between 1987 and 1994 taken)	Analysis of patient data	160 Cases	Incidence and prevalence of primary biliary cirrhosis in Newcastle Upon Tyne	2−	61
Blower *et al*[804]	UK (1990–91)	Analysis of routine data	620 Cases	Upper GI disease and NSAID use	2+	57
Sawczenko *et al*[805]	UK (1999)	Survey	739 Responses	Childhood IBD	2−	50
James *et al*[838]	UK (data between 1987 and 1994 taken)	Collection and analysis of patient data	770 Cases	Primary biliary cirrhosis	2−	52
McKay *et al*[806]	UK (data between 1984 and 1995 taken)	Analysis of patient data	Over 10 000 cases	Acute pancreatitis	2−	57
Griffin *et al*[806]	UK (2002)	Analysis and summary of patient data	3361 Cases	Summary of incidence and mortality rates for upper GI cancers	3	43
Cooper *et al*[807]	UK (2001)	Analysis of NHS Direct data	Over 150 000 calls	Calls to NHS Direct and GI diseases	2−	55
CSCG[808]	UK (2003)	Commentary	NA	Response to NICE service guidance on upper GI cancers	Guideline	41
Jones[809]	International (1999)	Review of evidence	Around 20 articles	Methodological considerations	3	68
Feuer[595]	International (1999)	Commentary; review of evidence	Around 20 articles	Management of intestinal obstruction	3	50
NHS, NICE[810]	UK (2004)	National commentary; guidelines; recommendations	NA	Improving the outcomes in colorectal cancer	Guideline	70
South Wales Cancer Network[754]	UK (2003)	Service guidelines; recommendations	NA	Configuration of services	3	45
Aerts and Penninckx[266]	Europe (2003)	Review of evidence; commentary	Around 30 articles	Burden of gallstone disease	2−	52
Ashorn[811]	Europe (2003)	Review of evidence; commentary	Around 20 articles	Paediatric GI disease	3	43
Delvaux[210]	Europe (2003)	Review of evidence; commentary	Around 30 articles	Diverticular disease of the colon	3	48
Delvaux[812]	Europe (2003)	Review of evidence; commentary	Around 40 articles	Faecal incontinence	3	55
Delvaux[813]	Europe (2003)	Review of evidence; commentary	Around 30 articles	Functional bowel disorders and IBS	3	50
McNamara[319]	Europe (2003)	Review of evidence; commentary	Around 40 articles	Pancreatic disease	3	50
Burroughs and McNamara[227]	Europe (2003)	Review of evidence; commentary;	Around 30 articles	Liver disease	3	50
Talley *et al*[53]	USA (1987–90)	Survey of random sample of population	328 Survey responses	Prevalence of gastrointestinal symptoms in the elderly	2−	70
Section 3.3 Mortality						
Gut Week[103]	UK (2004)	Public information leaflets; commentary	NA	Digestive health in the UK	3	36
Munkholm[814]	International (2003)	Review of evidence; commentary	Around 25 articles	Incidence and prevalence of colorectal cancer	3	57
AGA[788]	USA (2001)	Review of evidence; expert commentary	Over 125 articles	Prevalence and costs of GI diseases	2+	68
de Dombal[544]	International; emphasis on UK (1994)	Commentary; review of evidence	Around 7 articles	Acute abdominal pain	3	57
Davis *et al*[815]	International (1990)	Analysis of data	Data from 1968 to 1987	International cancer mortality trends	2−	64
Stanley *et al*[816]	International (1988)	Review of trends	Around 20 articles	Mortality trends	2−	59
Khan *et al*[817]	International (data between 1979 and 1998 taken)	Analysis of mortality data	Not specified, but a large amount of data	Mortality trends	2−	57
Cucino and Sonnenberg[818]	USA (data between 1991 and 1996 taken)	Analysis of mortality data	Data of around 5000 patient deaths	Occupational mortality	2−	57
Farrokhyar *et al*[795]	International (literature between 1950 and 1999 taken)	Review of evidence	Around 200 articles	Epidemiology of IBD	1	66
Maroun *et al*[819]	Canada (not clear—circa late 1990s)	Analysis of data; review of evidence	NA; cases taken from databases	Costs of cancer management	2−	73
Fernandez *et al*[820]	Europe (data between 1955and 1989 taken)	Analysis of data	Not specified (but a large amount)	Trends in pancreatic cancer mortality	2+	61
La Vecchia *et al*[821]	Europe (data between 1970 and 1996 taken)	Analysis of data	Not specified (but a large amount)	Trends in primary liver cancer mortality	2+	55
Maheswaran *et al*[822]	UK (1993–95)	Analysis of mortality data	Over 10 000 cases	Trends in stomach cancer	2+	61
Taylor-Robinson *et al*[446]	UK (data between 1968 and 1996 taken)	Analysis of mortality data	A large amount	Mortality rates from intrahepatic cholangiocarcinoma	2−	57
ONS[803]	UK (2001)	National data	Cancer trends between 1950 and 1999	Cancer trends in England and Wales	2+	66
Payne *et al*[823]	UK (1991)	Cross sectional survey	3877 Survey responses	Comparison of prevalence rates	2−	73
Rockall *et al*[91]	UK (1993)	Analysis of patient data	4185 Cases	Incidence and mortality from GI haemorrhage	2−	57
Sharp *et al*[824]	UK (data between 1968 and 1992)	Analysis of cancer data	Not specified, but a large amount	Cancer incidence and mortality	2−	50
Blower *et al*[804]	UK (1990–1991)	Analysis of routine data	620 Cases	Upper GI disease and NSAID use	2+	57
Pye *et al*[825]	UK (1995–1996)	Analysis of patient data	910 Patients	Carcinoma of the oesophagus and stomach	2−	57
James *et al*[838]	UK (data between 1987 and 1994 taken)	Collection and analysis of patient data	770 Cases	Primary biliary cirrhosis	2−	52
McKay *et al*[806]	UK (data between 1984 and 1995 taken)	Analysis of patient data	Over 10 000 cases	Acute pancreatitis	2−	57
Bray *et al*[828]	Europe (1995)	Analysis of mortality data	Not specified, but a large amount	Cancer incidence and mortality	2+	66
AUGIS[826]	UK (2002)	Analysis and summary of patient data	3361 Cases	Summary of incidence and mortality rates for upper GI cancers	3	43
Rockall *et al*[398]	UK (1993–94)	Collection and analysis of patient data	Over 5000 cases	Outcomes after acute upper GI haemorrhage	2−	57
Tekkis *et al*[827]	UK (1999–2001)	Analysis of patient data	8077 Patients	Operative mortality in colorectal cancer	2−	70

Table A.12 Continued

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Level of evidence	Quality score (AGREE) (%)
NHS, NICE[671]	UK (2004)	National commentary; guidelines; recommendations	NA	Improving the outcomes in colorectal cancer	Guideline	70
South Wales Cancer Network[754]	UK (2003)	Service guidelines; recommendations	NA	Configuration of services	3	45
Burroughs and McNamara[227]	Europe (2003)	Review of evidence; commentary	Around 30 articles	Liver disease	3	50
Section 3.4 Morbidity						
Morris[787]	International (1991)	Commentary; review of research	Around 80 articles	Non-ulcer dyspepsia	3	59
Waddell and Hislop[357]	UK (not specified—circa 1999 onwards)	Analysis of patient data	390 Patients	Impact of alcohol related disease	2−	59
Payne *et al*[828]	UK (1991)	Cross sectional survey	3877 Survey responses	Comparison of prevalence rates	2−	73
McCulloch *et al*[829]	UK (1999–2002)	Cohort study; analysis of patient data	955 Patients	Mortality and morbidity in gastro-oesophageal cancer surgery	2−	64
Smith *et al*[775]	UK (not specified—circa 2003)	Survey of people with IBS symptoms	486 Cases	Management of IBS in primary and secondary care	2−	66
Spechler[20]	International (1992)	Review of research	Around 30 articles	Epidemiology of GERD	3	66
Section 3.5 Geographical variation						
Talley *et al*[830]	International (not specified—circa 1995 to 2000)	Survey of communities	Over 5000 survey responses	Classification of GI symptoms	2−	70
Wong *et al*[791]	China and Hong Kong (2002)	Survey of Chinese population	2209 Survey responses	Gastro-oesophageal reflux disease (GERD)	2−	80
Loftus[102]	International (2004)	Review of evidence	Around 170 articles	IBD	2−	59
Russel[793]	International (2000)	Review of evidence; commentary	Around 50 articles	Incidence of IBD	3	55
Moum and Ekbom[794]	International (2002)	Review of evidence	Around 90 articles	Incidence of IBD	3	55
Farrokhyar *et al*[795]	International (literature between 1950 and 1999 taken)	Review of evidence	Around 200 articles	Epidemiology of IBD	1	66
Maheswaran *et al*[822]	UK (1993–95)	Analysis of mortality data	Over 10 000 cases	Trends in stomach cancer	2+	61
Bray *et al*[828]	Europe (1995)	Analysis of mortality data	Not specified, but a large amount	Cancer incidence and mortality	2+	66
Levenstein *et al*[831]	International (data between 1991 and 1996 taken)	Survey of patients	2002 Patients	Cross-cultural variation in patients with IBD	2−	75
Section 3.6 Socioeconomic factors						
Dominitz *et al*[783]	USA (not specified—circa 2002; data between 1987 and 1996)	Analysis of routine data	Sample taken from 746 130 births	Infants born to mothers with IBD	2−	66
Hislop and Heading[785]	UK (2000–01)	Survey and analysis of routine data	53 Clinicians	Impact of alcohol related disease	2−	61
Neumann and Cooper[32]	UK (data between 1989 and 1996 taken)	Analysis of patient data	1101 Patients	Ethnic differences in gastro-oesophageal disease	2−	68
Wong *et al*[791]	China and Hong Kong (2002)	Survey of Chinese population	2209 Survey responses	Gastro-oesophageal reflux disease (GERD)	2−	80
Loftus[102]	International (2004)	Review of evidence	Around 170 articles	IBD	2−	59
Longobardi *et al*[832]	USA (1999)	Analysis of data	23 649 Records	Work losses due to IBD	2−	66
Longobardi *et al*[833]	Canada (1999)	Analysis of data	23,649 Records	Work losses due to IBD	2−	66
Fass *et al*[798]	USA (1992–95)	Analysis of patient data; survey	505 Patients	Functional bowel disorders (FBD) and sleep disorders	2−	73
Danese *et al*[834]	International (2004)	Expert commentary; summary of evidence	Around 40 articles	IBD and environmental factors	3	48
Payne and Saul[801]	UK (data between 1994 and 1998 taken)	Survey and analysis of data	12 239 Responses	Common disorders in long term illnesses	2−	61
Kennedy and Jones[22]	UK (not specified—circa 1997–2000)	Cross sectional survey	3179 Survey responses	Prevalence of gastro-oesophageal reflux symptoms	2−	64
McKinney *et al*[835]	UK (data between 1960 and 1990)	Analysis of cancer data	Not specified, but a large number	Oesophageal and gastric cancer incidence	2−	52
Bray *et al*[828]	Europe (1995)	Analysis of mortality data	Not specified, but a large number	Cancer incidence and mortality	2+	66
Dean *et al*[836]	USA (1999)	Survey of patients	11 604 Responses	Work productivity and gastro-oesophageal reflux disease (GERD)	2−	75
Bernstein *et al*[837]	Canada (1995–96)	Survey and analysis of patient data	Not clear, but a large number	Socioeconomic factors associated with IBD	2−	55
Sands *et al*[652]	USA (patients between 1991 and 1997)	Analysis of patient data	345 Patients	Risk of early surgery for Crohn's disease	2+	64
Vaughn *et al*[838]	UK (not specified—circa 1998)	Survey of patients and their relatives	Not clear—around 29 patients	Expressed emotion during the course of IBD	2−	59
Crane and Martin[839]	UK (not specified—circa 2002)	Survey of patients	58 Patients	Social learning, affective state, and passive coping in IBD and IBS	2−	68
Sewitch *et al*[634]	Canada (Not specified—circa 2001)	Survey of patients and physicians	10 Gastroenterologists and 200 patients	Patient-physician correlates in IBD	2−	75
Casati and Toner[840]	International (2000)	Review of evidence; commentary	Around 70 articles	Psychosocial aspects of IBD	3	55
Sewitch *et al*[841]	Canada (1999)	survey of patients	200 Patients	Psychosocial aspects in IBD	3	70
Soo *et al*[842]	International (studies from 1966 to present)	Systematic review	4 Studies	Psychological interventions for non-ulcer dyspepsia	2−	80
Guthrie[843]	International (2002)	Review of evidence	3 Studies	Psychodynamic-interpersonal therapy for functional bowel disorders	3	52
Kisely[844]	UK (1996–97)	Analysis of patient data	65 204 Patient records	Multiple readmissions	2−	59
Moum[585]	International (2000)	Review of evidence	Around 80 articles	Medical treatment for IBD	3	64
Tojek *et al*[845]	USA (not specified—circa 2000)	Survey of patients	62 Patients	Health status in IBD	2−	75
Jahnsen *et al*[846]	Norway (not specified—circa 2003)	Population based study	60 Patients	Body composition in patients with IBD	2+	66
de Rooy *et al*[687]	Canada (not specified—circa 2001)	Survey of patients	259 Patients	Concerns of patients with IBD	2−	68
Ward *et al*[738]	International (circa 1998)	Review of evidence	Around 40 articles	Management of IBD	2−	70
Hatch[847]	Not specified—appears to be USA (circa 1996)	Case study	2 Patients	Treatment of bowel obsessions	3	70

Table A.12 Continued

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Level of evidence	Quality score (AGREE) (%)
Guthrie *et al*[848]	UK (not specified—circa 2003)	Survey of patients; analysis of patient data	107 Patients	Cluster analysis to define patient subgroups for IBS	2−	75
Drossman[849]	International (1999)	Review of evidence	Around 40 articles	Psychosocial factors in IBS	3	66
Payne *et al*[823]	UK (1991)	Survey of population in Rotherham	3877 Survey responses	Deprivation and morbidity	2−	70
Section 3.7 Quality of life						
Pachler and Wille-Jorgensen[850]	International (2002–03 (no restriction on date of studies)	Systematic review	8 Studies	Quality of life (QoL) after rectal resection for cancer	1	75
Yacavone *et al*[851]	International (review of evidence: 1966 to 1999)	Review of evidence	Around 80 articles	QoL in gastroenterology	2+	68
Simren *et al*[852]	Sweden (not specified—circa 2002)	Survey of patients	83 Patients	QoL in IBD	2−	66
Rubin *et al*[676]	UK (not specified—circa 2003)	Survey of patients	409 Responses	QoL in IBD	2−	68
Halder *et al*[450]	USA (not specified—circa 2003)	Case-control study	112 Patients; 110 controls	GI disorders and QoL	2+	66
Hahn *et al*[853]	UK and USA (not specified—circa 1999)	Survey of patients	Around 600 patients	Impact of IBS on QoL	2−	66
Blondel-Kucharski *et al*[854]	France (not specified—circa 2001)	Survey of patients	231 Patients	QoL in Crohn's disease	2−	66
Akehurst *et al*[740]	UK (1998)	Survey of patients	161 Patients	QoL and cost impact of IBS	2+	77
Gonsalkorale *et al*[855]	UK (not specified—circa 2002)	Survey of patients	78 Patients	Cognitive change in patients during IBS	2−	70
Moayyedi and Mason[747]	UK (1992–94)	Analysis of patient data; survey of patients	Not clear; over 8000 patients	Economic consequences of dyspepsia	3	82
Borgaonkar and Irvine[447]	International (2000)	Review of evidence between 1966 and 1999	Around 140 articles	QoL measurement in gastrointestinal and liver disorders	2+	80
El-Serag *et al*[856]	International (2001)	Systematic review of evidence between 1980 and 2001	17 articlesArticles	QoL of people with IBS	1+	77
Koloski *et al*[449]	Australia (not clear—circa 1996–2000)	Survey of random sample of population	2910 Survey respondents	Impact of functional GI disorders on QoL	2−	70
O'Keefe *et al*[857]	USA (1987–90)	Survey of random sample of population	530 Survey responses	Bowel disorders and its impact on QoL in the elderly	2−	75
Gralnek *et al*[858]	USA (1994–1998)	Survey of patients	877 Patients	Impact of IBS on health related QoL	2−	73
Section 4.1 Care pathways						
McNamara *et al*[881]	International; emphasis on USA (2000)	Review of evidence; expert commentary	Around 70 articles	Non-ulcer dyspepsia (NUD)	2−	64
Association of Coloproctology of GB and Ireland[505]	UK (2001)	Specification of guidelines	NA	Guidelines for the management of colorectal cancer	Guideline	61
CSCG[808]	UK (2003)	Commentary	NA	Response to NICE service guidance on upper GI cancers	Guideline	41
Pfau *et al*[859]	USA (1997–1999)	Implementation of care pathway	421 patients	Clinical care pathway for the management of acute nonvariceal upper GI bleeding	2−	77
Kisely[844]	UK (1996–1997)	Analysis of patient data	65204 patient records	Multiple readmissions	2−	59
Feuer[595]	International (1999)	Commentary; review of evidence	Around 20 articles	Management of intestinal obstruction	3	50
Section 4.2 Workforce						
Garvican[607]	UK (1998)	Commentary; cost analysis	NA	Colorectal cancer screening	3	70
Duff *et al*[606]	UK (2002)	Audit	65 Patients	Waiting times for treatment of rectal cancer in northwest England	3	52
Slade *et al*[860]	UK (not specified—circa 1998)	Survey of patients; treatment intervention	232 Patients	Serological testing for *H pylori* to reduce workload	2−	61
Lamy and McNamara[861]	Europe (data between 1996 and 2001)	Survey of experts	Not clear—around 25 European countries	Gastroenterology and hepatology services in Europe	3	59
Association of Coloproctology of GB and Ireland[753]	UK (2001)	Analysis of audit data; expert commentary and recommendations	8 Main sources of audit data	Resources for coloproctology	3	52
Section 4.3.1 Primary care						
Cumberland *et al*[858]	UK (not specified—circa 2003)	Survey and follow-up	85 Practices; over 1000 cases	Infectious intestinal disease (IID) in England	2+	73
Section 4.3.2 Inpatients						
Hislop and Heading[785]	UK (2000–01)	Survey and analysis of routine data	53 Clinicians	Impact of alcohol related disease	2−	
Waddell and Hislop[357]	UK (Not specified—circa 1999 onwards)	Analysis of patient data	390 patients	Impact of alcohol related disease	2−	
Section 4.3.3 Outpatients						
Rayner *et al*[862]	UK (1997–98)	Analysis of patient data	1203 Patients	Outpatient review practices	2−	57
Section 4.3.4 Procedures						
Westbrook *et al*[863]	Australia (data between 1986 and 1990 taken)	Analysis of patient data	Unclear—over 17 000 cases	Upper GI tract investigations in the elderly	2−	61
Grassi[864]	Italy (data between 1991 and 1999)	Commentary on data	Not clear, but a large number	Endoscopy activity	4	36
BSG[865]	UK (1987)	Commentary; review of evidence	Around 20 articles	Requirements for colonoscopy	3	57
Section 4.6.1 Access						
Froehlich *et al*[600]	Switzerland; comparisons with UK (1994–95)	Review of evidence; analysis of patient data	8135 Patients	Overuse of upper GI endoscopy in primary care	2−	61
Gralnek[501]	International (2002)	Commentary	NA	Outpatient management of low risk non-variceal upper GI haemorrhage	4	50
Silcock and Bramble[502]	UK (1994)	Survey	333 Responses	Survey of current practice in open access gastroscopy (OAG)	2−	68
Section 4.6.2 Inequalities						
Watt[503]	UK (2002)	Commentary	NA	The inverse care law	4	39
Section 4.6.3 Waiting lists						

Table A.12 Continued

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Level of evidence	Quality score (AGREE) (%)
Association of Coloproctology of GB and Ireland[503]	UK (2001)	Specification of guidelines	NA	Guidelines for the management of colorectal cancer	Guideline	61
Flashman *et al*[507]	UK (2000–01)	Audit	249 Patients	Two week standard for bowel cancer	2−	61
Duff *et al*[506]	UK (2002)	Audit	65 Patients	Waiting times for treatment of rectal cancer in northwest England	3	52
Parente *et al*[866]	Italy (1999–2000)	Audit	142 Patients	Audit of gastroscopy	2−	61
Dunnill and Pounder[504]	UK (articles between 1966 and 2002)	Literature review	Around 40 articles	Outpatient services	2−	70
Hellier[508]	UK (1999–2001)	Survey of GI units	210 GI units	Two week target for investigation cancer patients	3	55
Section 4.6.4 Patient safety						
Van Kouwen *et al*[522]	Netherlands (1994–98)	Analysis of endoscopy services and patient data	218 Patients	Upper GI endoscopy for older patients	2−	57
Navarro and Hanauer[509]	International (2003)	Review of evidence; commentary	Around 70 articles	Safe treatment for IBD	3	59
Akehurst and Kaltenthaler[510]	International (trials between 1987 and 1998)	Review of RCTs	45 RCTs	Treatment of IBS	1	66
Dick *et al*[511]	UK (2002)	Analysis of prescriptions	308 Patientsand 777 prescriptions	Use of unlicensed and off-label drugs in paediatric GI diseases	2−	61
Chan and Graham[512]	International (2004)	Review of evidence	Around 60 articles	Prevention of NSAID GI complications	3	73
Sheen and Colin-Jones[513]	International; emphasis on UK (2001)	Review of evidence	Around 100 articles	Over-the-counter drugs for GI diseases	3	68
Abbas *et al*[520]	Not specified—circa 2003)	Survey of patients; analysis of patient data	1287 Patients	Outpatient upper GI endoscopy	2−	64
Bloor and Maynard[514]	UK (1996)	Review of evidence	Around 40 articles	Prescription of NSAIDs	3	73
Feagan[515]	International (2003)	Review of evidence	Around 90 articles	Maintenance treatment for IBD	2+	61
Ripamonti *et al*[526]	International (1993)	Literature review	Around 40 articles	Management of bowel obstruction in patients with cancer	2−	75
Cook *et al*[517]	International (articles from 1966 onwards)	Meta-analysis	30 RCTs	Endoscopic therapy for acute non-variceal upper GI haemorrhage	1	73
Page *et al*[524]	USA (Patientsbetween 1989 and 1999)	Analysis of patient data	Over 100 patients	Surgical risk in elderly patients with IBD	2−	59
Moorthy *et al*[525]	UK (data between 1991 and 2001)	Analysis of patient data	48 Patients	Patients undergoing laparoscopic surgery for Crohn's disease	2−	64
Yim *et al*[527]	Not specified—probably USA (1996–99)	Analysis of patient data	29 Patients	Enteral stents for patients with upper GI obstruction	2+	64
Heuschkel *et al*[518]	USA and UK (2000)	Survey of patients	208 Survey responses	Complementary medicine used by children for IBD	2−	80
Quine *et al*[521]	UK (1991)	Survey of clinicians	39 Hospitals; 383 clinicians	Audit of upper GI endoscopy	2−	64
Section 4.6.5 Information to patients and practitioners						
Dick *et al*[511]	UK (2002)	Analysis of prescriptions	308 Patients and 777 prescrip-tions	Use of unlicensed and off-label drugs in paediatric GI diseases	2−	61
Sheen and Colin-Jones[513]	International; emphasis on UK (2001)	Review of evidence	Around 100 articles	Over-the-counter drugs for GI diseases	3	68
Sewitch *et al*[534]	Canada (not specified—circa 2001)	Survey of patients and physicians	10 Gastroenterologists and 200 patients	Patient-physician correlates in IBD	2−	75
Stone *et al*[141]	UK (2002)	Analysis of patient data	Over 86 000 patients	Management of IBD	2−	73
Sewitch *et al*[535]	Canada (1999)	Survey of patients and clinicians	10 Clinicians; 153 patients	Patient non-adherence to medication in IBD	2−	75
Mansfield *et al*[537]	UK (not specified—circa 1997)	Survey of clinicians and patients	732 Patients; 6 gastroenterology clinics	Information for patients about IBD	2−	64
Thompson *et al*[532]	UK (not specified—circa 2003)	Survey of patients and nurses	402 Patients; 62 nurses	Information for patients undergoing gastroscopy	2−	73
Hawkey and Hawkey[530]	UK (not specified—circa 1989)	Survey of patients	751 Survey responses	Information for patients with GI diseases	2−	70
NICE[671]	UK (2004)	Summary of guidelines	NA	Information leaflet for patients	3	30
Greiner *et al*[536]	USA (2002)	Survey of patients	Not clear—around 800 patients	Barriers to colorectal cancer screening	2−	70
Institute of Food Research[529]	UK (2004)	Information and advice to the public	NA	Diet and health	3	41
Mukherjee *et al*[528]	UK (not specified—circa 2001)	Qualitative study	24 Patients	Parents' experiences of IBD	2−	75
Section 4.6.6 Diagnosis and complications in care						
Jenkins[541]	UK (2001)	Commentary, review of evidence	NA	Paediatric IBD	3	52
Mamula *et al*[790]	International; emphasis on USA (data between 1977 and 2000 taken)	Analysis of routine data	82 Patients	IBD in children under 5 years of age	2−	70
de Dombal[544]	International; emphasis on UK (1994)	Commentary; review of evidence	Around 7 articles	Acute abdominal pain	3	57
Gatta *et al*[561]	Europe (not specified—data collected between 1988 and 1999)	Analysis of cancer data	2720 Patients	Colorectal cancer in Europe	2−	59
Camilleri-[543]	USA (2001)	Review of evidence; commentary	Around 170 articles	Management of IBS	3	64
Limpert *et al*[554]	USA (patients between 1992 and 2002 were used	Analysis of patient data	181 Patients	Colon and rectal cancer in the elderly	2−	61
Sanders *et al*[174]	UK (1999–2001)	Cross sectional intervention	1200 Participants	Diagnosis of coeliac disease	2+	70
Spray *et al*[540]	UK (patients between 1994 and 1998 were used)	Analysis of medical records	Around 100 patients	IBD in children	2+	52
Hamilton and Sharp[556]	UK (evidence between 1966 and 2002 taken)	Assessment of clinical guidelines	Around 100 articles	Guidelines for the diagnosis of colorectal cancer	2+	66

Table A.12 Continued

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Level of evidence	Quality score (AGREE) (%)
Ofman *et al*[645]	USA (not specified—circa 2002)	Application of decision analysis	NA	Management strategies for gastro-oesophageal reflux disease	2−	75
Brignoli *et al*[648]	Switzerland (not specified—circa 1997)	Case-control study	1078 Patients	Diagnostic strategies for dyspepsia	2+	70
Summerton and Paes[549]	UK (1997–98)	Survey; audit	275 Responses	Clinical assessment of patients with large bowel symptoms	2−	70
Farmer *et al*[639]	USA (not specified—circa 2000)	Evaluation of practice; analysis of patient data	119 Patients	Diagnostic accuracy for IBD	2−	61
Shah *et al*[662]	USA (1995–98)	Review of patient data	168 Patients	Use of colonoscopy and biopsy	2−	61
Erickson and Glick[563]	International (studies between 1974 and 1982 taken)	Review of evidence	Around 80 articles	Benefits of oesophagogastroduodenoscopy	2−	61
Drossman *et al*[651]	USA (1996–98)	Survey of patients	211 Patients	Factors pointing to the severity of functional bowel disorders	2−	70
Sands *et al*[652]	USA (patients between 1991 and 1997)	Analysis of patient data	345 Patients	Risk of early surgery for Crohn's disease	2+	64
Lang *et al*[666]	Finland (1996–97)	Observational study	503 Patients	Resource use in gastroenterological surgery	2−	70
Tunaci[558]	International (2002)	Commentary	NA	Imaging of GI cancers	3	52
Quine *et al*[867]	UK (1991)	Audit	15 Hospitals in East Anglia and northwest England	Audit of upper GI endoscopy	2−	59
Parry *et al*[664]	UK (not specified—circa 2001)	Retrospective study of patient data	52 Patients	Push enteroscopy	2−	61
Diamanti *et al*[650]	Italy (not specified—circa 2002)	Analysis of patient data	6 Patients	Patients with ultra-short bowel disease	2−	52
Yasui *et al*[665]	International (cancer cases between 1993 and 1998)	Analysis of cancer cases	9241 Cases	Molecular-pathological diagnosis of GI tissues for cancer histopathology	2−	68
Schofield[567]	UK (data between 1994 and 1998 taken)	Review of medical cases	245 Cases	Medical negligence in coloproctology	3	57
Hansen *et al*[647]	Denmark (1991–92)	Interview of patients	612 Patients	Management of dyspeptic patients in primary care	2−	70
Talley *et al*[646]	International (1991)	Review of evidence	Around 180 articles	Classification and guidelines for the diagnosis and management of functional dyspepsia	3	80
Mulcahy *et al*[868]	UK (data between 1989 and 1998 taken)	Retrospective review of patients data	9795 Patients	Patterns of sedation use for diagnostic gastroscopy	2−	55
Hin *et al*[878]	UK (1996–97)	Case finding study	30 Patients	Coeliac disease in primary care	2−	66
Schmulson and Chang[542]	International (1999)	Review of evidence	Around 50 articles	Diagnostic approach to IBS	3	70
Martin *et al*[555]	UK (1994)	Analysis of patient data; survey	115 Patients	Delays in the diagnosis of oesophagogastric cancer	2−	61
Angelelli *et al*[653]	International (2003)	Review of evidence; commentary	Around 40 articles	Computed tomography and acute bowel ischaemia	3	66
Berg *et al*[638]	International (2001)	Review of evidence; commentary	Around 40 articles	Acute surgical emergencies in IBD	3	64
Rockey *et al*[869]	USA (2000–04)	Comparison of imaging tests	614 Patients	Comparison of colon imaging tests	2+	82
Halligan and Atkin[870]	UK (2005)	Commentary	NA	Virtual colonoscopy	4	55
Section 4.7.1 Guidelines for care						
Chiang *et al*[997]	Australia (2001)	Analysis of patient data	167 Patients	Acute pancreatitis management	2+	68
BSG[574]	UK (2002)	Guidelines	NA	Guidelines for dyspepsia management	Guideline	45
Hamilton and Sharp[556]	UK (evidence between 1966 and 2002 taken)	Assessment of clinical guidelines	Around 100 articles	Guidelines for the diagnosis of colorectal cancer	2+	66
Association of Coloproctology of GB and Ireland[505]	UK (2001)	Specification of guidelines	NA	Guidelines for the management of colorectal cancer	Guideline	61
Flashman *et al*[607]	UK (2000–01)	Audit	249 Patients	Two week standard for bowel cancer	2−	61
Kubba and Whyman[606]	UK (1994)	Survey of clinicians	81 Responses	Survey of practice amongst Scottish gastroenterologists	2−	59
DoH[605]	UK (2004)	Guidelines	NA	Renal services implementation strategy	Guideline	45
Rockall *et al*[998]	UK (1993)	Analysis of patient data	2531 Patients	Management of upper GI haemorrhage	2−	57
Limburg and Ahlquist[569]	International; emphasis on USA (2002)	Commentary	NA	Management of colorectal cancer	4	45
Ahmed *et al*[671]	International (studies from 1996 onwards)	Systematic review	Four RCTs	Supportive care for patients with GI cancer	1	75
McNamara *et al*[681]	International; emphasis on USA (2000)	Review of evidence; expert commentary	Around 70 articles	Non-ulcer dyspepsia (NUD)	2−	64
Meineche-Schmidt[871]	Denmark (1999–2000)	RCT and follow-up	829 Patients	Healthcare consumption	2+	57
Wexner *et al*[600]	USA (2001)	Commentary; consensus	NA	Principles for privileging and credentialing for endoscopy and colonoscopy	4	52
Bardou *et al*[672]	USA (1999–2002)	Case-control study	Over 80 000 patients	Treatment of oesophageal cancer	2+	70
Bodger *et al*[696]	UK (not specified—circa 1996)	Analysis of physicians' practice data	9 GPs	Prescriptions in primary care	2−	66
Delaney *et al*[579]	International (2003)	Systematic review	20 RCTs	Management strategies for dyspepsia	1	82
Fisher *et al*[699]	USA (1995–1996)	Analysis of patient data	3546 Patients	Mortality and follow-up colonoscopy after colorectal cancer	2+	61
Mourn[585]	International (2000)	Review of evidence	Around 80 articles	Medical treatment for IBD	3	64
Feuer[595]	International (1999)	Commentary; review of evidence	Around 20 articles	Management of intestinal obstruction	3	50
Conio *et al*[691]	International (2001)	Commentary; review of evidence	Around 80 articles	Endoscopic treatment of pancreatico-biliary malignancies	3	57

Table A.12 Continued

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Level of evidence	Quality score (AGREE) (%)
Talley *et al*[646]	International (1991)	Review of evidence	Around 180 articles	Classification and guidelines for the diagnosis and management of functional dyspepsia	3	80
Drossman *et al*[651]	International (not specified—circa 1994)	Survey of patients	270 Patients	Measuring health status and severity of illness for functional bowel disorders	2−	77
Jeffery *et al*[668]	International (studies from 1966 onwards)	Systematic review	5 RCTs	Follow-up strategies for colorectal cancer	1	75
Axon *et al*[602]	UK (not specified—circa 1995)	Audit; survey of clinicians	350 General physicians, 400 surgeons, 477 gastroenterologists, 70 GPs	Guidelines on appropriate indications for upper GI endoscopy	2+	77
Allum *et al*[670]	UK (2002)	Review of evidence; recommendations	Around 340 articles	Guidelines for the management of oesophageal and gastric cancer	Guideline	75
Raine *et al*[693]	UK (2002)	Qualitative research into GPs' beliefs	46 GPs	GPs' perceptions of chronic disease syndrome and IBS	2−	73
Carter *et al*[684]	UK (2004)	Review of evidence; recommendations	Around 150 articles	Guidelines for the management of IBD	Guideline	75
Ryder[594]	UK (2003)	Review of evidence; recommendations	Around 150 articles	Guidelines for the diagnosis and treatment of hepatocellular carcinoma	Guideline	75
Verma and Giaffer[588]	UK (not specified—circa 2001)	Survey of patients; analysis of patient data	Around 1000 patients	*H pylori* eradication	2−	77
Milne *et al*[672]	UK (1993)	Survey of gastroenterologists	670 Survey responses	*H pylori* and upper GI disease	2−	64
Parry *et al*[678]	UK (1995)	Survey of GPs	140 GPs	GPs' management of dyspepsia in primary care	2−	73
Probert *et al*[604]	UK (not specified—circa 1993)	Survey of gastroenterologists	236 Survey responses	Gastroenterologists' care profile for patients with IBD	2−	61
Whitaker *et al*[689]	UK (1997)	Commentary; review of guidelines for care	Around 50 articles	Management of GI disease in primary care	3	59
Paton[590]	UK (1992–93)	Economic analysis; RCT	255 Patients	Comparison of two treatments for gastro-oesophageal reflux disease	2+	64
Wright *et al*[686]	UK (not specified—circa 2001)	Analysis of patient data	6037 Patients	Implementation of *H pylori* eradication therapy	2−	61
NICE[577]	UK (2003)	Guidelines	NA	Managing adult patients with dyspepsia	Guideline	57
Spiegel *et al*[675]	International; emphasis on USA (2002)	Review of guidelines; economic modelling	Around 120 articles	Competing strategies for dyspepsia management	2−	75
Bodger *et al*[676]	UK (1995–1996)	Observational study	340 Patients	Implications of BSG dyspepsia guidelines	2−	68
Association of coloproctology of GB and Ireland[805]	UK (1999)	Guidelines for coloproctology	NA	Guidelines for coloproctology	Guideline	45
Manes *et al*[601]	Italy (1998)	Analysis of patient data	706 Patients	Appropriateness and diagnostic yield of upper GI endoscopy in an open access system	2−	64
Tremaine *et al*[683]	USA (1997)	Survey and analysis of patient data	Not clear—around 100 patients	Practice guidelines in IBD	2+	61
Section 4.7.2 Incidence of cancer						
Forman *et al*[873]	UK (data up to 1992; published 2003)	Analysis of data	Over 1.5 million cases	Cancer prevalence in the UK	2−	66
Munkholm[814]	International (2003)	Review of evidence; commentary	Around 25 articles	Incidence and prevalence of colorectal cancer	3	57
AGA[788]	USA (2001)	Review of evidence; expert commentary	Over 125 articles	Prevalence and costs of GI diseases	2+	68
Sant *et al*[874]	Europe (2001)	Analysis of routine data	1 836 287 Patient records	Cancer survival rates	2−	57
Stanley *et al*[816]	International (1988)	Review of trends	Around 20 articles	Mortality trends	2−	59
Askling *et al*[875]	Sweden (data between 1952 and 1995 taken)	Analysis of patient data	114 102 Records	Colorectal cancer rates	2+	52
Lynch and de la Chapelle[876]	International; emphasis on USA (2003)	Commentary; review of evidence	Around 100 articles	Hereditary colorectal cancer	3	52
ONS[441]	UK (data between 1991 and 2001)	Update on cancer survival rates	NA	Cancer survival rates	NA	NA
Sharp *et al*[824]	UK (data between 1968 and 1992)	Analysis of cancer data	Not specified, but a large amount	Cancer incidence and mortality	2−	50
McKinney *et al*[835]	UK (data between 1960 and 1990)	Analysis of cancer data	Not specified, but a large amount	Oesophageal and gastric cancer incidence	2−	52
Pye *et al*[825]	UK (1995–96)	Analysis of patient data	910 Patients	Carcinoma of the oesophagus and stomach	2−	57
Bray *et al*[828]	Europe (1995)	Analysis of mortality data	Not specified, but a large amount	Cancer incidence and mortality	2+	66
Bardou *et al*[672]	USA (1999–2002)	Case-control study	Over 80 000 patients	Treatment of oesophageal cancer	2+	70
Rhodes and Campbell[877]	International (2002)	Review of evidence	Around 70 articles	Inflammation and colorectal cancer	3	61
AUGIS[826]	UK (1999)	Commentary and recommendations	NA	Service provision	4	35
Section 4.7.4 Screening (includes surveillance)						
Mpofu *et al*[611]	International; emphasis on UK (2004)	Systematic review	9 Key reports	Strategies for detecting colon cancer	1	84
Rozen *et al*[608]	International (2002)	Expert commentary; recommendations	NA	Worldwide cancer screening	3	73
Mandel *et al*[609]	USA (longitudinal study—results from 70s, 80s, and 90s)	Analysis of patient data	46 551 Participants	Screening for colorectal cancer	2+	64
Garvican[607]	UK (1998)	Commentary; cost analysis	NA	Colorectal cancer screening	3	70
Doria-Rose *et al*[633]	USA (data between 1994 and 2000 taken)	Analysis of patient data	Over 70 000 participants	Screening intervals	2−	70

Table A.12 Continued

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Level of evidence	Quality score (AGREE) (%)
Lin *et al*[613]	USA (1999)	Survey of clinical practice	103 Responses	Current practices in Barrett's oesophagus	2−	73
UK Colorectal Cancer Screening Pilot Group[610]	UK (2000–03)	Pilot/audit	271 646 Participants	Screening for colorectal cancer	2−	64
Hill *et al*[628]	UK (not specified—circa 2000)	Assessment of practice	109 Families	Screening for colorectal cancer	2−	57
Kronborg[627]	Europe (1992)	Assessment of guidelines	Around 50 articles	Screening guidelines for colorectal cancer	2−	68
Dubinsky *et al*[623]	USA (2000)	Economic and statistical analyses	Not specified	Economic issues for competing diagnostic strategies	2−	75
Gerson *et al*[615]	USA (2003)	Economic modelling	Not specified, but a large amount	Cost effectiveness of endoscopic screening and surveillance for GERD	2−	73
Lewis[878]	USA (2000)	Commentary	NA	Screening of colorectal cancer	4	43
Macafee and Scholefield[632]	UK (2002)	Commentary; review of evidence	Around 40 articles	Screening of colorectal cancer	3	57
Ganz *et al*[626]	USA (1999)	Survey; RCT	36 Provider organisations	Screening of colorectal cancer	2+	68
Gross *et al*[612]	USA (1998)	Survey of gastroenterologists	279 Survey responses	Management of Barrett's oesophagus	2−	80
Loeve *et al*[621]	USA (circa 2000—projected data between 1993 and 2023)	Data simulation	Baseline data from routine sources and expert opinion	Colorectal cancer screening	2−	77
Rae[630]	Australia (data between 1987 and 1996 taken)	Analysis of patient data	3845 Patients	Community screening for colorectal cancer	2−	61
Nietert *et al*[620]	USA (circa 2002)	Economic modelling	NA	Cost effectiveness of screening for chronic gastroesophageal refulx disease	2−	75
Ramsey *et al*[617]	USA (data between 1993 and 1999 taken)	Analysis of patient data	206 Patients	Costs of screening for colorectal cancer	2−	70
Sonnenberg *et al*[629]	USA (1998)	Economic modelling	NA	Costs of screening for colorectal cancer	2−	70
Renehan *et al*[618]	UK (2002)	Review of evidence	5 RCTs	Cost effectiveness of surveillance for colorectal cancer	2+	80
Helm *et al*[625]	International; emphasis on USA (not specified—circa 2003)	Review of evidence; commentary	Around 60 articles	Strategies for colorectal cancer screening	3	80
Taylor *et al*[629]	UK (not specified—circa 2000)	Survey of patients	4153 Survey responses	Acceptability of flexible sigmoidoscopy screening	2−	64
Bejes and Marvel[624]	USA (not specified—circa 1992)	Case-control study	546 Patients	Offering colorectal cancer screening to patients	2−	61
Cotton *et al*[635]	USA (2000–01)	Non-randomised trial	615 Patients	Virtual colonoscopy	2−	64
Hur *et al*[634]	USA (2004)	Mathematical modelling	Data from 1998 to 2002	Computed tomographic colonography	2−	70
Section 4.7.5 Genetics						
Lynch and de la Chapelle[876]	International; emphasis on USA (2003)	Commentary; review of evidence	Around 100 articles	Hereditary colorectal cancer	3	52
Polito II *et al*[880]	USA (data between 1985 and 1991)	Analysis of patient data	552 Patients	Genetic anticipation in Crohn's disease	2−	55
Yasui *et al*[665]	International (cancer cases between 1993 and 1998)	Analysis of cancer cases	9241 Cases	Molecular-pathological diagnosis of GI tissues for cancer histopathology	2−	68
Morris-Yates *et al*[881]	Australia (participants between 1984 and 1986)	Structured interviews of patients; genetic modelling	686 Individual twins	Genetic contribution to functional bowel disorders	2−	70
Faybush *et al*[882]	Canada (patient data between 1984 and 1995)	Analysis of patient data	315 Patients	Generational differences in IBD: genetic, bias, and temporal effects issues	2−	59
Section 4.7.6 Prevention						
Chan and Graham[512]	International (2004)	Review of evidence	Around 60 articles	Prevention of NSAID GI complications	3	73
Muller and Sonnenberg[652]	USA (1988–93)	Analysis of patient data	Over 16 000 patients	Prevention of colorectal cancer	2+	55
Hulscher *et al*[651]	International (review of studies from 1966 onwards)	Systematic review	55 Studies	Prevention in primary care	1	77
O'Connor and Sebastian[654]	Europe (2003)	Review of evidence; commentary	Around 60 articles	Burden of *H pylori* in Europe	3	50
Section 4.7.6 Devolution						
Greer[883]	UK (2004)	Commentary; review of evidence	Around 30 articles	Devolution and the NHS	3	52
Section 4.7.7 Managed cancer networks						
CSCG[808]	UK (2003)	Commentary	NA	Response to NICE service guidance on upper GI cancers	Guideline	41
South Wales Cancer Network[754]	UK (2003)	Service guidelines; recommendations	NA	Configuration of services	3	45
Section 4.7.8 Quality assessment						
Garvican[607]	UK (1998)	Commentary; cost analysis	NA	Colorectal cancer screening	3	70
Association of Coloproctology of GB and Ireland[605]	UK (2001)	Specification of guidelines	NA	Guidelines for the management of colorectal cancer	Guideline	61
Lilford *et al*[884]	UK (not specified—circa 2004)	Review of evidence	Around 90 articles	Managing performance in acute medical care	3	73
Rockall *et al*[885]	UK (1993–94)	Collection and analysis of patient data	Over 5000 cases	Outcomes after acute upper GI haemorrhage	2−	57
Johansen *et al*[886]	USA (applicable internationally) (2000)	Commentary	NA	Quality and outcomes assessment in GI endoscopy	3	45
Dougall *et al*[887]	UK (1997)	Survey of patients	84 Patients	Patient experiences of an open access flexible sigmoidoscopy service	2−	77
Feuer and Broadley[888]	International (studies from 1966 onwards)	Systematic review	25 Articles	Surgery for malignant bowel obstruction in GI cancers	2+	73
Fletcher[889]	Australia (1997)	Review of evidence	Around 40 articles	Management of peptic disease	3	64
Bodenheimer *et al*[890]	USA (2002)	Case study	Four healthcare organisations	Improving primary care for chronic illness	3	61

Table A.12 Continued

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Level of evidence	Quality score (AGREE) (%)
van der Eijk *et al*[891]	International (2000)	Literature review	Around 80 articles	Quality of care in IBD	3	68
Gilmore *et al*[892]	UK (1991)	Audit	1500 Completed audit forms	Audit of liver biopsy	2−	61
Jones[809]	International (1999)	Review of evidence	Around 20 articles	Methodological considerations	3	68
McCulloch *et al*[829]	UK (1999–2002)	Cohort study; analysis of patient data	955 Patients	Mortality and morbidity in gastro-oesophageal cancer surgery	2−	64
Kurlberg *et al*[893]	Sweden (2004)	Commentary	NA	Access to patient information	3	43
Bass *et al*[695]	UK (1994)	Analysis of patient data	762 Patients	Frequent attendants at a gastroenterology clinic	2−	61
Palmer and Morris[894]	UK (2004)	Commentary	NA	Colonoscopy practice in England	4	41
Bowles *et al*[752]	UK (not specified—circa 2003)	Survey of clinicians and patients	9223 Cases	Colonoscopy practice in the UK	2−	66
Macarthur *et al*[895]	UK (1993)	Audit of deaths from large bowel surgery	187 Cases	Deaths from large bowel surgery	2−	61
van der Eijk *et al*[896]	International (1998)	Observational study/survey	Physicians and health workers from 8 countries	Best practice in IBD	2−	73
Eaden *et al*[897]	UK (not specified—circa 1998)	Survey of clinicians	341 Responses	Screening for colonic cancer by gastroenterologists	2−	64
Section 5.1 Where should services be provided (primary, secondary, tertiary—includes patient roles)?						
Scott *et al*[898]	Canada (not specified—circa 2003)	Survey of patients	14 Patients	Use of complementary therapies for IBD	2−	55
Hinton[899]	UK (not specified—circa 1994)	Survey	415 Patients; focus on 77 of these	Transfer of care from home to hospital	2−	45
Shepperd and Iliffe[689]	International (1996–2001)	Systematic review	16 Trials	Hospital versus home care	1	66
Barrett *et al*[900]	UK (1998–99)	Retrospective study; analysis of routine data	903 Patients	Description of intermediate care service	2−	57
Gill and Martin[901]	New Zealand (1995–97)	Analysis of patient data	3351 Patients	Distance from hospital	2−	59
South Wales Cancer Network[754]	UK (2003)	Service guidelines; recommendations	NA	Configuration of services	3	45
Whynes and Thornton[902]	UK (not specified—circa 1998)	Economic/statistical analysis	Not clear—data for around 18 wards	Concentration in primary care	2−	61
Section 5.2 What types of services should be provided (includes current provision)?						
Gonsalkorale *et al*[903]	UK (not specified—circa 2002)	Survey of patients	232 Patients	Hypnotherapy in IBS	2−	75
van Dam *et al*[904]	Not specified—probably international (not specified—circa 2004)	Review of clinical trials	Review of around 10 papers	Review of computerised tomographic colonography (CTC)	2+	70
Podolsky[905]	Not specified—probably international (2004)	Expert commentary	NA	CTC	4	41
Silcock and Bramble[502]	UK (1994)	Survey	333 Responses	Survey of current practice in open access gastroscopy (OAG)	2−	68
Baron *et al*[906]	USA (2002–03)	Cohort study	498 Patients	Demand for colonoscopy	2+	66
Cheung *et al*[907]	UK (1999)	Survey and structured interviews	160 GPs	Shared care in gastroenterology	2−	61
Moody *et al*[772]	UK (not specified—circa 1993)	Survey of GPs	259 Responses	GPs views on requirements for gastroenterology services	2−	70
Smith *et al*[908]	UK (not specified—circa 2000)	Survey of patients	100 Responses	Impact of a nurse-led counselling service	2−	68
Ilnyckyj *et al*[909]	Canada (1996–1997)	Observational study	70 Patients	Gastroenterology consultation	2−	64
Pasricha[910]	Not specified—probably international (2004)	Expert commentary	NA	Future of therapeutic endoscopy	3	52
Axon[911]	UK (1998)	Expert commentary	NA	Open access endoscopy in Britain	4	50
DoH[912]	UK (2001)	National commentary; recommendations	NA	Upper GI cancers	Guideline	48
Richards *et al*[760]	International (1997)	Systematic review	256 Studies	Home parenteral nutrition (HPN)	1	77
Talley and Spiller[913]	International (not specified—circa 2002)	Review of evidence	Around 140 studies	IBS	3	70
Nord[914]	USA (1999)	Expert commentary	NA	Developments in Endoscopy	4	57
Jones[770]	UK (1996)	Expert commentary	NA	GI disease in primary care	3	59
van der Eijk *et al*[896]	International (1998)	Observational study/survey	Physicians and health workers from 8 countries	Best practice in IBD	2−	73
Abuksis *et al*[915]	Israel (1998)	RCT	142 Patients	A patient education programme	2+	68
Lewin van den Broek *et al*[916]	Netherlands (1995–97)	RCT	349 Patients	Management strategies for dyspepsia	2+	66
Delaney and Moayyedi[917]	Predominantly UK (not specified—circa 2003)	Evidence-based assessment	Around 160 articles	Dyspepsia management	2−	57
Heaney *et al*[918]	UK (1993–96)	Analysis of patient and GP data	1872 Cases	Open access gastroscopy in Royal Victoria Hospital, Belfast	2−	55
Pye *et al*[825]	UK (1995–96)	Analysis of patient data	910 Patients	Carcinoma of the oesophagus and stomach	2−	57
Association of Coloproctology of GB and Ireland[505]	UK (2001)	Specification of guidelines	NA	Guidelines for the management of colorectal cancer	Guideline	61
Hansen *et al*[919]	Denmark (1987–88)	Survey of patients and GPs	436 Patients	Efficacy of open access endoscopy	2−	68
Section 5.3 Who should deliver/perform services and/or procedures (for example, endoscopies)?						
Eaden *et al*[897]	UK (not specified—circa 1998)	Survey of clinicians	341 Responses	Screening for colonic cancer by gastroenterologists	2−	64
Paisley *et al*[920]	UK (1994–96)	Analysis of patient data	222 Patients	Role of the surgical trainee	2−	59
Chin and Newton[921]	UK (not specified—circa 1996)	Survey	167 Surgical trainees	Training in minimal access surgery	2−	66
Pardo *et al*[922]	Spain (1998–99)	Retrospective study; analysis of patient data	620 Patients	Impact of physician speciality	2−	61
Waye *et al*[923]	International (2001)	Expert commentary	NA	Who is permitted to do endoscopy?	4	36
Bini *et al*[924]	USA (1998–99)	Analysis of routine data	197 Patients	Impact of specialists	2−	68

Table A.12 Continued

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Level of evidence	Quality score (AGREE) (%)
Eaden *et al*[925]	UK (data between 1985 and 1999 taken)	Survey of clinicians	13 Clinicians	Variation between generals and specialists	2−	68
Barrison *et al*[926]	UK (2001)	Expert commentary and recommendations	NA	Provision of endoscopy services in general hospitals	4	45
Quine *et al*[521]	UK (1991)	Survey of clinicians	39 Hospitals; 383 clinicians	Audit of upper GI endoscopy	2−	64
NHS CRD[560]	UK (2004)	National commentary; guidelines; recommendations	NA	Improving the outcomes in colorectal cancer	Guideline	70
Lim *et al*[927]	UK (1995)	Survey of clinicians	453 Responses	*H pylori* serology and management	2−	68
Cockel *et al*[928]	UK (1976–79)	Survey	173 Responses	GI endoscopy services	2−	66
Meyer *et al*[710]	USA (1993)	Analysis of patient data	Over 1.3 million cases	Differences between generalists and specialists	2−	68
Knight-Davis *et al*[929]	UK (1996)	Survey of clinicians	350 Responses	Cross-cover for physicians	2−	59
Association of Coloproctology of GB and Ireland[733]	UK (2001)	Analysis of audit data; expert commentary; recommendations	8 Main sources of audit data	Resources for coloproctology	3	52
Chen and Rex[717]	International (2004)	Commentary; recommendations	NA	Nurse administered sedation for endoscopy	3	59
Nightingale and Hogg[930]	UK (2003)	Review of evidence; commentary	Around 40 articles	GI advanced practitioners	3	64
Section 5.4 What are the key issues concerning changing roles and general practitioners with a special interest (GPwSI)?						
Farthing *et al*[931]	UK (1993)	Peer reviewed expert commentary and recommendations	NA	Service provision	3	59
Colin-Thome[932]	UK, NHS (2002)	Commentary	NA	GPwSI	4	43
Birch[933]	UK, NHS (2004)	Commentary; guidelines	NA	GPwSI	3	52
AUGIS[826]	UK (1999)	Commentary; recommendations	NA	Service provision	4	35
Pearson *et al*[934]	Boston, USA (1996)	Survey of general internists and gastroenterologists	91 Survey responses	Study of consultations provided to general internists by gastroenterologists.	2−	75
Williams *et al*[935]	UK (2002)	Commentary; recommendations	NA	The role of GPwSI	3	66
DoH and RCGP[691]	UK (2003)	Commentary; recommendations	NA	Implementing GPwSI	Guideline	45
DoH and RCGP[936]	UK (2002)	National guidelines	NA	GPwSI roles	Guideline	25
Ryan[937]	UK (2002)	Commentary	NA	Role of GPwSI in respiratory disease	4	30
Gruffydd-Jones[938]	UK (2003)	Brief commentary	NA	Framework for GPwSI	3	55
Kernick[939]	UK (2003)	Commentary	NA	Economic perspectives on GPwSI	4	52
Richardson[940]	UK (2002)	Commentary; interviews	NA	Rise of GPwSI	4	50

Table A.13 Summary of articles examined after consultation feedback

ID and authors	Research setting and year of study	Study design	Sample size	Topic of document	Key results and conclusions	Level of evidence	Quality score (AGREE)
Barry *et al*[941]	UK (data between 1995 and 2000)	Comparative study	110 Patients	Cancer staging	Special interest radiology improves the perceived preoperative stage of gastric cancer	2+	57%
Bassi *et al*[708]	UK (2000)	Single centre retrospective study	479 Patients	Cost of IBD treatment	The study represents the first detailed characterisation of the scale and determinants of costs of illness for IBD. Hospitalisation affected a minority of patients but accounted for half the total direct costs	2+	66%
Carter *et al*[684]	International (2004)	Guidelines	NA	Management of IBD	Guidelines commissioned by BSG for the management of IBD in adults	Guidelines	55%
Rubin *et al*[*136]	UK (NA)	Retrospective case reviews	568 Patients	Epidemiology and management of IBD	Prevalence rates, but not incidence rates, for IBD are substantially higher than described in UK populations. GPs make a significant contribution to meeting the healthcare needs of these patients	3	66%
Axon[*719]	International (NA)	Review of evidence	NA	Cancer surveillance in ulcerative colitis	Regular clinical follow-up is important. At 8–10 years after their first attack, total colonoscopy should be performed with multiple biopsy specimens to check for colitis	4	41%
Lim *et al*[*720]	UK (data between 1978–1990)	Retrospective cohort study	128 Patients	Follow up of patients with ulcerative colitis	Low grade dysplasia diagnosis is not sufficiently reliable to justify prophylactic colectomy. Conservative management of established low grade dysplasia cases should not be rules out	2+	61%
Fullerton[942]	International (projections for 2000)	Economic evaluation	NA	Economic impact of functional digestive disorders	The economic impact of functional GI disease is large. Economic estimates are useful in policy decision making for the allocation of healthcare resources	3	50%
Robinson *et al*[943]	UK (NA)	RCT	458 Patients	Self help interventions for IBS	Introducing a self help guidebook results in a reduction in primary care consultations, a perceived reduction in symptoms, and significant health service savings	2+	68%
Provenzale *et al*[704]	International (1980–1998)	Literature review	2157 Articles; 10 included	Specialised and general GI care	Gastroenterologists may provide better care than other provider types for certain disorders.	1	80%
Norton and Kamm[944]	UK 2002	Discussion	N/A	Specialist nurses in gastroenterology	Specialist nurses can take on some tasks traditionally carried out by doctors, although evidence concerning safety and effectiveness is lacking. It is not necessarily cheaper to substitute nurses for doctors. A multidisciplinary approach is advocated, in which the skills of one professional group are complemented by the skills of the other	5	N/A
Robinson *et al*[*681]	UK (NA)	RCT	203 Patients	Ulcerative colitis care	Self management of ulcerative colitis accelerates treatment provision and reduces doctor visits, and does not increase morbidity. This approach could be used in long term management of many other chronic diseases to improve health service provision and use, and to reduce costs	2+	68%
Wade[945]	UK 1983	Observational comparative interview follow-up study	215 Patients, 142 in district health authorities with stoma care nurses, 73 in districts without stoma care nurses	Psychological symptoms in colostomy patients after surgery and the benefits of stoma care nurses	Short term outcomes were improved in the stoma care district patients, although there were no differences at one year. 10% of patients who reported that they were well were anxious or depressed. Physical symptoms were associated with psychiatric morbidity. Psychiatric referral was suggested to be inappropriate, as medical referral may be more helpful in resolving problems	2−	45%
Erwin-Toth and Spencer[946]	USA, not given, published 1991	Questionnaire follow-up of patients after ostomy surgery, convenience sample	52 Volunteers were recruited, 39 completed forms were received	Patient assessed quality of care	High satisfaction but results limited by methodological weaknesses, acknowledged by authors	2−	29%
Maule[758]	USA 1994 published	Prospective non-randomised controlled study	1881 Intervention patients; 730 control patients	Effectiveness of screening for colorectal cancer by nurses compared with doctors	Depth of insertion of sigmoidoscope was greater in those examined by doctors. There was no difference in the proportion of examinations that were positive for adenomas or cancer. A higher proportion of patients whose examination was normal and were examined by nurses returned for follow-up	2+	57%
Moshakis *et al*[*714]	UK Published 1996	Comparative study	50 Trainer and 50 pupil cases	Competence of nurses with training to undertake endoscopies	Quality and accuracy were assessed as equal between groups, with 60 cm insertion achieved in a similar number of cases. Nurses can be taught to practise flexible sigmoidoscopy efficiently and safely.	2−	23%
Schoenfeld *et al*[*715]	USA Published 1999	Randomised controlled trial	162 Patients intervention group; 166 patients control group	Accuracy of polyp detection, depth of insertion and complication rate for flexible sigmoidoscopy: comparison of nurses and doctors	No differences in detection of polyps or frequency of complications were found, suggesting nurse endoscopists may perform screening flexible sigmoidoscopy as safely and as effectively as gastroenterologists	1	59%

*These articles were cited in the text.

9. APPENDICES

Appendix 1: Charities with an interest in the care of patients with gastroenterological and liver disorders (through patient support or research or both)

1 Bardhan Research and Education Trust of Rotherham (BRET)
2 Barrett's Oesophagus Foundation
3 British Association for the Study of the Liver (BASL)
4 British Liver Trust (BLT)
5 Children's Liver Disease Foundation
6 Coeliac UK
7 Colon and Rectal Disease Research Foundation of GB and Ireland
8 Colon Cancer Concern
9 CORE (new name for the Digestive Disorders Foundation)
10 Crohn's in Childhood Research Association (CICRA)
11 Foundation for Liver Research
12 Guildford Undetected Tumour Screening (GUTS)
13 The Ileostomy and Internal Pouch Support Group (IA)
14 IBS Network
15 National Association for Colitis and Crohn's Disease (NACC)

Appendix 2 AGREE tool for quality assessment

Score each of the following questions using a three-point Likert scale:

- 0—Not specified (little or no evidence)
- 1—Disagree (some evidence)
- 2—Agree (good or strong evidence)

Scope and purpose:

1. The overall objective(s) of the research is (are) clearly described.
2. The research question(s) covered by the methodology is (are) clearly described.
3. The recipients to whom the research is meant to apply are clearly described.

Stakeholder/participant involvement:

1. The research is carried out by relevant professional groups.
2. The participants' views and preferences have been sought.
3. The target users of the research are clearly defined.
4. The research has been piloted among participants.

Rigour of development:

1. Methods to search for evidence have been specified (for example, systematic review, unbiased screening, search strategy).
2. The techniques for formulating the results have been specified.
3. The advantages, disadvantages, and risks are considered in the results.
4. There is an explicit link between the results and the supporting evidence (sufficient relevant references).
5. The research has been externally reviewed before its publication, or published in peerb reviewed sources.
6. A procedure for updating the research is provided, or for primary studies, a clear indication of what further research is needed.

Clarity and presentation:

1. The results are clear and unambiguous.
2. The different options for conducting the research are clearly presented, or for primary studies, a description of the pros and cons of each method.
3. Key points in the results are easily identifiable.
4. The research is supported with tools for application (for example, computer support, documentation, reference guide for reviews/guidelines), or for primary studies, a clear path for dissemination and potential implementation.

Applicability:

1. The potential barriers in applying the results have been discussed.
2. The potential cost implications of applying the results have been considered.
3. The research presents key (review) criteria for monitoring and/or audit purposes (for example, cost should be <£100; time <7 days).

Editorial independence:

1. The research is editorially independent from the funding body.
2. Conflicts of interest among research members have been recorded.

Appendix 3: Brief sent to participants for the patient workshop

Specific questions to be answered

(a) Greater self management by patients

There is good evidence to show that if patients with chronic illnesses such as inflammatory bowel disease or irritable bowel syndrome are given enough information and are supported by expert services that are easy to reach, they can manage with fewer hospital and GP appointments. This could be used for a wide variety of chronic illnesses, which would reduce demand on NHS services.

What is your view on such an approach?

(b) Endoscopy outside hospitals

It has been suggested that more endoscopies (internal examination of the gut through a tube) should be carried out in special centres or in local GP surgeries instead of hospital, which may be easier for patients but may mean that these tests would be less available in hospital. Research is needed to find out whether these tests would be safe and effective, if undertaken outside hospitals.

What is your view on such tests being carried out in places other than hospitals?

(c) Nurses or doctors?

There is good evidence that nurses do a good job when undertaking endoscopy to help make a diagnosis. Also, patients prefer nurses doing the test to doctors. This suggests that nurses should take over routine diagnostic endoscopy from doctors. There is some evidence (that is less strong) that nurses should also take over the continuing care of certain patients with chronic gastrointestinal problems.

What would you feel about seeing a nurse rather than a doctor for these tests and appointments?

(d) Where should services be located?

There is some evidence that major operations for gastrointestinal problems should be performed at specialist centres that serve large populations because the results may be better. However, this would take away expertise from local hospitals,

where specialist care will still be needed, particularly for emergency problems.

What is more important to you—having services available locally or being treated by specialists, even if it is further away?

Open discussion

What else would be important to you about the way services for gastrointestinal problems are provided?

Appendix 4: Articles not used in this report

Table A.14 lists the articles not used in this report, and table A.15 the articles not used for economic analysis.

Table A.14 Articles not used in this report

No	Reference	Reason for exclusion
1	Rakatansky H. Review article: gastroenterology and the pharmaceutical industry. *Aliment Pharmacol Ther* 2002;**16**:1859–66.	Too specific
2	Chaudhry F, Ashish K, Brant S. Saturday surgeries—do patients feel their needs can be met by alternative out-of-hours care? A questionnaire study. *Br J Gen Practice* 2003;**54**:46–9.	Too specific
3	Franks A. General practitioner with a special interest in dermatology—the dermatologist's perspective. *Clin Med* 2004;**4**:87–8.	Too brief, not gastroenterology
4	Gonsalkorale WM, Toner BB, Whorwell PJ. Cognitive change in patients undergoing hypnotherapy for irritable bowel syndrome. *J Psychosom Res* 2004;**56**:271–8.	Too specific
5	Yacavone RF, Locke III GR, Provenzale D, *et al.* Quality of life measurement in gastroenterology: what is available? *Am J Gastroenterol* 2001;**96**:285–97.	Too specific
6	Morris JS. Laennec's stethoscope—the Welsh connection.; *J Roy Soc Med* 2004;**97**:137–41.	Too specific
7	D'Costa H, Taylor EW. Patient management following uncomplicated elective gastrointestinal operations. *Br J Clin Pract* 1990;**44**: 552–6.	Too treatment focused
8	Woolfson RG, Jennings K,Whalen GF. Management of bowel obstruction in patients with abdominal cancer. *Arch Surg* 1997;**132**:1093–7.	Too treatment focused
9	Feuer DJ, Broadley KE. Corticosteroids for the resolution of malignant bowel obstruction in advanced gynaecological and gastrointestinal cancer (Cochrane review). In: *The Cochrane Library* 2004, Issue 3.	Too treatment focused
10	Soares-Weiser K, Brezis M, Tur-Kaspa R, *et al.* Antibiotic prophylaxis for cirrhotic patients with gastrointestinal bleeding (Cochrane review). In: *The Cochrane Library* 2004, Issue 3.	Too treatment focused
11	Selective Decontamination of the Digestive Tract Trialists' Collaborative Group. Meta-analysis of randomized controlled trials of selective decontamination of the digestive tract. *BMJ* 1993;**307**:525–32.	Too treatment focused
12	Guenaga KF, Matos D, Castro AA, *et al.* Mechanical bowel preparation for elective colorectal surgery (Cochrane review). In: *The Cochrane Library* 2004, Issue 3.	Too treatment focused
13	Lewis SJ, Egger M, Sylvester PA, *et al.* Early enteral feeding versus ''nil by mouth'' after gastrointestinal surgery: systematic review and meta-analysis of controlled trials. *BMJ* 2001;**323**:1–5.	Too treatment focused
14	Logan AJ, Morris-Stiff GJ, Bowrey DJ, *et al.* Upper gastrointestinal complications after renal transplantation: a 3-yr sequential study. *Clin Transplant* 2002;**16**:163–7.	Too treatment focused
15	Henry DA, O'Connell DL. Effects of fibrinolytic inhibitors on mortality from upper gastrointestinal haemorrhage. *BMJ* 1989;**298**:1142–6.	Too treatment focused

Table A.15 Articles not used for economic analysis

No	Reference	Reason for exclusion
1	Sonnenberg A. Personal view: cost and benefit of medical rituals in gastroenterology. *Aliment Pharmacol Ther* 2004;**20**:939–42.	Too specific
2	Ladas SD, Malfertheiner P, Axon A. An introductory course for training in endoscopy. *Dig Dis* 2002;**20**:242–5.	Too specific
3	Dick A, Keady S, Mohamed F, *et al.* Use of unlicensed and off-label medication in paediatric gastroenterology with a review of the commonly used formularies in the UK. *Aliment Pharmacol Ther* 2003;**17**:571–5.	Too specific
4	Cooper DL, Smith GE, O'Brien SJ, *et al.* What can analysis of calls to NHS direct tell us about the epidemiology of gastrointestinal infections in the community? *J Infect* 2003;**46**:101–5.	Too specific
5	Keys J, Beardon PHG, Lau C, *et al.* General practitioners' use of non-steroidal anti-inflammatory drugs in Tayside and Fife regions. *J R Soc Med* 1992;**85**:442–5.	No economics
6	Rembacken B, Fujii T, Kondo H. The recognition and endoscopic treatment of early gastric and colonic cancer. *Best Pract Res Clin Gastroenterol* 2001;**15**:317–36.	No economics
7	Dube MG, Lobo DN, Rowlands BJ*et al.* Audit of acute pancreatitis management: a tale of two hospitals. *J R Coll Surg Edinb* 2001;**46**:292–6.	No economics
8	Langman M, Kahler KH, Kong SX, *et al.* Drug switching patterns among patients taking non-steroidal anti-inflammatory drugs: a retrospective cohort study of a general practitioners database in the United Kingdom. *Pharmacoepidemiol Drug Saf* 2001;**10**:517–24.	No economics
9	Renehan AG, Egger M, Saunders MP, *et al.* Impact on survival of intensive follow-up after curative resection for colorectal cancer:systematic review and meta-analysis of randomized trials. *BMJ* 2002;**324**:813.	No economics
10	Pathmakanthan S, Murray I, Smith K, *et al.* Nurse endoscopists in United Kingdom health care: a survey of prevalence skills and attitudes. *J Adv Nurs* 2001;**36**:705–10.	No economics
11	O' Hanrahan T, Irving MH. The role of home parenteral nutrition in the management of intestinal failure—report of 400 cases. *Clin Nutr* 1992;**11**:331–6.	No economics
12	Thompson WG, Heaton KW, Symth GT, *et al.* Irritable bowel syndrome in general practice: prevalence, characteristics, and referral. *Gut* 2000;**46**:78–82.	No economics
13	Thomas-Gibson S, Thapar C, Shah SG, *et al.* Colonoscopy at a combined district general hospital and specialist endoscopy unit:lessons from 505 consecutive examinations. *J Roy Soc Med* 2002;**95**:194–7.	Not relevant
14	Stanghellini V, Armstrong D, Monnikes H, *et al.* Systematic review: do we need a new gastro-oesophageal reflux disease questionnaire? *Aliment Pharmacol Ther* 2004;**19**:463–79.	Non-UK article
15	Spiegel BMR, Vakil NB, Ofman JJ. Dyspepsia management in primary care:a decision analysis of competing strategies. *Gastroenterology* 2002;**122**:1270–85.	Non-UK article
16	Lin OS, Mannava S, Hwang KL, *et al.* Reasons for current practices in managing Barrett's esophagus. *Dis Esophagus* 2002;**15**:39–45.	Non-UK article
17	Abuksis G, Mor M, Segal N, *et al.* Patient education program is cost effective for preventing failure of endoscopic procedures in a Gastroenterology department. *Am J Gastroenterol* 2001;**96**:1786–90.	Non-UK article
18	Van Kouwen MC, Drenth JP, Verhoeven HM, *et al.* Upper gastrointestinal endoscopy in patients aged 85 years or more. Results of a feasibility study in a district general hospital. *Arch Gerontol Geriatr* 2003;**37**:45–50.	Non-UK article
19	Lapane KL, Spooner JJ, Mucha L, *et al.* Effect of nonsteroidal anti-inflammatory drug use on the rate of gastrointestinal hospitalizations among people living in long term care. *J Am Geriatr Soc* 2001;**49**:577–84.	Non-UK article
20	Longobardi T, Jacobs P, Wu L, *et al.* Work losses related to inflammatory bowel disease in Canada:results from a National Population Health Survey. *Am J Gastroenterol* 2003;**98**:844–9.	Non-UK article
21	Levy RL, Von Korff M, Whitehead WE, *et al.* Costs of care for irritable bowel syndrome patients in a health maintenance organization; *Am J Gastroenterol* 2001;**96**:3122–9.	Non-UK article
22	Yim HB, Jacobson BC, Saltzman JR, *et al.* Clinical outcome of the use of enteral stents for palliation of patients with malignant upper GI obstruction; *Gastrointest Endosc* 2001;**53**:329–32.	Non-UK article
23	Bini EJ, Weinshel EH, Generoso R, *et al.* Impact of gastroenterology consultation on the outcomes of patients admitted to the hospital with decompensated cirrhosis. *Hepatology* 2001;**34**:1089–95.	Non-UK article
24	Pardo A, Durandez R, Hernandez M, *et al.* Impact of physician specialty on the cost of nonvariceal upper GI bleeding care; *Am J Gastroenterol* 2002;**97**:1535–42.	Non-UK article
25	Fletcher DR. Peptic disease: can we afford current management? *Aust N Z J Surg* 1997;**67**:75–80.	Non-UK article
26	Callahan CM, Buchanan NN, Stump TE. Healthcare costs associated with percutaneous endoscopic gastrostomy among older adults in a defined community. *J Am Geriatr Soc* 2001;**49**:1525–9.	Non-UK article
27	Lang M, Niskanen M, Miettinen P, *et al.* Outcome and resource utilization in gastroenterological surgery. *Br J Surg* 2001;**88**:1006–14.	Non-UK article
28	Richter JM, Wang TC, Fawaz K, *et al.* Practice patterns and costs of hospitalization for upper gastrointestinal hemorrhage; *J Clin Gastroenterol* 1991;**13**:268–73.	Non-UK article
29	Parente F, Bargiggia S, Bianchi Porro G. Prospective audit of gastroscopy under the 'three-day rule': a regional initiative in Italy to reduce waiting time for suspected malignancy. *Aliment Pharmacol Ther* 2002;**16**:1011–14.	Non-UK article
30	Quirk DM, Barry MJ, Aserkoff B, *et al.* Physician specialty and variations in the cost of treating patients with acute upper gastrointestinal bleeding; *Gastroenterology* 1997;**113**:1443–8.	Non-UK article

Table A.15 Continued

No	Reference	Reason for exclusion
31	The Burden of Gastrointestinal Diseases, The American Gastroenterological Association. Available at http://www.gastro.org/wmspage.cfm?parm1=669 (accessed 3 January 2006).	Non-UK article
32	Delvaux M. Digestive health in the elderly: faecal incontinence in adults. *Aliment Pharmacol Ther* 2003;**8**(Suppl 3):84–9.	Non-UK article
33	Marshall JK, Cawdron R, Yamamura DL, *et al*. Use and misuse of cost effectiveness terminology in the gastroenterology literature:a systematic review. *Am J Gastroenterol* 2002;**97**:172–9.	Non-UK article
34	Provenzale D, Lipscomb J. A reader's guide to economic analysis in the GI literature. *Am J Gastroenterol* 1996;**91**:2461–70.	Non-UK article
35	Gross CP, Canto MI, Hixson J, *et al*. Management of Barrett's esophagus: a national study of practice patterns and their cost implications. *Am J Gastroenterol* 1999;**94**:3440–7.	Non-UK article
36	Froehlich F, Burnand B, Pache I, *et al*. Overuse of upper gastrointestinal endoscopy in a country with open access endoscopy: a prospective study in primary care. *Gastrointest Endosc* 1997;**45**:13–19.	Non-UK article
37	Norum J, Olsen JA. A cost effectiveness approach to the Norwegian follow-up programme in colorectal cancer. *Ann Oncol* 1997;**8**:1081–7.	Non-UK article
38	Spiegel BMR, Targownik LE, DeRosa V, *et al*. The quality of published health economic analyses in digestive diseases:a systematic review and quantitative appraisal. *Gastroenterology* 2004;**127**:403–11.	Non-UK article
39	Provenzale D, Wong JB, Onken JE, *et al*. Performing a cost effectiveness analysis:surveillance of patients with ulcerative colitis. *Am J Gastroenterol* 1998;**93**:872–80.	Non-UK article
40	Maroun J, Ng E, Berthelot JM, *et al*. Lifetime costs of colon and rectal cancer management in Canada. *Chronic Dis Can* 2003;**24**:91–101.	Non-UK article
41	Sonnenberg A, Inadomi JM, Becker LA. Economic analysis of step-wise treatment of gastro-oesophageal reflux disease. *Aliment Pharmacol Ther* 1999;**13**:1003–13.	Non-UK article
42	Loeve F, Brown ML, Boer R, *et al*. Endoscopic colorectal cancer screening:a cost-saving analysis. *J Natl Cancer Inst* 2000;**92**:557–63.	Non-UK article
43	Nietert PJ, Silverstein MD, Mokhashi MS, *et al*. Cost effectiveness of screening a population with chronic gastroesophageal reflux. *Gastrointest Endosc* 2003;**57**:311–18.	Non-UK article
44	Sonnenberg A, Delco F, Inadomi JM. Cost effectiveness of colonoscopy in screening for colorectal cancer. *Ann Intern Med* 2000;**133**:573–84.	Non-UK article
45	Baxter YC, Dias MCG, Maculevicius J, *et al*. Economc study in surgical patients of a new model of nutrition therapy integrating hospital and home vs the conventional hospital model. *JPEN J Parenter Enteral Nutr* 2005;**29**(Suppl):S96–105.	Non-UK article
46	Chen SC, Rex DK. Review article:registered nurse-administered propofol sedation for endoscopy. *Aliment Pharmacol Ther* 2004;**19**:147–55.	Non-UK article

Appendix 5: Glossary

Table A.16 Glossary

AUGIS	Association of Upper Gastrointestinal Surgeons of Great Britain and Ireland
BASL	British Association for the Study of the Liver
BSG	British Society of Gastroenterology
CLO	Columnar-lined oesophagus
CRD	Centre for Reviews and Dissemination
CT	Computed tomography
DoH	Department of Health
FCE	Finished consultant episode
GERD	Gastro-esophageal reflux disease
GI	Gastrointestinal
GORD	Gastro-oesophageal reflux disease
HES	Hospital Episode Statistics
HPN	Home parenteral nutrition
HRQoL	Health related quality of life
IBD	Inflammatory bowel disease
IBS	Irritable bowel syndrome
ICD-10	International Classification of Diseases-10th revision
ICD-9	International Classification of Diseases-9th revision
JAG	Joint Advisory Group
NACC	National Association for Colitis and Crohns
NAFLD	Non-alcoholic fatty liver disease
NASH	Non-alcoholic Steatohepatitis
NCCGs	Non-Consultant Career Grades
NHS	National Health Service
NICE	National Institute for Clincal Excellence
NSF	National Service Framework
OHE	Office of Health Economics
ONS	Office for National Statistics
OPCS	Office of Population Censuses and Surveys
PEDW	Patient Episode Database Wales
RCP	Royal College of Physicians
RCT	Radomised Controlled Trial
SF12	Short Form-12
SF36	Short Form-36
SIGN	Scottish Intercollegiate Guidelines Network
SMR	Standardised mortality ratio
SPSS	Statistical Package for the Social Sciences
UGIH	Upper gastrointestinal haemorrhage

Appendix 6: Specialists who provided comments and feedback

Table A.17 Specialist who provided comments and feedback

Professor Qasim Aziz	Professor of gastroenterology
Professor Andrew Burroughs	Consultant physician and hepatologist
Shona Campbell	Consultant GI radiologist
Dr John de Caestecker	Consultant gastroenterologist
Professor RM Charnely	Professor of surgery
Dr Ian Forgacs	Consultant gastroenterologist
Professor Ian Gilmore	Consultant gastroenterologist
Dr Barry Jones	Consultant gastroenterologist
Norma McGough	Dietetic services manager
Professor Paul Moayyedi	Professor of gastroenterology
Professor Christine Norton	Professor of gastrointestinal nursing
Dr KR Palmer	Consultant gastroenterologist
Lynne Smith	Chair of the Association of GI Physiologists
Dr Richard Stephens	General practitioner
Professor Robert Sutton	Professor of surgery
Dr Simon Travis	Consultant gastroenterologist
Dr Kevin Wedgwood	Consultant surgeon

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11. PRINCIPAL TEAM MEMBERS

This study was conducted during 2004–05. Principal team members were:

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Dr Mike Hellier, president, British Society of Gastroenterology.

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Members of the Patient and Carer Network, Royal College of Physicians, London.

Mr Richard Driscoll, National Association for Crohn's and Colitis.

Competing interests: This was an independent study undertaken by the School of Medicine of the University of Wales Swansea, in collaboration with colleagues at the University of Glamorgan and University of Wales Bangor. Professor John Williams, Dr Mike Hellier, Dr Alistair McIntyre, and Dr Roland Valori are practising gastroenterologists and members of the British Society of Gastroenterology. Dr Hellier is currently president of the Society (2004–05). Dr Faiz Ali is a trainee in gastroenterology.

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Team roles

Professor John Williams led the project throughout, devised the original research proposal, wrote some sections and edited the report. Professor Ian Russell and Professor David Cohen provided invaluable advice and guidance on the development of research methodology, and wrote or edited some sections.

Dr Helen Snooks was responsible for the day-to-day management of the project, provided methodological input and analyses, and wrote some sections. Dr Adrian Edwards and Mrs Margot Greer gave advice on the systematic literature search. Dr Hayley Hutchings and Dr Wai-Yee Cheung provided methodological and statistical input. Dr Stephen Roberts, Dr Faiz Ali, and Dr Barry Ip provided methodological input and analyses, reviewed the literature and wrote various sections. Working with Professor David Cohen, Ms Mirella Longo carried out economic analyses, reviewed the health economics literature and wrote the health economics sections.

Mrs Gaynor Demery and Mrs Judy Williams provided clerical support. Mrs Anne Seagrove proof read the report. Mrs Kymberley Thorne assisted with the appraisal of the research literature.

13 REFERENCES

1 **Wanless D**. *Securing our future health: taking a long-term view - interim report*. London: HM Treasury, 2001.
2 **Pronect Team advised by Wanless D**. *The review of health and social care in Wales*, Welsh Assembly Government, 2003.
3 **Wanless D**. *Securing good health for the whole population - final report*. London: HM Treasury, 2004.
4 **NICE**. *Guidlines on nutrition support in adults*. London: NICE, 2006.
5 **Royal College of Physicians**. *Nutrition - a doctor's responsibility*. London: Royal College of Physicians, 2002.
6 **Royal College of Physicians**. *Storing up problems. The medical case for a slimmer nation*. London: Royal College of Physicians, 2005.
7 **Department of Gastroenterology**. Division of Medicine (http://www.med.miami.edu, accessed 18 January 2007). Miami: University of Miami, 2005.
8 **Körner E**. *First report to the secretary of state of the steering group on health services information*. London: HMSO, 1987.
9 **Cleary R**, Beard R, Coles J, *et al*. Comparative hospital databases: value for management and quality. *Qual Health Care* 1994;**3**:3–10.
10 **Dixon J**, Sanderson C, Elliott P, *et al*. Assessment of the reproducibility of clinical coding in routinely collected hospital activity data: a study in two hospitals. *J Public Health Med* 1998;**20**:63–9.
11 **Williams JG**, Mann RY. Hospital episode statistics: time for clinicians to get involved? *Clin Med* 2002;**2**:34–7.
12 **Nguyen-Van-Tam JN**, Logan R. Digestive diseases. In:*The health of adult Britain, 1841–1994*. London: HMSO, 1996.
13 **Goldacre MJ**. Cause-specific mortality: understanding uncertain tips of the disease iceberg. *J Epidemiol Community Health* 1993;**47**:491–6.
14 **Quinn M**, Babb P, Brock A, *et al*. *Cancer trends in England and Wales, 1950–99*. London: The Stationary Office, 2001.
15 **Mohammed I**, Cherkas LF, Riley SA, *et al*. Genetic influences in gastro-oesophageal reflux disease: a twin study. *Gut* 2003;**52**:1085–9.
16 **Mahmood Z**, McNamara D. Gastro-oesophageal reflux disease and ulcer disease. *Aliment Pharmacol Ther* 2003;**18**(Suppl 3):31–7.
17 **Nilsson M**, Lagergren J. The relation between body mass and gastro-oesophageal reflux. *Best Pract Res Clin Gastroenterol* 2004;**18**:1117–23.
18 **Kang JY**. Systematic review: geographical and ethnic differences in gastro-oesophageal reflux disease. *Aliment Pharmacol Ther* 2004;**20**:705–7.
19 **Mahadeva S**, Raman MC, Ford AC, *et al*. Gastro-oesophageal reflux is more prevalent in Western dyspeptics: a prospective comparison of British and South-East Asian patients with dyspepsia. *Aliment Pharmacol Ther* 2005;**21**:1483–90.
20 **Spechler SJ**. Epidemiology and natural history of gastro-oesophageal reflux disease. *Digestion* 1992;**51**(Suppl 1):24–9.
21 **Delaney BC**. Review article: prevalence and epidemiology of gastro-oesophageal reflux disease. *Aliment Pharmacol Ther* 2004;**20**(Suppl 8):2–4.
22 **Kennedy TM**, Jones RH. The prevalence of gastro-oesophageal reflux symptoms in a UK population and the consultation behaviour of patients with these symptoms. *Aliment Pharmacol Ther* 2000;**14**:1589–94.
23 **Kulig M**, Nocon M, Vieth M, *et al*. Risk factors of gastroesophageal reflux disease: methodology and first epidemiological results of the ProGERD study. *J Clin Epidemiol* 2004;**57**:580–9.
24 **Pisegna J**, Holtmann G, Howden CW, *et al*. Review article: oesophageal complications and consequences of persistent gastro-oesophageal reflux disease. *Aliment Pharmacol Ther* 2004;**20**(Suppl 9):47–56.
25 **Ford AC**, Forman D, Reynolds PD, *et al*. A retrospective case control study to determine the risk of Barrett's oesophagus according to ethnic origin. *Am J Epidemiol* 2005;**162**:454–60.
26 **Caygill CP**, Watson A, Lao-Sirieix P, *et al*. Barrett's oesophagus and adenocarcinoma. *World J Surg Oncol* 2004;**2**:12.
27 **Bartlesman JF**, Hameeteman W, Tytgat GN. Barrett's oesophagus. *Eur J Cancer Prev* 1992;**1992**:323–5.
28 **Solaymani-Dodaran M**, Coupland C, Logan RF. Risk of oesophageal cancer in Barrett's oesophagus and in gastro-oesophageal reflux. *Gut* 2003;**52**:A20.
29 **Todd JA**, Johnston DA, Dillon JF. The changing spectrum of gastroesophageal reflux disease. *Eur J Cancer Prev* 2002;**11**:215–9.
30 **Caygill CP**, Reed PI, Johnston BJ, *et al*. A single centre's 20 years' experience of columnar-lined (Barrett's) oesophagus diagnosis. *Eur J Gastroenterol Hepatol* 1999;**11**:1355–8.
31 **Delaney BC**, Moayyedi P. Dyspepsia. *Health care needs assessment*. Oxford, 2005 (http://hcna.radcliffe-oxford.com/dysframe.htm, accessed 20 December 2006).
32 **Neumann CS**, Cooper BT. Ethnic differences in gastro-oesophageal reflux disease. *Eur J Gastroenterol Hepatol* 1999;**11**:735–9.
33 **Kang JY**, Ho KY. Different prevalences of reflux oesophagitis and hiatus hernia among dyspeptic patients in England and Singapore. *Eur J Gastroenterol Hepatol* 1999;**11**:845–50.
34 **Delaney B**, Moayyedi P. Dyspepsia - HCNA. *Health care needs assessment*. Oxford, 2005 (http://hcna.radcliffe-oxford.com/dysframe.htm, accessed 20 December 2006).
35 **Corder AP**, Jones RH, Sadler GH, *et al*. Heartburn, oesophagitis and Barrett's oesophagus in self-medicating patients in general practice. *Br J Clin Pract* 1996;**50**:245–8.
36 **Penston JG**, Pounder RE. A survey of dyspepsia in Great Britain. *Aliment Pharmacol Ther* 1996;**10**:83–9.
37 **Moayyedi P**, Forman D, Braunholtz D, *et al*. The proportion of upper gastrointestinal symptoms in the community associated with Helicobacter pylori, lifestyle factors, and nonsteroidal anti-inflammatory drugs. Leeds HELP Study Group. *Am J Gastroenterol* 2000;**95**:1448–55.
38 **Jones RH**, Lydeard S, Hobbs F, *et al*. Dyspepsia in England and Scotland. *Gut* 1990;**31**:401–5.
39 **Jones RH**, Lydeard S. Prevalence of symptoms of dyspepsia in the community. *BMJ* 1989;**298**:30–2.
40 **Kennedy TM**, Jones RH, Hungin AP, *et al*. Irritable bowel syndrome, gastro-oesophageal reflux, and bronchial hyper-responsiveness in the general population. *Gut* 1998;**43**:770–4.
41 **Weir RD**, Backett EM. Studies of the epidemiology of peptic ulcer in a rural community: prevalence and natural history of dyspepsia and peptic ulcer. *Gut* 1968;**9**:75–83.
42 **Woodward M**, Morrison CE, McColl KE. The prevalence of dyspepsia and use of antisecretory medication in North Glasgow: role of Helicobacter pylori vs. lifestyle factors. *Aliment Pharmacol Ther* 1999;**13**:1505–9.
43 **Jones RH**, Lydeard S. Irritable bowel syndrome in the general population. *BMJ* 1992;**304**:87–90.
44 **Gill D**, Mayou R, Dawes M, *et al*. Presentation, management and course of angina and suspected angina in primary care. *J Psychosom Res* 1999;**46**:349–58.
45 **Davie AP**, Caesar D, Caruana L, *et al*. Outcome from a rapid-assessment chest pain clinic. *Q J Med* 1998;**91**:339–43.
46 **Potts SG**, Bass CM. Psychosocial outcome and use of medical resources in patients with chest pain and normal or near-normal coronary arteries: a long-term follow-up study. *Q J Med* 1993;**86**:583–93.
47 **Grainger SL**, Klass HJ, Rake MO, *et al*. Prevalence of dyspepsia: the epidemiology of overlapping symptoms. *Postgrad Med J* 1994;**70**:154–61.
48 **Doll R**, Avery Jones F, Buckatzsch MM. Occupational factors in the aetiology of gastric and dudenal ulcers, with an estimate of their incidence in the general population. London: HMSO, 1951 (MRC special report series, No, 276).
49 **Ford A**, Delaney B, Forman D, *et al*. Eradication therapy for peptic ulcer disease in Helicobacter pylori positive patients. *Cochrane Database Syst Rev* 2003;(4):CD003840.
50 **Harvey RF**, Spence RW, Lane JA, *et al*. Relationship between the birth cohort pattern of Helicobacter pylori infection and the epidemiology of duodenal ulcer. *Q J Med* 2002;**95**:519–25.
51 **Johnsen R**, Straume B, Forde OH. Peptic ulcer and non-ulcer dyspepsia—a disease and a disorder. *Scand J Primary Health Care* 1988;**6**:239–43.
52 **Bernersen B**, Johnsen R, Straume B. Non-ulcer dyspepsia and peptic ulcer: the distribution in a population and their relation to risk factors. *Gut* 1996;**38**:822–5.
53 **Talley NJ**, O'Keefe E, Zinsmeister A, *et al*. Prevalence of gastrointestinal symptoms in the elderly: a population-based study. *Gastroenterology* 1992;**102**:895–901.

54 **Kay L**, Jorgensen T. Epidemiology of upper dyspepsia in a random population. Prevalence, incidence, natural history, and risk factors. *Scand J Gastroenterol* 1994;**29**:2–6.
55 **Holtmann G**, Goebell H, Holtmann M, *et al.* Dyspepsia in healthy blood donors. Pattern of symptoms and association with Helicobacter pylori. *Dig Dis Sci* 1994;**39**:1090–8.
56 **Schlemper RJ**, van der Werf SD, Vandenbroucke JP, *et al.* Nonulcer dyspepsia in a Dutch working population and Helicobacter pylori. Ulcer history as an explanation of an apparent association. *Arch Intern Med* 1995;**155**:82–7.
57 **Locke GR 3rd**, Talley NJ, Fett SL, *et al.* Prevalence and clinical spectrum of gastroesophageal reflux: a population-based study in Olmsted County, Minnesota. *Gastroenterology* 1997;**112**:1448–56.
58 **Nandurkar S**, Talley NJ, Xia H, *et al.* Dyspepsia in the community is linked to smoking and aspirin use but not to Helicobacter pylori infection. *Arch Intern Med* 1998;**158**:1427–33.
59 **Zober A**, Schilling D, Ott MG, *et al.* Helicobacter pylori infection: prevalence and clinical relevance in a large company. *J Occup Environ Med* 1998;**40**:586–94.
60 **Caballero-Plasencia AM**, Sofos-Kontoyannis S, Valenzuela-Barranco M, *et al.* Irritable bowel syndrome in patients with dyspepsia: a community-based study in southern Europe. *Eur J Gastroenterol Hepatol* 1999;**11**:517–22.
61 **Haque M**, Wyeth JW, Stace NH, *et al.* Prevalence, severity and associated features of gastro-oesophageal reflux and dyspepsia: a population-based study. *N Z Med J* 2000;**113**:178–81.
62 **Agreus L**, Talley NJ, Svardsudd K, *et al.* Identifying dyspepsia and irritable bowel syndrome: the value of pain or discomfort, and bowel habit descriptors. *Scand J Gastroenterol* 2000;**35**:142–51.
63 **Boekema PJ**, van Dam van Isselt EF, Bots ML, *et al.* Functional bowel symptoms in a general Dutch population and associations with common stimulants. *Neth J Med* 2001;**59**:23–30.
64 **Olafsdottir LB**, Gudjonsson H, Thjodleifsson B. [Epidemiological study of functional bowel disorders in Iceland]. *Laeknabladid* 2005;**91**:329–33.
65 **Westbrook JI**, Talley NJ. Empiric clustering of dyspepsia into symptom subgroups: a population-based study. *Scand J Gastroenterol* 2002;**37**:917–23.
66 **Brown RC**, Langman MJ, Lambert PM. Hospital admissions for peptic ulcer during 1958–1972. *BMJ* 1976;**1**:35–7.
67 **Primatesta P**, Goldacre MJ, Seagroatt V. Changing patterns in the epidemiology and hospital care of peptic ulcer. *Int J Epidemiol* 1994;**23**:1206–17.
68 **Coggon D**, Lambert P, Langman MJ. 20 years of hospital admissions for peptic ulcer in England and Wales. *Lancet* 1981;**1**:1302–4.
69 **Jibril JM**, Redpath A, Macintyre IM. Changing pattern of admission and operation for duodenal ulcer in Scotland. *Br J Surg* 1994;**81**:87–9.
70 **Kang JY**, Elders A, Majeed A, *et al.* Recent trends in hospital admissions and mortality rates for peptic ulcer in Scotland 1982–2002. *Aliment Pharmacol Ther* 2006;**24**:65–79.
71 **Kang JY**, Tinto A, Higham J, *et al.* Peptic ulceration in general practice in England and Wales 1994–98: period prevalence and drug management. *Aliment Pharmacol Ther* 2002;**16**:1067–74.
72 **Watkins RM**, Dennison AR, Collin J. What has happened to perforated peptic ulcer? *Br J Surg* 1984;**71**:774–6.
73 **Walt R**, Katschinski B, Logan R, *et al.* Rising frequency of ulcer perforation in elderly people in the United Kingdom. *Lancet* 1986;**1**:489–92.
74 **Bardhan KD**, Williamson M, Royston C, *et al.* Admission rates for peptic ulcer in the Trent region, UK, 1972–2000. changing pattern, a changing disease? *Dig Liver Dis* 2004;**36**:577–88.
75 **Higham J**, Kang JY, Majeed A. Recent trends in admissions and mortality due to peptic ulcer in England: increasing frequency of haemorrhage among older subjects. *Gut* 2002;**50**:460–4.
76 **Langman MJ**, Weil J, Wainwright P, *et al.* Risks of bleeding peptic ulcer associated with individual non-steroidal anti-inflammatory drugs. *Lancet* 1994;**343**:1075–8.
77 **Henry D**, Lim LL, Garcia Rodriguez LA, *et al.* Variability in risk of gastrointestinal complications with individual non-steroidal anti-inflammatory drugs: results of a collaborative meta-analysis. *BMJ* 1996;**312**:1563–6.
78 **Moayyedi P**, Axon AT. Is there a rationale for eradication of Helicobacter pylori? Cost-benefit: the case for, *Br Med Bull* 1998;**54**:243–50.
79 **Forman D**, Webb P, Parsonnet J. H pylori and gastric cancer. *Lancet* 1994;**343**:243–4.
80 **Goodwin CS**, Mendall MM, Northfield TC. Helicobacter pylori infection. *Lancet* 1997;**349**:265–9.
81 **Sonnenberg A**. Temporal trends and geographical variations of peptic ulcer disease. *Aliment Pharmacol Ther* 1995;**9**(Suppl 2):3–12.
82 **Logan RF**, Walker MM. ABC of the upper gastrointestinal tract: epidemiology and diagnosis of Helicobacter pylori infection. *BMJ* 2001;**323**:920–2.
83 **Vreeburg EM**, Snel P, de Bruijne JW, *et al.* Acute upper gastrointestinal bleeding in the Amsterdam area: incidence, diagnosis, and clinical outcome. *Am J Gastroenterol* 1997;**92**:236–43.
84 **Schiller KF**, Truelove SC, Williams DG. Haematemesis and melaena, with special reference to factors influencing the outcome. *Br Med J* 1970;**2**:7–14.
85 **Berry AR**, Collin J, Frostick SP, *et al.* Upper gastrointestinal haemorrhage in Oxford. A prospective study. *J R Coll Surg Edinb* 1984;**29**:134–8.
86 **Johnston SJ**, Jones PF, Kyle J, *et al.* Epidemiology and course of gastrointestinal haemorrhage in North-east Scotland. *BMJ* 1973;**3**:655–60.
87 **Madden MV**, Griffith GH. Management of upper gastrointestinal bleeding in a district general hospital. *J R Coll Physicians Lond* 1985;**20**:213–5.
88 **Katschinski BD**, Logan RF, Davies J, *et al.* Audit of mortality in upper gastrointestinal bleeding. *Postgrad Med J* 1989;**65**:913–7.
89 **Holman RA**, Davis M, Gough KR, *et al.* Value of a centralised approach in the management of haematemesis and melaena: experience in a district general hospital. *Gut* 1990;**31**:504–8.
90 **Masson J**, Bramley PN, Herd K, *et al.* Upper gastrointestinal bleeding in an open-access dedicated unit. *J R Coll Physicians Lond* 1996;**30**:436–42.
91 **Rockall TA**, Logan RF, Devlin HE, *et al.* Incidence of and mortality from acute upper gastrointestinal haemorrhage in the United Kingdom. Steering Committee and members of the National Audit of Acute Upper Gastrointestinal Haemorrhage. *BMJ* 1995;**311**:222–6.
92 **Blatchford O**, Davidson LA, Murray WR, *et al.* Acute upper gastrointestinal haemorrhage in west of Scotland: case ascertainment study. *BMJ* 1997;**315**:510–4.
93 **Herner B**, Lauritzen G. Haematemesis and melaena from a limited reception area during a 5-year period. *Acta Med Scand* 1965;**177**:483–92.
94 **Henriksson AE**, Svensson JO. Upper gastrointestinal bleeding. With special reference to blood transfusion. *Eur J Surg* 1991;**157**:193–6.
95 **Mino Fugarolas G**, Jaramillo Esteban JL, Galvez Calderon C, *et al.* [An analysis of a general prospective series of 3270 upper digestive hemorrhages]. *Rev Esp Enferm Dig* 1992;**82**:7–15.
96 **Hallas J**, Lauritsen J, Villadsen HD, *et al.* Nonsteroidal anti-inflammatory drugs and upper gastrointestinal bleeding, identifying high-risk groups by excess risk estimates. *Scand J Gastroenterol* 1995;**30**:438–44.
97 **Longstreth GF**. Epidemiology of hospitalization for acute upper gastrointestinal hemorrhage: a population-based study. *Am J Gastroenterol* 1995;**90**:177–8.
98 **Ahmed ME**, al-Knaway B, al-Wabel A, *et al.* Acute upper gastrointestinal bleeding in southern Saudi Arabia. *J Royal Coll Physicians Lond* 1997;**31**:62–4.
99 **Soplepmann J**, Udd M, Peetsalu A, *et al.* Acute upper gastrointestinal haemorrhage in Central Finland Province, Finland, and in Tartu County, Estonia. *Ann Chir Gynaecol* 1997;**86**:222–8.
100 **Paspatis GA**, Matrella E, Kapsoritakis A, *et al.* An epidemiological study of acute upper gastrointestinal bleeding in Crete, Greece. *Eur J Gastroenterol Hepatol* 2000;**12**:1215–20.
101 **Laporte JR**, Ibanez L, Vidal X, *et al.* Upper gastrointestinal bleeding associated with the use of NSAIDs: newer versus older agents. *Drug Saf* 2004;**27**:411–20.
102 **Loftus EV Jr**. Clinical epidemiology of inflammatory bowel disease: Incidence, prevalence, and environmental influences. *Gastroenterology* 2004;**126**:1504–17.
103 **Gut Week**. Digestive health in the UK. *Gut Week Website* 2004:84–89.
104 **Feeney M**, Ciegg A, Winwood P, *et al.* A case-control study of measles vaccination and inflammatory bowel disease. The East Dorset Gastroenterology Group. *Lancet* 1997;**350**:764–6.
105 **Thompson NP**, Montgomery SM, Pounder RE, *et al.* Is measles vaccination a risk factor for inflammatory bowel disease? *Lancet* 1995;**345**:1071–4.
106 **MacDougall IP**. The cancer risk in ulcerative colitis. *Lancet* 1964;**ii**:655–8.
107 **Rosenqvist H**, Ohrling H, Lagercrantz R, *et al.* Ulcerative colitis and carcinoma coli. *Lancet* 1950;**i**:906–8.
108 **Gillen CD**, Walmsley RS, Prior P, *et al.* Ulcerative colitis and Crohn's disease: a comparison of the colorectal cancer risk in extensive colitis. *Gut* 1994;**35**:1590–2.
109 **Mellemkjaer L**, Olsen JH, Frisch M, *et al.* Cancer in patients with ulcerative colitis. *Int J Cancer* 1995;**60**:330–3.
110 **Eaden JA**, Mayberry JF, British Society for Gastroenterology, Association of Coloproctology for Great Britain and Ireland. Guidelines for screening and surveillance of asymptomatic colorectal cancer in patients with inflammatory bowel disease. *Gut* 2002;**51**(Suppl 5):V10–2.
111 **Edwards FC**, Truelove SC. The course and prognosis of ulcerative colitis; part III complications. *Gut* 1964;**5**:1–15.
112 **Grip O**, Svensson PJ, Lindgren S. Inflammatory bowel disease promotes venous thrombosis earlier in life. *Scand J Gastroenterol* 2000;**35**:619–23.
113 **Miehsler W**, Reinisch W, Valic E, *et al.* Is inflammatory bowel disease an independent and disease specific risk factor for thromboembolism? *Gut* 2004;**53**:542–8.
114 **Compston JE**, Judd D, Crawley EO, *et al.* Osteoporosis in patients with inflammatory bowel disease. *Gut* 1987;**28**:410–5.
115 **Scott EM**, Gaywood I, Scott BB. Guidelines for osteoporosis in coeliac disease and inflammatory bowel disease. British Society of Gastroenterology. *Gut* 2000;**46**(Suppl 1):i1–8.
116 **Scott EM**, Scott BB. A strategy for osteoporosis in gastroenterology. *Eur J Gastroenterol Hepatol* 1998;**10**:689–96.
117 **Shah A**, Mayberry JF, Williams G, *et al.* Epidemiological survey of coeliac disease and inflammatory bowel disease in first-degree relatives of coeliac patients. *Q J Med* 1990;**74**:283–8.
118 **Cottone M**, Marrone C, Casa A, *et al.* Familial occurrence of inflammatory bowel disease in celiac disease. *Inflamm Bowel Dis* 2003;**9**:321–3.
119 **Shepherd HA**, Selby WS, Chapman RW, *et al.* Ulcerative colitis and persistent liver dysfunction. *Q J Med* 1983;**52**:503–13.
120 **Cullen S**, Chapman R. Primary sclerosing cholangitis. *Autoimmun Rev* 2003;**2**:305–12.
121 **Thomas GA**, Millar-Jones D, Rhodes J, *et al.* Incidence of Crohn's disease in Cardiff over 60 years: 1986–1990 an update. *Eur J Gastroenterol Hepatol* 1995;**7**:401–5.
122 **Yapp TR**, Stenson R, Thomas GA, *et al.* Crohn's disease incidence in Cardiff from 1930: an update for 1991–1995. *Eur J Gastroenterol Hepatol* 2000;**12**:907–11.
123 **Kyle J**. Crohn's disease in the northeastern and northern Isles of Scotland: an epidemiological review. *Gastroenterology* 1992;**103**:392–9.
124 **Fellows IW**, Freeman JG, Holmes GK. Crohn's disease in the city of Derby, 1951–85. *Gut* 1990;**31**:1262–5.

125 **Lee FI**, Costello FT. Crohn's disease in Blackpool - incidence and prevalence 1968–1980. *Gut* 1985;**26**:274–8.
126 **Jayanthi V**, Probert CS, Pinder D, *et al.* Epidemiology of Crohn's disease in Indian migrants and the indigenous population in Leicestershire. *Q J Med* 1992;**82**:125–38.
127 **Logan RF**. Inflammatory bowel disease incidence: up, down or unchanged? *Gut* 1998;**42**:309–11.
128 **Bjornsson S**, Johannsson JH, Oddsson E. Inflammatory bowel disease in Iceland, 1980. A retrospective nationwide epidemiologic study. *Scand J Gastroenterol* 1998;**33**:71–7.
129 **Molinie F**, Gower-Rousseau C, Yzet T, *et al.* Opposite evolution in incidence of Crohn's disease and ulcerative colitis in Northern France (1988–1999). *Gut* 2004;**53**:843–8.
130 **Lakatos L**, Mester G, Erdelyi Z, *et al.* Striking elevation in incidence and prevalence of inflammatory bowel disease in a province of western Hungary between 1977–2001. *World J Gastroenterol* 2004;**10**:404–9.
131 Evans JG, Acheson ED. An epidemiological study of ulcerative colitis and regional enteritis in the Oxford area. *Gut* 1965;**6**:311–24.
132 **Jones HW**, Grogono J, Hoare AM. Surveillance in ulcerative colitis: burdens and benefit. *Gut* 1988;**29**:325–31.
133 **Srivastava ED**, Mayberry JF, Morris TJ, *et al.* Incidence of ulcerative colitis in Cardiff over 20 years: 1968–87. *Gut* 1992;**33**:256–8.
134 **Devlin HB**, Datta D, Dellipiani AW. The incidence and prevalence of inflammatory bowel disease in North Tees Health District. *World J Surg* 1980;**4**:183–93.
135 **Sinclair TS**, Brunt PW, Mowat NA. Nonspecific proctocolitis in northeastern Scotland: a community study. *Gastroenterology* 1983;**85**:1–11.
136 **Rubin GP**, Hungin AP, Kelly PJ, *et al.* Inflammatory bowel disease: epidemiology and management in an English general practice population. *Aliment Pharmacol Ther* 2000;**14**:1553–9.
137 **Miller DS**, Keighley AC, Langman MJ. Changing patterns in epidemiology of Crohn's disease. *Lancet* 1974;**2**:691–3.
138 **Smith IS**, Young S, Gillespie G, *et al.* Epidemiological aspects of Crohn's disease in Clydesdale 1961–1970. *Gut* 1975;**16**:62–7.
139 **Tresadern JC**, Gear MW, Nicol A. An epidemiological study of regional enteritis in the Gloucester area. *Br J Surg* 1973;**60**:366–8.
140 **Humphreys WG**, Brown JS, Parks TG. Crohn's disease in Northern Ireland—a retrospective study of 440 cases. *Ulster Med J* 1990;**59**:30–5.
141 **Stone MA**, Mayberry JF, Baker R. Prevalence and management of inflammatory bowel disease: a cross-sectional study from central England. *Eur J Gastroenterol Hepatol* 2003;**15**:275–80.
142 **Barton JR**, Gillon S, Ferguson A. Incidence of inflammatory bowel disease in Scottish children between 1968 and 1983; marginal fall in ulcerative colitis, three-fold rise in Crohn's disease. *Gut* 1989;**30**:618–22.
143 **Armitage E**, Drummond H, Ghosh S, *et al.* Incidence of juvenile-onset Crohn's disease in Scotland. *Lancet* 1999;**353**:1496–7.
144 **Watson AJ**, Johnston AT, Barker PM, *et al.* The presentation and management of juvenile-onset chronic inflammatory bowel disease in Northeastern Scotland. *J Pediatr Surg* 2002;**37**:83–6.
145 **Cosgrove M**, Al Atia RF, Jenkins HR. The epidemiology of paediatric inflammatory bowel disease. *Arch Dis Child* 1996;**74**:460–1.
146 **Ahmed M**, Davies IH, Hood K, *et al.* Incidence of paediatric inflammatory bowel disease in South Wales. *Arch Dis Child* 2006;**91**:344–5.
147 **Ehlin AG**, Montgomery SM, Ekbom A, *et al.* Prevalence of gastrointestinal diseases in two British national birth cohorts. *Gut* 2003;**52**:1117–21.
148 **Shivananda S**, Lennard-Jones J, Logan R, *et al.* Incidence of inflammatory bowel disease across Europe: is there a difference between north and south? Results of the European Collaborative Study on Inflammatory Bowel Disease (EC-IBD). *Gut* 1996;**39**:690–7.
149 **Jones J**, Boorman J, Cann P, *et al.* British Society of Gastroenterology guidelines for the management of irritable bowel syndrome. *Gut* 2000;**47**(Suppl 2):ii1–19.
150 **Harvey RF**, Salih SY, Read AE. Organic and functional disorders in 2000 gastroenterology outpatients. *Lancet* 1983;**1**:632–4.
151 **Ferguson A**, Sircus W, Eastwood MA. Frequency of ''functional'' gastrointestinal disorders. *Lancet* 1977;**2**:613–4.
152 **Fielding JE**. A year in out-patients with the irritable bowel syndrome. *Ir J Med Sci* 1977;**146**:162–6.
153 **Wilson A**, Reyes E, Ofman J. Prevalence and outcomes of anemia in inflammatory bowel disease: a systematic review of the literature. *Am J Med* 2004;**116**:44–9S.
154 **Kennedy TM**, Jones RH. Epidemiology of cholecystectomy and irritable bowel syndrome in a UK population. *Br J Surg* 2000;**87**:1658–63.
155 **Heaton KW**, O'Donnell LJ, Braddon FE, *et al.* Symptoms of irritable bowel syndrome in a British urban community: consulters and nonconsulters. *Gastroenterology* 1992;**102**:1962–7.
156 **Thompson WG**, Heaton KW, Smyth GT, *et al.* Irritable bowel syndrome in general practice: prevalence, characteristics, and referral. *Gut* 2000;**46**:78–82.
157 **Thompson WG**, Heaton KW. Functional bowel disorders in apparently healthy people. *Gastroenterology* 1980;**79**:283–8.
158 **Wilson S**, Roberts L, Roalfe A, *et al.* Prevalence of irritable bowel syndrome: a community survey. *Br J Gen Pract* 2004;**54**:495–502.
159 **Drossman DA**, Sandler RS, McKee DC, *et al.* Bowel patterns among subjects not seeking health care. Use of a questionnaire to identify a population with bowel dysfunction. *Gastroenterology* 1982;**83**:529–34.
160 **Sandler RS**, Drossman DA, Nathan HP, *et al.* Symptom complaints and health care seeking behavior in subjects with bowel dysfunction. *Gastroenterology* 1984;**87**:314–8.
161 **Gaburri M**, Bassotti G, Bacci G, *et al.* Functional gut disorders and health care seeking behavior in an Italian non-patient population. *Recenti Prog Med* 1989;**80**:241–244.
162 **Schlemper RJ**, van der Werf SD, Vandenbroucke JP, *et al.* Peptic ulcer, non-ulcer dyspepsia and irritable bowel syndrome in The Netherlands and Japan. *Scand J Gastroenterol* 1993;**200**(Suppl):33–41.
163 **Drossman DA**, Li Z, Andruzzi E, *et al.* U.S. householder survey of functional gastrointestinal disorders. Prevalence, sociodemography, and health impact. *Dig Dis Sci* 1993;**38**:1569–80.
164 **Saito YA**, Locke GR, Talley NJ, *et al.* A comparison of the Rome and Manning criteria for case identification in epidemiological investigations of irritable bowel syndrome. *Am J Gastroenterol* 2000;**95**:2816–24.
165 **Agreus L**, Svardsudd K, Nyren O, *et al.* Irritable bowel syndrome and dyspepsia in the general population: overlap and lack of stability over time. *Gastroenterology* 1995;**109**:671–80.
166 **Kay L**, Jorgensen T, Jensen KH. The epidemiology of irritable bowel syndrome in a random population: prevalence, incidence, natural history and risk factors. *J Intern Med* 1994;**236**:23–30.
167 **Boyce PM**, Koloski NA, Talley NJ. Irritable bowel syndrome according to varying diagnostic criteria: are the new Rome II criteria unnecessarily restrictive for research and practice? *Am J Gastroenterol* 2000;**95**:3176–83.
168 **Mearin F**, Badia X, Balboa A, *et al.* Irritable bowel syndrome prevalence varies enormously depending on the employed diagnostic criteria: comparison of Rome II versus previous criteria in a general population. *Scand J Gastroenterol* 2001;**36**:1155–61.
169 **Dapoigny M**, Bellanger J, Bonaz B, *et al.* Irritable bowel syndrome in France: a common, debilitating and costly disorder. *Eur J Gastroenterol Hepatol* 2004;**16**:995–1001.
170 **Thompson WG**, Irvine EJ, Pare P, *et al.* Functional gastrointestinal disorders in Canada: first population-based survey using Rome II criteria with suggestions for improving the questionnaire. *Dig Dis Sci* 2002;**47**:225–35.
171 **Barbezat G**, Poulton R, Milne B, *et al.* Prevalence and correlates of irritable bowel symptoms in a New Zealand birth cohort. *N Z Med J* 2002;**115**:U220.
172 **Saito YA**, Talley NJ, J Melton L, *et al.* The effect of new diagnostic criteria for irritable bowel syndrome on community prevalence estimates. *Neurogastroenterol Motil* 2003;**15**:687–94.
173 **Hogberg L**, Falth-Magnusson K, Grodzinsky E, *et al.* Familial prevalence of coeliac disease: a twenty-year follow-up study. *Scand J Gastroenterol* 2003;**38**:61–5.
174 **Sanders DS**, Patel D, Stephenson TJ, *et al.* A primary care cross-sectional study of undiagnosed adult coeliac disease. *Eur J Gastroenterol Hepatol* 2003;**15**:407–13.
175 **Scott BB**, Losowsky MS. Coeliac disease: a cause of various associated diseases. *Lancet* 1975;**ii**:956–7.
176 **Swinson CM**, Slavin G, Coles EC, *et al.* Coeliac disease and malignancy. *Lancet* 1983;**1**:111–5.
177 **Lawson A**, West J, Aithal GP, *et al.* Autoimmune cholestatic liver disease in people with coeliac disease: a population-based study of their association. *Aliment Pharmacol Ther* 2005;**21**:401–5.
178 **West J**, Logan RF, Card TR, *et al.* Fracture risk in people with celiac disease: a population-based cohort study. *Gastroenterology* 2003;**125**:429–36.
179 **Logan RF**, Ferguson A, Finlayson ND, *et al.* Primary biliary cirrhosis and coeliac disease: an association? *Lancet* 1978;**1**:230–3.
180 **Cooper BT**, Holmes GK, Cooke WT. Coeliac disease and immunological disorders. *BMJ* 1978;**1**:537–9.
181 **Sorensen HT**, Thulstrup AM, Blomqvist P, *et al.* Risk of primary biliary liver cirrhosis in patients with coeliac disease: Danish and Swedish cohort data. *Gut* 1999;**44**:736–8.
182 **West J**, Logan RF, Smith CJ, *et al.* Malignancy and mortality in people with coeliac disease: population based cohort study. *BMJ* 2004;**329**:716–9.
183 **Holmes GK**, Stokes PL, Sorahan TM, *et al.* Coeliac disease, gluten-free diet, and malignancy. *Gut* 1976;**17**:612–9.
184 **Howdle PD**, Jalal PK, Holmes GK, *et al.* Primary small-bowel malignancy in the UK and its association with coeliac disease. *Q J Med* 2003;**96**:345–53.
185 **Kingham JG**, Ramanaden D, Dawson A. Metachronous small-bowel adenocarcinoma in coeliac disease: gluten-free diet is not protective. *Scand J Gastroenterol* 1998;**33**:218–22.
186 **West J**, Logan RF, Hill P, *et al.* Seroprevalence, correlates, and characteristics of undetected coeliac disease in England. *Gut* 2003;**52**:960–5.
187 **Schweizer JJ**, von Blomberg BM, Bueno-de Mesquita HB, *et al.* Coeliac disease in The Netherlands. *Scand J Gastroenterol* 2004;**39**:359–64.
188 **Hovell CJ**, Collett JA, Vautier G, *et al.* High prevalence of coeliac disease in a population-based study from Western Australia: a case for screening? *Med J Aust* 2001;**175**:247–50.
189 **Lagerqvist C**, Ivarsson A, Juto P, *et al.* Screening for adult coeliac disease - which serological marker(s) to use? *J Intern Med* 2001;**250**:241–8.
190 **Csizmadia CG**, Mearin ML, von Blomberg BM, *et al.* An iceberg of childhood coeliac disease in the Netherlands. *Lancet* 1999;**353**:813–4.
191 **Pratesi R**, Gandolfi L, Garcia SG, *et al.* Prevalence of coeliac disease: unexplained age-related variation in the same population. *Scand J Gastroenterol* 2003;**38**:747–50.
192 **Gomez JC**, Selvaggio GS, Viola M, *et al.* Prevalence of celiac disease in Argentina: screening of an adult population in the La Plata area. *Am J Gastroenterol* 2001;**96**:2700–4.
193 **Fasano A**, Berti I, Gerarduzzi T, *et al.* Prevalence of celiac disease in at-risk and not-at-risk groups in the United States: a large multicenter study. *Arch Intern Med* 2003;**163**:286–92.
194 **Kolho KL**, Farkkila MA, Savilahti E. Undiagnosed coeliac disease is common in Finnish adults. *Scand J Gastroenterol* 1998;**33**:1280–3.

195 **Johnston SD**, Watson RG, McMillan SA, *et al*. Prevalence of coeliac disease in Northern Ireland. *Lancet* 1997;**350**:1370.
196 **Maki M**, Mustalahti K, Kokkonen J, *et al*. Prevalence of Celiac disease among children in Finland. *N Engl J Med* 2003;**348**:2517–24.
197 **Mustalahti K**, Reunanen A, Heuer M, *et al*. *Prevalence of coeliac disease in four European countries*. Belfast, Ireland: 11th International Symposium on Coeliac Disease, 2004:60.
198 **Simpson J**, Spiller R. Colonic diverticular disease. *Clin Evid* 2003;**9**:478–87.
199 **Key TJ**, Davey GK, Appleby PN. Health benefits of a vegetarian diet. *Proc Nutr Soc* 1999;**58**:271–5.
200 **Nair P**, Mayberry JF. Vegetarianism, dietary fibre and gastro-intestinal disease. *Dig Dis Sci* 1994;**12**:177–85.
201 **Campbell K**, Steele RJ. Non-steroidal anti-inflammatory drugs and complicated diverticular disease: a case-control study. *Br J Surg* 1991;**78**:190–1.
202 **Day TK**. Intestinal perforation associated with osmotic slow release indomethacin capsules. *Br Med J (Clin Res Ed)* 1983;**287**:1671–2.
203 **Morris CR**, Harvey IM, Stebbings WS, *et al*. Epidemiology of perforated colonic diverticular disease. *Postgrad Med J* 2002;**78**:654–8.
204 **Sheers R**, Williams WR. NSAIDs and gut damage. *Lancet* 1989;**2**:1154.
205 **Canter JW**, Shorb PE Jr. Acute perforation of colonic diverticula associated with prolonged adrenocorticosteroid therapy. *Am J Surg* 1971;**121**:46–51.
206 **Hart AR**, Kennedy HJ, Stebbings WS, *et al*. How frequently do large bowel diverticula perforate? An incidence and cross-sectional study. *Eur J Gastroenterol Hepatol* 2000;**12**:661–5.
207 **Kyle J**, Adesola AO, Tinckler AF. Incidence of diverticulitis. *Scand J Gastroenterol* 1967;**2**:77–80.
208 **Kang JY**, Dhar A, Pollok R, *et al*. Diverticular disease of the colon: ethnic differences in frequency. *Aliment Pharmacol Ther* 2004;**19**:765–9.
209 **Parks TG**. Natural history of diverticular disease of the colon. *Clin Gastroenterol* 1975;**4**:53–69.
210 **Delvaux M**. Diverticular disease of the colon in Europe: epidemiology, impact on citizen health and prevention. *Aliment Pharmacol Ther* 2003;**18**(Suppl 3):71–4.
211 **Kyle J**, Davidson AI. The changing pattern of hospital admissions for divertical disease of the colon. *Br J Surg* 1975;**62**:537–41.
212 **Kang JY**, Hoare JD, Tinto A, *et al*. Diverticular disease of the colon - on the rise: a study of hospital admissions in England between 1989/1990 and 1999/2000. *Aliment Pharmacol Ther* 2003;**17**:1189–95.
213 **Campbell WB**, Lee EJ, Van de Sijpe K, *et al*. A 25-year study of emergency surgical admissions. *Ann R Coll Surg Engl* 2002;**84**:273–7.
214 **BASL, BSG, AUGIS, UK Liver Surgeons Group, Pancreatic Society UK**. *Specialised services for hepatology and hepato-pancreato-biliary (HPB) surgery*. London: BASL, BSG, AUGIS, UK Liver Surgeons Group and Pancreatic Society UK, 2004.
215 **Information and Statistics Division**. *Cancer statistics for Scotland. Scotland: NHS in Scotland*, 2004 (http://www.isdscotland.org/isd/183.html, accessed 20 December 2006).
216 **Tao N**, Sussman S, Nieto J, *et al*. Demographic characteristics of hospitalized patients with alcoholic liver disease and pancreatitis in los angeles county. *Alcohol Clin Exp Res* 2003;**27**:1798–804.
217 **Saunders JB**, Walters JR, Davies AP, *et al*. A 20-year prospective study of cirrhosis. *BMJ* 1981;**282**:263–6.
218 **Goodall JA**, Bryan C. The low incidence of alcoholic cirrhosis in the islands of Lewis and Harris. *Scott Med J* 1988;**33**:229–30.
219 **Scottish Health Statistics**. Scottish Health Statistics 2004. Available at http://www.cabinetoffice.gov.uk/strategy/work_areas/alcohol_misuse/, accessed 18 January 2007.
220 **Chick J**. Evidence suggesting increasing health damage in Scotland related to alcohol. *Health Bull (Edinb)* 1997;**55**:134–9.
221 **Prime Minister's Strategy Unit**. Alcohol harm reduction strategy for England. London: Cabinet Office, 2004.
222 **Schmidt DN**. Apparent risk factors for chronic and acute pancreatitis in Stockholm county. Spirits but not wine and beer. *Int J Pancreatol* 1991;**8**:45–50.
223 **Collantes R**, Ong JP, Younossi ZM. Nonalcoholic fatty liver disease and the epidemic of obesity. *Cleve Clin J Med* 2004;**71**:657–64.
224 **Caldwell SH**, Oelsner DH, Lezzoni JC, *et al*. Cryptogenic cirrhosis: clinical characterization and risk factors for underlying disease. *Hepatology* 1999;**29**:664–9.
225 **Joy D**, Thava VR, Scott BB. Diagnosis of fatty liver disease: is biopsy necessary? *Eur J Gastroenterol Hepatol* 2003;**15**:539–43.
226 **British Liver Trust**. 2002 (http://www.britishlivertrust.org.uk, accessed 20 December 2006).
227 **Burroughs A**, McNamara D. Liver disease in Europe. *Aliment Pharmacol Ther* 2003;**18**(Suppl 3):54–9.
228 **Department of Health**. *Hepatitis C strategy for England*. London: Department of Health, 2002.
229 **Health Protection Agency, SCIE National Public Health Service for Wales, CDSC Northern Ireland, CRDHB, UASSG**. *Shooting up: infections among injecting drug users in the United Kingdom 2003*. London: Health Protection Agency, 2004.
230 **World Health Organisation**. *Weekly epidemiological record*. Geneva: World Health Organisation, 1999.
231 **Judd A**, Hickman M, Jones S, *et al*. Incidence of hepatitis C virus and HIV among new injecting drug users in London: prospective cohort study. *BMJ* 2005;**330**:24–5.
232 **Department of Health/General Health Protection**. *Hepatitis C action plan for England*. London: Department of Health, 2004.
233 **Steinke DT**, Weston TL, Morris AD, *et al*. The epidemiology of liver disease in Tayside database: a population-based record-linkage study. *J Biomed Informatics* 2003;**35**:186–93.
234 **Henry JA**, Moloney C, Rivas C, *et al*. Increase in alcohol related deaths: is hepatitis C a factor? *J Clin Pathol* 2002;**55**:704–7.
235 **Deuffic S**, Poynard T, Valleron AJ. Correlation between hepatitis C virus prevalence and hepatocellular carcinoma mortality in Europe. *J Viral Hepat* 1999;**6**:411–3.
236 **Metcalf JW**, Howel D, James OF, *et al*. Primary biliary cirrhosis: epidemiology helping the clinician. *BMJ* 1996;**312**:1181–2.
237 **Myszor M**, James OF. The epidemiology of primary biliary cirrhosis in north-east England: an increasingly common disease? *Q J Med* 1990;**75**:377–85.
238 **James OF**, Bhopal R, Howel D, *et al*. Primary biliary cirrhosis once rare, now common in the United Kingdom? *Hepatology* 1999;**30**:390–4.
239 **Triger DR**. Primary biliary cirrhosis: An epidemiological study. *BMJ* 1980;**281**:772–5.
240 **Hislop WS**, Hopwood D, Bouchier IA. Primary biliary cirrhosis in elderly females. *Age Ageing* 1982;**11**:153–9.
241 **Hamlyn AN**, Macklon AF, James O. Primary biliary cirrhosis: a geographical clustering and symptomatic onset seasonality. *Gut* 1983;**24**:940–5.
242 **Goudie BM**, MacFarlane G, Boyle P. Epidemiology of antimitochondrial antibody seropositivity and primary biliary cirrhosis in west of Scotland. *Gut* 1987;**28**:A1346.
243 **Metcalf JV**, Bhopal RS, Gray J, *et al*. Incidence and prevalence of primary biliary cirrhosis in the city of Newcastle upon Tyne, England. *Int J Epidemiol* 1997;**26**:830–6.
244 **Kingham JG**, Parker DR. The association between primary biliary cirrhosis and coeliac disease: a study of relative prevalences. *Gut* 1998;**42**:120–2.
245 **Danielsson A**, Boqvist L, Uddenfeldt P. Epidemiology of primary biliary cirrhosis in a defined rural population in the northern part of Sweden. *Hepatology* 1990;**11**:458–64.
246 **Eriksson S**, Lindgren S. The prevalence and clinical spectrum of primary biliary cirrhosis in a defined population. *Scand J Gastroenterol* 1984;**19**:971–6.
247 **Lofgren J**, Jarnerot G, Danielsson DR, *et al*. Incidence and prevalence of primary biliary cirrhosis in a defined population in Sweden. *Scand J Gastroenterol* 1985;**20**:647–50.
248 **Triger DR**, Berg P, Rodes J. Epidemiology of primary biliary cirrhosis. *Liver* 1984;**4**:195–200.
249 **Witt-Sullivan H**, Heathcote J, Cauch K, *et al*. The demography of primary biliary cirrhosis in Ontario, Canada. *Hepatology* 1990;**12**:95–105.
250 **Caballero Plasencia AM**, Lopez Callejas C, Valenzuela Barranco M, *et al*. [Epidemiology of primary biliary cirrhosis in the South area of Granada]. *Med Clin (Barc)* 1991;**96**:481–5.
251 **Watson RG**, Angus PW, Dewar M, *et al*. Low prevalence of primary biliary cirrhosis in Victoria, Australia. Melbourne Liver Group. *Gut* 1995;**36**:927–930.
252 **Boberg KM**, Aadland E, Jahnsen J, *et al*. Incidence and prevalence of primary biliary cirrhosis, primary sclerosing cholangitis, and autoimmune hepatitis in a Norwegian population. *Scand J Gastroenterol* 1998;**33**:99–103.
253 **Remmel T**, Remmel H, Uibo R, *et al*. Primary biliary cirrhosis in Estonia. With special reference to incidence, prevalence, clinical features, and outcome. *Scand J Gastroenterol* 1995;**30**:367–71.
254 **Bambha K**, Kim WR, Talwalkar J, *et al*. Incidence, clinical spectrum, and outcomes of primary sclerosing cholangitis in a United States community. *Gastroenterology* 2003;**125**:1364–9.
255 **Hurlburt KJ**, McMahon BJ, Deubner H, *et al*. Prevalence of autoimmune liver disease in Alaska Natives. *Am J Gastroenterol* 2002;**97**:2402–7.
256 **Sood S**, Gow PJ, Christie JM, *et al*. Epidemiology of primary biliary cirrhosis in Victoria, Australia: high prevalence in migrant populations. *Gastroenterology* 2004;**127**:470–5.
257 **Chapman RW**. The management of primary sclerosing cholangitis. *Curr Gastroenterol Rep* 2003;**5**:9–17.
258 **Vera A**, Moledina S, Gunson B, *et al*. Risk factors for recurrence of primary sclerosing cholangitis of liver allograft. *Lancet* 2002;**360**:1943–4.
259 **Levy C**, Lindor KD. Treatment options for primary biliary cirrhosis and primary sclerosing cholangitis. *Curr Treat Options Gastroenterol* 2003;**6**:93–103.
260 **Bergquist A**, Ekbom A, Olsson R, *et al*. Hepatic and extrahepatic malignancies in primary sclerosing cholangitis. *J Hepatol* 2002;**36**:321–7.
261 **Broome U**, Lofberg R, Veress B, *et al*. Primary sclerosing cholangitis and ulcerative colitis: evidence for increased neoplastic potential. *Hepatology* 1995;**22**:1404–8.
262 **Kingham JG**. Risk of colon cancer in patients with ulcerative colitis is potentiated by the presence of primary sclerosing cholangitis. *Hepatology* 1997;**25**:254.
263 **Hardy RG**. ABC of colorectal cancer. Molecular basis for risk factors. *BMJ* 2000;**321**:886–9.
264 **Kingham JG**, Kochar N, Gravenor MB. Incidence, clinical patterns, and outcomes of primary sclerosing cholangitis in South Wales, United Kingdom. *Gastroenterology* 2004;**126**:1929–30.
265 **Berdal JE**, Ebbesen J, Rydning A. [Incidence and prevalence of autoimmune liver diseases]. *Tidsskr Nor Laegeforen* 1998;**118**:4517–9.
266 **Aerts R**, Penninckx F. The burden of gallstone disease in Europe. *Aliment Pharmacol Ther* 2003;**18**(Suppl 3):49–53.
267 **Heaton KW**, Braddon FE, Mountford RA, *et al*. Symptomatic and silent gall stones in the community. *Gut* 1991;**32**:316–20.
268 **Holland C**, Heaton KW. Increasing frequency of gall bladder operations in the Bristol clinical area. *Br Med J* 1972;**3**:672–5.
269 **Plant JC**, Percy I, Bates T, *et al*. Incidence of gallbladder disease in Canada, England, and France. *Lancet* 1973;**2**:249–51.
270 **Bateson MC**. Gallstones and cholecystectomy in modern Britain. *Postgrad Med J* 2000;**76**:700–3.

271 **Kang JY**, Ellis C, Majeed A, *et al*. Gallstones-an increasing problem: a study of hospital admissions in England between 1989/1990 and 1999/2000. *Aliment Pharmacol Ther* 2003;**17**:561–9.
272 **Glambek I**, Kvaale G, Arnesjo B, *et al*. Prevalence of gallstones in a Norwegian population. *Scand J Gastroenterol* 1987;**22**:1089–94.
273 **Berndt H**, Nurnberg D, Pannwitz H. Prevalence of cholelithiasis. Results of an epidemiologic study using sonography in East Germany. *Z Gastroenterol* 1989;**27**:662–6.
274 **Muhrbeck O**, Ahlberg J. Prevalence of gallstone disease in a Swedish population. *Scand J Gastroenterol* 1995;**30**:1125–8.
275 **Caroli-Bosc FX**, Deveau C, Harris A, *et al*. Prevalence of cholelithiasis: results of an epidemiologic investigation in Vidauban, southeast France. General Practitioner's Group of Vidauban. *Dig Dis Sci* 1999;**44**:1322–9.
276 **Attili AF**, Carulli N, Roda E, *et al*. Epidemiology of gallstone disease in Italy: prevalence data of the Multicenter Italian Study on Cholelithiasis (M.I.COL.). *Am J Epidemiol* 1995;**141**:158–65.
277 **Acalovschi M**. Epidemiology of gallstone disease. In: Acalovschi M, Paumgartner G, eds. *Hepatobiliary diseases:cholestasis and gallstones - Falk Workshop*. London: Kluwer Academic Publishers, 2001:117–30.
278 **Barbara L**, Sama C, Morselli Labate AM, *et al*. A population study on the prevalence of gallstone disease: the Sirmione Study. *Hepatology* 1987;**7**:913–7.
279 **Martinez de Pancorbo C**, Carballo F, Horcajo P, *et al*. Prevalence and associated factors for gallstone disease: results of a population survey in Spain. *J Clin Epidemiol* 1997;**50**:1347–55.
280 **GREPCO**. Prevalence of gallstone disease in an Italian adult female population. Rome Group for the Epidemiology and Prevention of Cholelithiasis (GREPCO). *Am J Epidemiol* 1984;**119**:796–805.
281 **Jorgensen T**. Prevalence of gallstones in a Danish population. *Am J Epidemiol* 1987;**126**:912–21.
282 **Kratzer W**, Kron M, Hay B, *et al*. Prevalence of cholecystolithiasis in South Germany—an ultrasound study of 2,498 persons of a rural population. *Z Gastroenterol* 1999;**37**:1157–62.
283 **Connor S**, Raraty MG, Howes N, *et al*. Surgery in the treatment of acute pancreatitis—minimal access pancreatic necrosectomy. *Scand J Surg* 2005;**94**:135–42.
284 **Trapnell JE**, Duncan EH. Patterns of incidence in acute pancreatitis. *BMJ* 1975;**2**:179–83.
285 **Corfield AP**, Cooper MJ, Williamson RC. Acute pancreatitis: a lethal disease of increasing incidence. *Gut* 1985;**26**:724–9.
286 **Bourke JB**, Giggs JA, Ebdon DS. Variations in the incidence and the spatial distribution of patients with primary acute pancreatitis in Nottingham. *Gut* 1979;**20**:366–71.
287 **Thomson SR**, Hendry WS, McFarlane GA, *et al*. Epidemiology and outcome of acute pancreatitis. *Br J Surg* 1987;**74**:398–401.
288 **Toh SK**, Phillips S, Johnson CD. A prospective audit against national standards of the presentation and management of acute pancreatitis in the South of England. *Gut* 2000;**46**:239–43.
289 **De Beaux AC**, Palmer KR, Carter DC. Factors influencing morbidity and mortality in acute pancreatitis; an analysis of 279 cases. *Gut* 1995;**37**:121–6.
290 **Norton SA**, Cheruvu CV, Collins J, *et al*. An assessment of clinical guidelines for the management of acute pancreatitis. *Ann R Coll Surg Engl* 2001;**83**:399–405.
291 **Mero M**. Changing aetiology of acute pancreatitis. *Ann Chir Gynaecol* 1982;**71**:126–9.
292 **Svensson JO**, Norback B, Bokey EL, *et al*. Changing pattern in aetiology of pancreatitis in an urban Swedish area. *Br J Surg* 1979;**66**:159–61.
293 **Halvorsen FA**, Ritland S. Acute pancreatitis in Buskerud county, Norway. Incidence and etiology. *Scand J Gastroenterol* 1996;**31**:411–4.
294 **Benchimol D**, Firtion O, Bereder JM, *et al*. Acute pancreatitis treated in a surgery ward. Apropos of 57 cases. *J Chir (Paris)* 1996;**133**:208–13.
295 **Minguez M**, Garcia A, Boix V. [Acute pancreatitis. A prospective epidemiological study in the province of Alicante. A Hospital Group for Study of Digestive Diseases in Alicante]. *Rev Esp Enferm Dig* 1995;**87**:869–73.
296 **Gullo L**, Migliori M, Olah A, *et al*. Acute pancreatitis in five European countries: etiology and mortality. *Pancreas* 2002;**24**:223–7.
297 **Milheiro A**, Medeiros A, Castro e Sousa F. Acute pancreatitis. An analysis of 91 consecutive cases (1988–1991) with a brief review of the literature. *Acta Med Port* 1995;**8**:269–77.
298 **Gislason H**, Horn A, Hoem D, *et al*. Acute pancreatitis in Bergen, Norway. A study on incidence, etiology and severity. *Scand J Surg* 2004;**93**:29–33.
299 **Lindkvist B**, Appelros S, Manjer J, *et al*. Trends in incidence of acute pancreatitis in a Swedish population: is there really an increase? *Clin Gastroenterol Hepatol* 2004;**2**:831–7.
300 **Maes B**, Hastier P, Buckley MJ, *et al*. Extensive aetiological investigations in acute pancreatitis: results of a 1-year prospective study. *Eur J Gastroenterol Hepatol* 1999;**11**:891–6.
301 **Birgisson H**, Moller PH, Birgisson S, *et al*. Acute pancreatitis: a prospective study of its incidence, aetiology, severity, and mortality in Iceland. *Eur J Surg* 2002;**168**:278–82.
302 **Flint R**, Windsor J, Bonham M. Trends in the management of severe acute pancreatitis: interventions and outcome. *ANZ J Surg* 2004;**74**:335–42.
303 **Goldacre MJ**, Roberts SE. Hospital admission for acute pancreatitis in an English population, 1963–98: database study of incidence and mortality. *BMJ* 2004;**328**:1466–9.
304 **Tinto A**, Lloyd DA, Kang JY, *et al*. Acute and chronic pancreatitis-diseases on the rise: a study of hospital admissions in England 1989/90–1999/2000. *Aliment Pharmacol Ther* 2002;**16**:2097–105.
305 **Wilson C**, Imrie CW. Changing patterns of incidence and mortality from acute pancreatitis in Scotland, 1961–1985. *Br J Surg* 1990;**77**:731–4.
306 **McKay CJ**, Evans S, Sinclair M, *et al*. High early mortality rate from acute pancreatitis in Scotland, 1984–1995. *Br J Surg* 1999;**86**:1302–5.
307 **Appelros S**, Borgstrom A. Incidence, aetiology and mortality rate of acute pancreatitis over 10 years in a defined urban population in Sweden. *Br J Surg* 1999;**86**:465–70.
308 **Floyd A**, Pedersen L, Nielsen GL, *et al*. Secular trends in incidence and 30-day case fatality of acute pancreatitis in North Jutland County, Denmark: a register-based study from 1981–2000. *Scand J Gastroenterol* 2002;**37**:1461–5.
309 **Lankisch PG**, Assmus C, Maisonneuve P, *et al*. Epidemiology of pancreatic diseases in Luneburg county. A study in a defined German population. *Pancreatology* 2002;**2**:469–77.
310 **Eland IA**, Sturkenboom MJ, Wilson JH, *et al*. Incidence and mortality of acute pancreatitis between 1985 and 1995. *Scand J Gastroenterol* 2000;**35**:1110–6.
311 **Tran DD**, Van Schilfgaarde R. Prevalence and mortality from acute pancreatitis in the Netherlands during 1971–1990. *Digestion* 1994;**55**:342–3.
312 **Jaakkola M**, Nordback I. Pancreatitis in Finland between 1970 and 1989. *Gut* 1993;**34**:1255–60.
313 **Lankisch PG**, Assmus D, Pflichtohofer D. The burden of pancreatic disease in a well defined population. *Gastroenterology* 1998;**116**:A324.
314 **Dite P**, Stary K, Novotny I, *et al*. Incidence of chronic pancreatitis in the Czech Republic. *Eur J Gastroenterol Hepatol* 2001;**13**:749–50.
315 **Mitchell C**. Chronic pancreatitis. *Gastroenterology* 2003;**31**:122–5.
316 **Garg PK**, Tandon RK. Survey on chronic pancreatitis in the Asia-Pacific region. *J Gastroenterol Hepatol* 2004;**19**:998–1004.
317 **Otsuki M**. Chronic pancreatitis in Japan: epidemiology, prognosis, diagnostic criteria, and future problems. *J Gastroenterol Hepatol* 2003;**38**:315–26.
318 **Lin Y**, Tamakoshi A, Matsuno S, *et al*. Nationwide epidemiological survey of chronic pancreatitis in Japan. *J Gastroenterol* 2000;**35**:136–41.
319 **McNamara D**. Pancreatic diseases. *Aliment Pharmacol Ther* 2003;**18**(Suppl 3):60–5.
320 **Johnson CD**, Hosking S. National statistics for diet, alcohol consumption, and chronic pancreatitis in England and Wales, 1960–88. *Gut* 1991;**32**:1401–5.
321 **National Statistics**. *Living in Britain: results from the 2000 General Household Survey*. London: HMSO, 2001.
322 **Levy P**, Barthet M, Mollard BR, *et al*. Estimation of the prevalence and incidence of chronic pancreatitis and its complications. *Gastroenterol Clin Biol* 2006;**30**:838–44.
323 **Dzieniszewski J**, Jarosz M, Ciok J. Chronic pancreatitis in Warsaw. *Mater Med Pol* 1990;**22**:202–4.
324 **Keighley MR**. Gastrointestinal cancers in Europe. *Aliment Pharmacol Ther* 2003;**18**(Suppl 3):7–30.
325 **Slaney G**, Brooke BN. Cancer in ulcerative colitis. *Lancet* 1959;**2**:694–8.
326 **Ekbom A**, Helmick C, Zack M, *et al*. Ulcerative colitis and colorectal cancer. A population-based study. *N Engl J Med* 1990;**323**:1228–33.
327 **Softley A**, Clamp SE, Watkinson G, *et al*. The natural history of inflammatory bowel disease: has there been a change in the last 20 years? *Scand J Gastroenterol* 1988;**144**(Suppl):20–3.
328 **Bray F**, Sankila R, Ferlay J, *et al*. Estimates of cancer incidence and mortality in Europe in 1995. *Eur J Cancer* 2002;**38**:99–166.
329 **Lagergren J**, Bergstrom R, Lindgren A, *et al*. Symptomatic gastroesophageal reflux as a risk factor for esophageal adenocarcinoma. *N Engl J Med* 1999;**340**:825–31.
330 **Malka D**, Hammel P, Maire F, *et al*. Risk of pancreatic adenocarcinoma in chronic pancreatitis. *Gut* 2002;**51**:849–52.
331 **Kang JY**, Hoare J, Majeed A, *et al*. Decline in admission rates for acute appendicitis in England. *Br J Surg* 2003;**90**:1586–92.
332 **Stoll BA**. Association between breast and colorectal cancers. *Br J Surg* 1998;**85**:1468–72.
333 **Lieverse RJ**, Jansen JB, Masclee AA, *et al*. Gastrointestinal disturbances with obesity. *Scand J Gastroenterol Suppl* 1993;**200**:53–8.
334 **Key TJ**, Allen NE, Spencer EA, *et al*. The effect of diet on risk of cancer. *Lancet* 2002;**360**:861–8.
335 **Walther C**, Zilling T, Perfekt R, *et al*. Increasing prevalence of adenocarcinoma of the oesophagus and gastro-oesophageal junction: a study of the Swedish population between 1970 and 1997. *Eur J Surg* 2001;**167**:748–57.
336 **Vaughan TL**, Kristal AR, Blount PL, *et al*. Nonsteroidal anti-inflammatory drug use, body mass index, and anthropometry in relation to genetic and flow cytometric abnormalities in Barrett's esophagus. *Cancer Epidemiol Biomarkers Prev* 2002;**11**:745–52.
337 **Engel LS**, Chow WH, Vaughan TL, *et al*. Population attributable risks of esophageal and gastric cancers. *J Natl Cancer Inst* 2003;**95**:1404–13.
338 **Rozen P**. Cancer of the gastrointestinal tract: early detection or early prevention? *Eur J Cancer Prev* 2004;**13**:71–5.
339 **Caldwell SH**, Crespo DM, Kang HS, *et al*. Obesity and hepatocellular carcinoma. *Gastroenterology* 2004;**127**(Suppl 1):S97–103.
340 **El-Serag HB**. Hepatocellular carcinoma: recent trends in the United States. *Gastroenterology* 2004;**127**(Suppl 1):S27–34.
341 **Bunout D**. Nutritional and metabolic effects of alcoholism: their relationship with alcoholic liver disease. *Nutrition* 1999;**15**:583–9.
342 **Day CP**. Who gets alcoholic liver disease: nature or nurture? *J R Coll Physicians Lond* 2000;**34**:557–62.
343 **Naveau S**, Giraud V, Borotto E, *et al*. Excess weight risk factor for alcoholic liver disease. *Hepatology* 1997;**25**:108–11.
344 **Luyckx FH**, Lefebvre PJ, Scheen AJ. Non-alcoholic steatohepatitis: association with obesity and insulin resistance, and influence of weight loss. *Diabetes Metab* 2000;**26**:98–106.

345 **Charlton M**. Nonalcoholic fatty liver disease: a review of current understanding and future impact. *Clin Gastroenterol Hepatol* 2004;**2**:1048–58.
346 **Friis-Liby I**, Aldenborg F, Jerlstad P, *et al*. High prevalence of metabolic complications in patients with non-alcoholic fatty liver disease. *Scand J Gastroenterol* 2004;**39**:864–9.
347 **Shalauta MD**, Saad R. Barrett's esophagus. *Am Fam Physician* 2004;**69**:2113–8.
348 **Caygill CP**, Johnston DA, Lopez M, *et al*. Lifestyle factors and Barrett's esophagus. *Am J Gastroenterol* 2002;**97**:1328–31.
349 **Wilson LJ**, Ma W, Hirschowitz BI. Association of obesity with hiatal hernia and esophagitis. *Am J Gastroenterol* 1999;**94**:2840–4.
350 **Kodera Y**, Ito S, Yamamura Y, *et al*. Obesity and outcome of distal gastrectomy with D2 lymphadenectomy for carcinoma. *Hepatogastroenterology* 2004;**51**:1225–8.
351 **Flancbaum L**, Choban PS. Surgical implications of obesity. *Annu Rev Med* 1998;**49**:215–34.
352 **Funnell IC**, Bornman PC, Weakley SP, *et al*. Obesity: an important prognostic factor in acute pancreatitis. *Br J Surg* 1993;**80**:484–6.
353 **Martinez J**, Sanchez-Paya J, Palazon JM, *et al*. Is obesity a risk factor in acute pancreatitis? A meta-analysis. *Pancreatology* 2004;**4**:42–8.
354 **Singer MV**. Effect of ethanol and alcoholic beverages on the gastrointestinal tract in humans. *Rom J Gastroenterol* 2002;**11**:197–204.
355 **Chick J**. Alcohol problems in the general hospital. *Br Med Bull* 1994;**50**:200–10.
356 **Findlay A**. Alcohol misuse in Scotland—is there a growing health problem? *Health Bull (Edinb)* 1991;**49**:273–83.
357 **Waddell TS**, Hislop WS. Analysis of alcohol-related admissions in gastroenterology, cardiology and respiratory medicine. *Scott Med J* 2003;**48**:114–6.
358 **Cumberland PJ**, Sethi D, Roderick PJ, *et al*. The infectious intestinal disease study of England: a prospective evaluation of symptoms and health care use after an acute episode. *Epidemiol Infect* 2003;**130**:453–60.
359 **Lunniss PJ**, Gladman MA, Hetzer FH, *et al*. Risk factors in acquired faecal incontinence. *J R Soc Med* 2004;**97**:111–6.
360 **Norton C**, Chelvanayagam S, Wilson-Barnett J, *et al*. Randomized controlled trial of biofeedback for fecal incontinence. *Gastroenterology* 2003;**125**:1320–9.
361 **Norton C**, Chelvanayagam S. *Bowel continence nursing*. Beaconsfield: Beaconsfield Publishers, 2004.
362 **Hinds JP**, Eidelman BH, Wald A. Prevalence of bowel dysfunction in multiple sclerosis. *Gastroenterology* 1990;**98**:1538–42.
363 **Chia YW**, Fowler CJ, Kamm MA, *et al*. Prevalence of bowel dysfunction in patients with multiple sclerosis and bladder dysfunction. *J Neurol* 1995;**242**:105–8.
364 **Wiesel P**, Norton C, Glickman S, *et al*. Pathophysiology and management of bowel dysfunction in multiple sclerosis. *Eur J Gastroenterol Hepatol* 2001;**13**:1–18.
365 **Edwards LL**, Quigley EM, Pfeiffer RF. Gastrointestinal dysfunction in Parkinson's disease: frequency and pathophysiology. *Neurology* 1992;**42**:726–32.
366 **Malone PS**, Wheeler RA, Williams JE. Continence in patients with spina bifida: long term results. *Arch Dis Child* 1994;**70**:107–10.
367 **Nakayama H**, Jorgensen HS, Pedersen PM, *et al*. Prevalence and risk factors of incontinence after stroke: the Copenhagen Stroke Study. *Stroke* 1997;**28**:58–62.
368 **Glickman S**, Kamm MA. Bowel dysfunction in spinal-cord-injury patients. *Lancet* 1996;**347**:1651–3.
369 **Krogh K**, Nielsen J, Djurhuus JC, *et al*. Colorectal function in patients with spinal cord lesions. *Dis Colon Rectum* 1997;**40**:1233–1239.
370 **Menter R**, Weitzenkamp D, Cooper D, *et al*. Bowel management outcomes in individuals with long-term spinal cord injuries. *Spinal Cord* 1997;**35**:608–12.
371 **Coggrave M**, Wiesel P, Norton C, *et al*. Bowel management for adults with neurological disease or injury (Cochrane review). The Cochrane Library, Issue 2. Chichester, UK: John Wiley & Sons, 2003.
372 **Poulton B**, Thomas S. The nursing cost of constipation. *Primary Health Care* 1999;**9**:17–20.
373 **McKiernan PJ**, Baker AJ, Kelly DA. The frequency and outcome of biliary atresia in the UK and Ireland. *Lancet* 2000;**355**:25–9.
374 **Jones B**. *Intestinal failure, short bowel syndrome and HPN*, 2004 (http://www.gastrospr.co.uk/officefiles/HPNSprs14dec04.ppt, accessed 20 December 2006).
375 **Cook IJ**, Pavli P, Riley JW, *et al*. Gastrointestinal investigation of iron deficiency anaemia. *BMJ (Clin Res Ed)* 1996;**292**:1380–2.
376 **Logan EC**, Yates JM, Stewart RM, *et al*. Investigation and management of iron deficiency anaemia in general practice: a cluster randomised controlled trial of a simple management prompt. *Postgrad Med J* 2002;**78**:533–7.
377 **Yates JM**, Logan EC, Stewart RM. Iron deficiency anaemia in general practice: clinical outcomes over three years and factors influencing diagnostic investigations. *Postgrad Med J* 2004;**80**:405–10.
378 **Hin H**, Bird G, Fisher P, *et al*. Coeliac disease in primary care: case finding study. *BMJ* 1999;**318**:164–7.
379 **Office of National Statistics**. *Mortality statistics, 2000. Cause*, Series DH2 no.27. London: HMSO, 2001.
380 **Office of Population Censuses and Surveys**. *Mortality statistics, 1990. Cause*, Series DH2 no.17. London: HMSO, 1992.
381 **Garcia Rodriguez LA**, Ruigomez A, Hasselgren G, *et al*. Comparison of mortality from peptic ulcer bleed between patients with or without peptic ulcer antecedents. *Epidemiology* 1998;**9**:452–6.
382 **Irvin TT**. Mortality and perforated peptic ulcer: a case for risk stratification in elderly patients. *Br J Surg* 1989;**76**:215–8.
383 **Canoy DS**, Hart AR, Todd CJ. Epidemiology of duodenal ulcer perforation: a study on hospital admissions in Norfolk, United Kingdom. *Dig Liver Dis* 2002;**34**:322–7.
384 **Jones AF**. Haematemesis and melaena with special reference to bleeding peptic ulcer. *Br Med J* 1947;**ii**:441–6.
385 **Needham CD**, McConachie JA. Haematemesis and melaena. *Br Med J* 1950;**2**:133–8.
386 **Coghill NF**, Wilcox RG. Factors in the prognosis of bleeding chronic gastric and duodenal ulcers. *Q J Med* 1960;**29**:576–96.
387 **Hoare AM**. Comparative study between endoscopy and radiology in acute upper gastrointestinal haemorrhage. *Br Med J* 1975;**1**:27–30.
388 **Allan R**, Dykes P. A study of factors influencing mortality rates from gastrointestinal haemorrhage. *QJ Med* 1976;**45**:533–50.
389 **Mayberry JF**, Penny WJ, Counsell BR, *et al*. Mortality in acute upper gastrointestinal haemorrhage: a six-year survey from the University Hospital of Wales. *Postgrad Med J* 1981;**57**:627–32.
390 **Brown SG**, Salmon PR, Brown P, *et al*. Upper gastrointestinal haemorrhage. *J R Coll Physicians Lond* 1981;**15**:265–8.
391 **Clason AE**, Macleod DA, Elton RA. Clinical factors in the prediction of further haemorrhage or mortality in acute upper gastrointestinal haemorrhage. *Br J Surg* 1986;**73**:985–7.
392 **Sanderson JD**, Taylor RF, Pugh S, *et al*. Specialized gastrointestinal units for the management of upper gastrointestinal haemorrhage. *Postgrad Med J* 1990;**66**:654–6.
393 **Daneshmend TK**, Hawkey CJ, Langman MJ, *et al*. Omeprazole versus placebo for acute upper gastrointestinal bleeding: randomised double blind controlled trial. *BMJ* 1992;**304**:143–7.
394 **Clements D**, Aslan S, Foster D, *et al*. Acute upper gastrointestinal haemorrhage in a district general hospital: audit of an agreed management policy. *J R Coll Physicians Lond* 1991;**25**:27–30.
395 **Kapur KC**, Green JT, Turner RG, *et al*. Auditing mortality from upper gastrointestinal haemorrhage: impact of a high dependency unit. *J R Coll Physicians Lond* 1998;**32**:246–50.
396 **Sanders DS**, Perry MJ, Jones SG, *et al*. Effectiveness of an upper-gastrointestinal haemorrhage unit: a prospective analysis of 900 consecutive cases using the Rockall score as a method of risk standardisation. *Eur J Gastroenterol Hepatol* 2004;**16**:487–94.
397 **Lim CH**, Vani D, Shah SG, *et al*. The outcome of suspected upper gastrointestinal bleeding with 24-hour access to upper gastrointestinal endoscopy: a prospective cohort study. *Endoscopy* 2006;**38**:581–5.
398 **Rockall TA**, Logan RF, Devlin HB, *et al*. Variation in outcome after acute upper gastrointestinal haemorrhage. The National Audit of Acute Upper Gastrointestinal Haemorrhage. *Lancet* 1995;**346**:346–50.
399 **Logan RF**, Finlayson ND. Death in acute upper gastrointestinal bleeding. Can endoscopy reduce mortality? *Lancet* 1976;**1**:1173–5.
400 **Ch'ng CL**, Kingham JG. Scoring systems and risk assessment for upper gastrointestinal bleeding. *Eur J Gastroenterol Hepatol* 2001;**13**:1137–9.
401 **Probert CS**, Jayanthi V, Wicks AC, *et al*. Mortality from Crohn's disease in Leicestershire, 1972–1989: an epidemiological community based study. *Gut* 1992;**33**:1226–8.
402 **Probert CS**, Jayanthi V, Wicks AC, *et al*. Mortality in patients with ulcerative colitis in Leicestershire, 1972–1989. An epidemiological study. *Dig Dis Sci* 1993;**38**:538–41.
403 **Farrokhyar F**, Swarbrick ET, Grace RH, *et al*. Low mortality in ulcerative colitis and Crohn's disease in three regional centers in England. *Am J Gastroenterol* 2001;**96**:501–7.
404 **Mayberry JF**, Newcombe RG, Rhodes J. Mortality in Crohn's disease. *Q J Med* 1980;**49**:63–8.
405 **Card T**, Hubbard R, Logan RF. Mortality in inflammatory bowel disease: a population-based cohort study. *Gastroenterology* 2003;**125**:1583–90.
406 **Logan RF**, Rifkind EA, Turner ID, *et al*. Mortality in celiac disease. *Gastroenterology* 1989;**97**:265–71.
407 **Corrao G**, Corazza GR, Bagnardi V, *et al*. Mortality in patients with coeliac disease and their relatives: a cohort study. *Lancet* 2001;**358**:356–61.
408 **Peters U**, Askling J, Gridley G, *et al*. Causes of death in patients with celiac disease in a population-based Swedish cohort. *Arch Intern Med* 2003;**163**:1566–72.
409 **Cottone M**, Termini A, Oliva L, *et al*. Mortality and causes of death in celiac disease in a Mediterranean area. *Dig Dis Sci* 1999;**44**:2538–41.
410 **Nielsen OH**, Jacobsen O, Pedersen ER, *et al*. Non-tropical sprue. Malignant diseases and mortality rate. *Scand J Gastroenterol* 1985;**20**:13–8.
411 **Papagrigoriadis S**, Debrah S, Koreli A, *et al*. Impact of diverticular disease on hospital costs and activity. *Colorectal Disease* 2004;**6**:81–4.
412 **Elliott TB**, Yego S, Irvin TT. Five-year audit of the acute complications of diverticular disease. *Br J Surg* 1997;**84**:535–9.
413 **Tudor RG**, Farmakis N, Keighley MR. National audit of complicated diverticular disease: analysis of index cases. *Br J Surg* 1994;**81**:730–2.
414 **Finlay IG**, Carter DC. A comparison of emergency resection and staged management in perforated diverticular disease. *Dis Colon Rectum* 1987;**30**:929–33.
415 **Leon DA**, McCambridge J. Liver cirrhosis mortality rates in Britain from 1950 to 2002: an analysis of routine data. *Lancet* 2006;**367**:52–6.
416 **Vass A**. Rates of liver cirrhosis rise in England, fall in Europe. *BMJ* 2001;**323**:1388.
417 **Fisher NC**, Hanson JN, Phillips A, *et al*. Mortality from liver disease in the West Midlands, 1993–2000: observational study. *BMJ* 2002;**325**:312–3.
418 **Degos F**. Hepatitis C and alcohol. *J Hepatol* 1999;**31**(Suppl 1):113–8.

419 **Roberts SE**, Goldacre MJ, DY. Trends in mortality after hospital admission for liver cirrhosis in an English population from 1968 to 1999. *Gut* 2005;**54**:1615–21.
420 **Department of Health**. *Annual Report of the Chief Medical Officer, 2001*. London: Department of Health, 2001.
421 **Cucchiaro G**, Watters CR, Rossitch JC, *et al*. Deaths from gallstones. Incidence and associated clinical factors. *Ann Surg* 1989;**209**:149–51.
422 **Heatley MK**, Crane J. Acute pancreatitis as a cause of sudden or unexpected death in Northern Ireland. *Ulster Med J* 1989;**58**:51–5.
423 **Giggs JA**, Bourke JB, Katschinski B. The epidemiology of primary acute pancreatitis in Greater Nottingham: 1969–1983. *Soc Sci Med* 1988;**26**:79–89.
424 **Mann DV**, Hershman MJ, Hittinger R, *et al*. Multicentre audit of death from acute pancreatitis. *Br J Surg* 1994;**81**:890–3.
425 **Dube MG**, Lobo DN, Rowlands BJ, *et al*. Audit of acute pancreatitis management: a tale of two hospitals. *J R Coll Surg Edinb* 2001;**46**:292–6.
426 **Tunnemann J**, Easterbrook JR, Firth J, *et al*. Management of acute pancreatitis: a comparative audit of clinical practice against the recommendations of the British Society of Gastrenterology. *Br J Surg* 2000;**87**:362–73.
427 **Lankisch PG**, Burchard-Reckert S, Petersen M, *et al*. Morbidity and mortality in 602 patients with acute pancreatitis seen between the years 1980–1994. *Z Gastroenterol* 1996;**34**:371–7.
428 **Cavallini G**, Frulloni L, Bassi C, *et al*. Prospective multicentre survey on acute pancreatitis in Italy (prolnf AISP): results on 1005 patients. *Dig Dis Sci* 2004;**36**:205–11.
429 **Carter CR**, McKay CJ, Imrie CW. Percutaneous necrosectomy and sinus tract endoscopy in the management of infected pancreatic necrosis: an initial experience. *Ann Surg* 2000;**232**:175–80.
430 **Wilson C**, McArdle CS, Carter DC, *et al*. Surgical treatment of acute necrotizing pancreatitis. *Br J Surg* 1988;**75**:1119–23.
431 **Beattie GC**, Mason J, Swan D, *et al*. Outcome of necrosectomy in acute pancreatitis: the case for continued vigilance. *Scand J Gastroenterol* 2002;**37**:1449–53.
432 **Schneider H**, Boyle N, McCluckie A, *et al*. Acute severe pancreatitis and multiple organ failure: total parenteral nutrition is still required in a proportion of patients. *Br J Surg* 2000;**87**:362–73.
433 **Appelros S**, Lindgren S, Borgstrom A. Short and long term outcome of severe acute pancreatitis. *Eur J Surg* 2001;**167**:281–6.
434 **Blum T**, Maisonneuve P, Lowenfels AB, *et al*. Fatal outcome in acute pancreatitis: its occurence and early prediction. *Pancreatology* 2001;**1**:237–41.
435 **Lowenfels AB**, Maisonneuve P, Cavallini G, *et al*. Prognosis of chronic pancreatitis: an international multicenter study. International Pancreatitis Study Group. Lowenfels AB, Maisonneuve P, Cavallini. *Am J Gastroenterol* 1994;**89**:1467–71.
436 **Lowenfels AB**, Maisonneuve P, Cavallini G, *et al*. Pancreatitis and the risk of pancreatic cancer. International Pancreatitis Study Group. *N Engl J Med* 1993;**328**:1433–7.
437 **Ekbom A**, McLaughlin JK, Karlsson BM, *et al*. Pancreatitis and pancreatic cancer: a population-based study. *J Natl Cancer Inst* 1994;**86**:625–7.
438 **Miyake H**, Harada H, Ochi K, *et al*. Prognosis and prognostic factors in chronic pancreatitis. *Dig Dis Sci* 1989;**34**:449–55.
439 **Talamini G**, Falconi M, Bassi C, *et al*. Incidence of cancer in the course of chronic pancreatitis. *Am J Gastroenterol* 1999;**94**:1253–60.
440 **Karlson BM**, Ekbom A, Josefsson S, *et al*. The risk of pancreatic cancer following pancreatitis: an association due to confounding? *Gastroenterology* 1997;**113**:587–92.
441 **ONS**. Cancer survival, England and Wales, 1991–2001. Available at http://www.statistics.gov.uk/statbase/product.asp?vlnk=10821/, accessed 18 January 2007.
442 **Metcalf JV**, Smith J, Jones R, *et al*. Incidence and causes of rectal bleeding in general practice as detected by colonoscopy. *Br J Gen Pract* 1996;**46**:161–4.
443 **Hamilton W**, Round A, Sharp D, *et al*. Clinical features of colorectal cancer before diagnosis: a population-based case-control study. *Br J Cancer* 2005;**93**:399–405.
444 **Crosland A**, Jones R. Rectal bleeding: prevalence and consultation behaviour. *BMJ* 1995;**311**:486–8.
445 **Ciccolallo L**, Capocaccia R, Coleman MP, *et al*. Survival differences between European and US patients with colorectal cancer: role of stage at diagnosis and surgery. *Gut* 2005;**54**:268–73.
446 **Taylor-Robinson SD**, Toledano MB, Arora S, *et al*. Increase in mortality rates from intrahepatic cholangiocarcinoma in England and Wales 1968–1998. *Gut* 2001;**48**:816–20.
447 **Borgaonkar MR**, Irvine EJ. Quality of life measurement in gastrointestinal and liver disorders. *Gut* 2000;**47**:444–54.
448 **Fitzpatrick R**, Fletcher A, Gore S. Quality of life measures in health care. 1: Applications and issues in assessment, *BMJ* 1992;**305**:1074–7.
449 **Koloski NA**, Talley NJ, Boyce PM. The impact of functional gastrointestinal disorders on quality of life. *Am J Gastroenterol* 2000;**95**:67–71.
450 **Halder SL**, Locke III GR, Talley NJ, *et al*. Impact of functional gastrointestinal disorders on health-related quality of life: a population-based care-control study. *Aliment Pharmacol Ther* 2004;**19**:233–42.
451 **Whincup PH**, Mendall MA, Perry IJ, *et al*. Prospective relations between Helicobacter pylori infection, coronary heart disease, and stroke in middle aged men. *Heart* 1996;**75**:568–72.
452 **Armitage EL**, Aldhous ML, Anderson N, *et al*. Incidence of juvenile-onset Crohn's disease in Scotland: association with northern latitude and affluence. *Gastroenterology* 2004;**127**:1051–7.
453 **Department of Health**. *Hospital episode statistics*. London: Department of Health, 2004, (http://www.dh.gov.uk/PublicationsAndStatistics/Statistics/HospitalEpisodeStatistics/fs/en, accessed 20 December 2006).
454 **National Cancer Intelligence Centre Office for National Statistics**. *Cancer statistics for England*, (http://www.dh.gov.uk/PolicyAndGuidance/HealthAndSocialCareTopics/Cancer/fs/en, accessed 20 December 2006).
455 **Welsh Cancer Intelligence and Surveillance Unit**. *Cancer incidence in Wales, 1992–2002*, (http://www.wales.nhs.uk/sites3/home.cfm?OrgID=242, accessed 20 December 2006).
456 **Northern Ireland Cancer Registry**. *Cancer statistics for Northern Ireland*, (http://www.qub.ac.uk/research-centres/nicr/, accessed 20 December 2006).
457 **Talley NJ**, Piper D. Major life event stress and dyspepsia of unknown cause: a case control study. *Gut* 1986;**27**:127–34.
458 **Baron JH**, Sonnenberg A. Alimentary diseases in the poor and middle class in London 1773–1815, and in New York poor 1797–1818. *Aliment Pharmacol Ther* 2002;**16**:1709–14.
459 **Veldhuyzen van Zanten S**. Do socio-economic status, marital status and occupation influence the prevalence of Helicobacter pylori infection? *Aliment Pharmacol Ther* 1995;**9**(Suppl 2):41–4.
460 **Webb PM**, Knight T, Greaves S, *et al*. Relation between infection with Helicobacter pylori and living conditions in childhood: evidence for person to person transmission in early life. *BMJ* 1994;**308**:750–3.
461 **Malcolm CA**, MacKay WG, Shepherd A, *et al*. Helicobacter pylori in children is strongly associated with poverty. *Scott Med J* 2004;**49**:136–8.
462 **Sonnenberg A**. Factors which influence the incidence and course of peptic ulcer. *Scand J Gastroenterol* 1988;**155**(Suppl):119–40.
463 **Suadicani P**, Hein HO, Gyntelberg F. Genetic and life-style determinants of peptic ulcer. A study of 3387 men aged 54 to 74 years: the Copenhagen Male Study, *Scand J Gastroenterol* 1999;**34**:12–7.
464 **Caygill CP**, Hill MJ, Knowles RL, *et al*. Occupational and socioeconomic factors associated with peptic ulcer and with cancers following consequent gastric surgery. *Ann Occup Hyg* 1990;**34**:19–27.
465 **Thompson NP**, Montgomery SM, Wadsworth ME, *et al*. Early determinants of inflammatory bowel disease: use of two national longitudinal birth cohorts. *Eur J Gastroenterol Hepatol* 2000;**12**:25–30.
466 **Mendall MA**, Kumar D. Antibiotic use, childhood affluence and irritable bowel syndrome (IBS). *Eur J Gastroenterol Hepatol* 1998;**10**:59–62.
467 **Howell S**, Talley NJ, Quine S, *et al*. The irritable bowel syndrome has origins in the childhood socioeconomic environment. *Am J Gastroenterol* 2004;**99**:1572–8.
468 **Kennedy TM**, Jones RH. The epidemiology of hysterectomy and irritable bowel syndrome in a UK population. *Int J Clin Pract* 2000;**54**:647–50.
469 **Johnsen R**, Jacobsen BK, Forde OH. Associations between symptoms of irritable colon and psychological and social conditions and lifestyle. *Br Med J (Clin Res Ed)* 1986;**292**:1633–5.
470 **Ford MJ**, Miller PM, Eastwood J, *et al*. Life events, psychiatric illness and the irritable bowel syndrome. *Gut* 1987;**28**:160–5.
471 **Nanda R**, James R, Smith H, *et al*. Food intolerance and the irritable bowel syndrome. *Gut* 1989;**30**:1099–104.
472 **Talley NJ**, Phillips SF, Bruce B, *et al*. Relation among personality and symptoms in nonulcer dyspepsia and the irritable bowel syndrome. *Gastroenterology* 1990;**99**:327–33.
473 **Price B**. *Body image: nursing concepts and care*. London: Prentice Hall, 1990.
474 **Harrison L**, Gardiner E. Do the rich really die young? Alcohol-related mortality and social class in Great Britain. *Addiction* 1999;**94**:1871–80.
475 **Marang-van de Mheen PJ**, Davey Smith D, Hart CL, *et al*. Socioeconomic diferentials in mortality among men within Great Britain: time trends and contributory causes. *J Epidemiol Community Health* 1998;**52**:214–8.
476 **Hutchinson SJ**, Goldberg DJ, King M, *et al*. Hepatitis C virus among childbearing women in Scotland: prevalence, deprivation, and diagnosis. *Gut* 2004;**53**:593–8.
477 **Stuver SO**, Boschi-Pinto C, Trichopoulos D. Infection with hepatitis B and C viruses, social class and cancer. *IARC Sci Publ* 1997:319–24.
478 **Brown J**, Harding S, Bethune A, *et al*. Longitudinal study of socio-economic differences in the incidence of stomach, colorectal and pancreatic cancers. *Popul Trends* 1998:35–41.
479 **Gerhardsson M**, Norell SE, Kiviranta H, *et al*. Sedentary jobs and colon cancer. *Am J Epidemiol* 1986;**123**:775–80.
480 **Adams J**, White M, Barker G, *et al*. Are there socio-economic inequalities in age of resection of colorectal cancer in people with HNPCC? *Fam Cancer* 2003;**2**(3–4):169–73.
481 **Whynes DK**, Frew EJ, Manghan CM, *et al*. Colorectal cancer, screening and survival: the influence of socio-economic deprivation. *Public Health* 2003;**117**:389–95.
482 **McCaffery K**, Wardle J, Nadel M, *et al*. Socioeconomic variation in participation in colorectal cancer screening. *J Med Screen* 2002;**9**:104–8.
483 **Lewison G**. *Gastroenterology in the UK: the burden of disease*. London: The Wellcome Trust, 1997.
484 **Unit of Health-Care Epidemiology**. *Unit of Health-Care Epidemiology*. Oxford, University of Oxford, 2004(http://www.uhce.ox.ac.uk, accessed 20 December 2006).
485 **McCormick A**, Fleming D, Charlton J. *Morbidity statistics from general practice. Fourth national study 1991–1992*. London: Office of Population Censuses and Surveys, 1995.
486 **Royal College of General Practitioners, Office of Population Censuses and Surveys, Department of Health and Social Security**. *Morbidity statistics from general practice. Third national study 1981–1982*. London: HMSO, 1986, (Series MB5 No 1.).

487 **Rigby MJ**, Severs MP, Swayne J, *et al*. Time to outlaw the episode. *Br J Healthcare Computing* 1994;**11**:26–8.
488 **Clarke A**, McKee M. The consultant episode: an unhelpful measure. *BMJ* 1992;**305**:1307–8.
489 **BSG & RCP**. GI services for patients in the new millennium: a national framework responsive to change (unpublished concensus document). BSG & RCP, 2003.
490 **Royal College of General Practitioners**. *Consultant physicians working with patients, the duties, responsibilities and practice of physicians in general medicine and the specialties*, 3rd ed. London: RGCP, 2005:1–335.
491 **Williams JG**, Russell I, Durai D, *et al*. What are the clinical outcome and cost-effectiveness of endoscopy undertaken by nurses when compared with doctors? A Multi-Institution Nurse Endoscopy Trial (MINuET). *Health Technol Assess* 2006;**10**.
492 **Douglass AB**, Powell A, Bramble MG. The nurse endoscopist contribution to service delivery. *Gastrointestinal Nursing* 2004;**2**:21–4.
493 **Russo MW**, Wei JT, Thiny MT, *et al*. Digestive and liver diseases statistics, 2004. *Gastroenterology* 2004;**126**:1448–53.
494 **Driscoll R**. The painful truth about colitis and Crohn's disease. *NACC News* 2004.
495 **Driscoll R**, Kane S. Member survey. *NACC News* 1992.
496 **Walters S**. NACC *Audit of IBD*. Chichester: Aeneas Press, 2000.
497 **Leigh S**, Goss S. *Counselling project report*, 2001.(http://www.nacc.org.uk/research, accessed 26 December 2006).
498 **Department of Health**. *NHS reference costs, 2001*. London: Department of Health, 2002.
499 **Office of Health Economics**. *Compendium of health statistics (2002–03)*. Abingdon: Radcliffe Publishing Ltd, 2004.
500 **Froehlich F**, Burnand B, Pache I, *et al*. Overuse of upper gastrointestinal endoscopy in a country with open-access endoscopy: a prospective study in primary care. *Gastrointest Endosc* 1997;**45**:13–9.
501 **Gralnek IM**. Outpatient management of ''low-risk'' nonvariceal upper GI hemorrhage. Are we ready to put evidence into practice? *Gastrointest Endosc* 2002;**55**:131–4.
502 **Silcock JG**, Bramble MG. Open access gastroscopy: second survey of current practice in the United Kingdom. *Gut* 1997;**40**:192–5.
503 **Watt G**. The inverse care law today. *Lancet* 2002;**360**:252–4.
504 **Dunnill MG**, Pounder RE. Medical outpatients: changes that can benefit patients. *Clin Med* 2004;**4**:45–9.
505 **Association of Coloproctology of GB and Ireland**. *Guidelines for the management of colorectal cancer*. London: Association of Coloproctology of GB and Ireland, 2001.
506 **Duff SE**, Wood C, McCredie V, *et al*. Waiting times for treatment of rectal cancer in North West England. *J R Soc Med* 2004;**97**:117–8.
507 **Flashman K**, O-Leary DP, Senapati A, *et al*. The department of health's two week standard for bowel cancer: is it working? *Gut* 2004;**53**:387–91.
508 **Hellier M**. Delivery of GI services in the new millennium. *BSG News* 2002;**10**.
509 **Navarro F**, Hanauer SB. Treatment of Inflammatory Bowel Disease: Safety and Tolerability Issues. *Am J Gastroenterol* 2003;**98**(Suppl 12):S18–23.
510 **Akehurst R**, Kaltenthaler E. Treatment of irritable bowel syndrome: a review of randomised controlled trials. *Gut* 2001;**48**:272–82.
511 **Dick A**, Keady S, Mohamed F, *et al*. Use of unlicensed and off-label medications in paediatric gastroenterology with a review of the commonly used formularies in the UK. *Aliment Pharm Ther* 2003;**17**:571–5.
512 **Chan FK**, Graham DY. Review article: prevention of non-steroidal anti-inflammatory drug gastrointestinal complications—review and recommendations based on risk assessment. *Aliment Pharmacol Ther* 2004;**19**:1051–61.
513 **Sheen CL**, Colin-Jones DG. Review article: over-the-counter drugs and the gastrointestinal tract. *Aliment Pharmacol Ther* 2001;**15**:1263–70.
514 **Bloor K**, Maynard A. Is there scope for improving the cost-effective prescribing of nonsteroidal anti-inflammatory drugs? *Pharmacoeconomics* 1996;**9**:484–96.
515 **Feagan BG**. Maintenance therapy for inflammatory bowel disease. *Am J Gastroenterol* 2003;**98**(Suppl 12):S6–17.
516 **Belsey JD**. Non-steroidal anti-inflammatory induced upper gastrointestinal event rates in patients awaiting joint replacement in the United Kingdom. An epidemiologically-based burden of disease model. *Curr Med Res Opin* 2003;**19**:306–12.
517 **Cook DJ**, Guyatt GH, Salena BJ, *et al*. Endoscopic therapy for acute nonvariceal upper gastrointestinal hemorrhage: a meta-analysis. *Gastroenterology* 1992;**102**:139–48.
518 **Heuschkel R**, Afzal N, Wuerth A, *et al*. Complementary medicine use in children and young adults with inflammatory bowel disease. *Am J Gastroenterol* 2002;**97**:382–8.
519 **Galloway JM**, Gibson J, Dalrymple J. Endoscopy in primary care—a survey of current practice. *Br J Gen Pract* 2002;**52**:536–8.
520 **Abbas S**, Shaw S, Campbell D, *et al*. Outpatient upper gastrointestinal endoscopy: large, prospective study of the morbidity and mortality rate at a single endoscopy unit in England. *Dig Endosc* 2004;**16**:113–6.
521 **Quine MA**, Bell GD, McCloy RF, *et al*. Prospective audit of upper gastrointestinal endoscopy in two regions of England: safety, staffing, and sedation methods. *Gut* 1995;**36**:462–7.
522 **Van Kouwen MC**, Drenth JP, Verhoeven HM, *et al*. Upper gastrointestinal endoscopy in patients aged 85 years or more. Results of a feasibility study in a district general hospital. *Arch Gerontol Geriatr* 2003;**37**:45–50.
523 **NCEPOD**. Scoping our practice. *The 2004 report of the national confidential enquiry into patient outcome and death*. London: NCEPOD, 2004.
524 **Page MJ**, Poritz LS, Kunselman SJ, *et al*. Factors affecting surgical risk in elderly patients with inflammatory bowel disease. *J Gastrointest Surg* 2002;**6**:606–13.
525 **Moorthy K**, Shaul T, Foley RJ. Factors that predict conversion in patients undergoing laparoscopic surgery for Crohn's disease. *Am J Surg* 2004;**187**:47–51.
526 **Ripamonti C**, De Conno F, Ventafridda V, *et al*. Management of bowel obstruction in advanced and terminal cancer patients. *Ann Oncol* 1993;**4**:15–21.
527 **Yim HB**, Jacobson BC, Saltzman JR, *et al*. Clinical outcome of the use of enteral stents for palliation of patients with malignant upper GI obstruction. *Gastrointest Endosc* 2001;**53**:329–32.
528 **Mukherjee S**, Sloper P, Turnbull A. An insight into the experiences of parents with inflammatory bowel disease. *J Adv Nurs* 2002;**37**:355–63.
529 **Institute of Food Research**. 2004 (http://www.ifr.ac.uk/, accessed 26 December 2006).
530 **Hawkey GM**, Hawkey CJ. Effect of information leaflets on knowledge in patients with gastrointestinal diseases. *Gut* 1989;**30**:1641–6.
531 **NICE**. *Healthcare services for bowel (colorectal) cancer*. London: NICE, 2004.
532 **Thompson K**, Melby V, Parahoo K, *et al*. Information provided to patients undergoing gastroscopy procedures. *J Clin Nurs* 2003;**12**:899–911.
533 **Stone MA**, Mayberry JF, Baker R. Prevalence and management of inflammatory bowel disease: a cross-sectional study from central England. *Eur J Gastroenterol Hepatol* 2003;**15**:1275–80.
534 **Sewitch MJ**, Abrahamowicz M, Bitton A, *et al*. Psychosocial correlates of patient-physician discordance in inflammatory bowel disease. *Am J Gastroenterol* 2002;**97**:2174–83.
535 **Sewitch MJ**, Abrahamowicz M, Barkun A, *et al*. Patient nonadherence to medication in inflammatory bowel disease. *Am J Gastroenterol* 2003;**98**:1535–44.
536 **Greiner KA**, Engelman KK, Hall MA, *et al*. Barriers to colorectal cancer screening in rural primary care. *Prev Med* 2004;**38**:269–75.
537 **Mansfield JC**, Tanner AR, Bramble MG. Information for patients about inflammatory bowel disease. *J R Coll Physicians Lond* 1997;**31**:184–7.
538 **Berg DF**, Bahadursingh AM, Kaminski D, *et al*. Acute surgical emergencies in inflammatory bowel disease. *Am J Surg* 2002;**184**:45–51.
539 **Farmer M**, Petras RE, Hunt LE, *et al*. The importance of diagnostic accuracy in colonic inflammatory bowel disease. *Am J Gastroenterol* 2000;**95**:3184–8.
540 **Spray C**, Debelle GD, Murphy MS. Current diagnosis, management and morbidity in paediatric inflammatory bowel disease. *Acta Paediatr* 2001;**90**:400–5.
541 **Jenkins H**. Update on paediatric inflammatory bowel disease. *Curr Paediatr* 2001;**11**:260–3.
542 **Schmulson MW**, Chang L. Diagnostic approach to the patient with irritable bowel syndrome. *Am J Med* 1999;**107**(5A):20S–26S.
543 **Camilleri M**. Management of the irritable bowel syndrome. *Gastroenterology* 2001;**120**:652–68.
544 **de Dombal F**. Acute abdominal pain in the elderly. *J Clin Gastroenterol* 1994;**19**:331–5.
545 **Ofman JJ**, Dorn GH, Fennerty MB, *et al*. The clinical and economic impact of competing management strategies for gastro-oesophageal reflux disease. *Aliment Pharmacol Ther* 2002;**16**:261–73.
546 **Talley NJ**, Colin-Jones DG, Koch K, *et al*. Functional dyspepsia: a classification with guidelines for diagnosis and management. *Gastroenterol Int* 1991;**4**:145–60.
547 **Hansen JM**, Bytzer P, Schaffalitzky De Muckadell O. Management of dyspeptic patients in primary care—value of the unaided clinical diagnosis and of dyspepsia subgrouping. *Scand J Gastroenterol* 1998;**33**:799–805.
548 **Brignoli R**, Watkins P, Halter F. The Omega Project—a comparison of two diagnostic strategies for risk- and cost-oriented management of dyspepsia. *Eur J Gastroenterol Hepatol* 1997;**9**:337–43.
549 **Summerton N**, Paes R. The clinical assessment of patients with large bowel symptoms by general practitioners. *Eur J Gen Pract* 2000;**6**:43–7.
550 **Diamanti A**, Gambarara M, Ferretti F, *et al*. Is severe liver disease an indication for early transplantation in patients with ultra-short bowel disease? *Transplant Proc* 2002;**34**:876–7.
551 **Drossman DA**, Whitehead WE, Toner BB, *et al*. What determines severity among patients with painful functional bowel disorders? *Am J Gastroenterol* 2000;**95**:974–80.
552 **Sands BE**, Arsenault JE, Rosen MJ. Risk of early surgery for Crohn's disease: implications for early treatment strategies. *Am J Gastroenterol* 2003;**98**:2712–8.
553 **Angelelli G**, Scardapane A, Memeo M, *et al*. Acute bowel ischemia: CT findings. *Eur J Radiol* 2004;**50**:37–47.
554 **Limpert P**, Longo WE, Kelemen PR, *et al*. Colon and rectal cancer in the elderly. High incidence of asymptomatic disease, less surgical emergencies, and a favorable short-term outcome. *Crit Rev Oncol Hematol* 2003;**48**:159–63.
555 **Martin IG**, Young S, Sue-Ling H, *et al*. Delays in the diagnosis of oesophagogastric cancer: a consecutive case series. *BMJ* 1997;**314**:467–70.
556 **Hamilton W**, Sharp D. Diagnosis of lung cancer in primary care: a structured review. *Fam Pract* 2004;**21**:605–11.
557 **NHS Centre for Reviews and Dissemination**. *Management of upper gastrointestinal cancers* 2000;**6**.
558 **Tunaci A**. Postoperative imaging of gastrointestinal tract cancers. *Eur J Radiol* 2002;**42**:224–30.
559 **NHS Centre for Reviews and Dissemination**. *The management of colorectal cancer* 1997;**3**.
560 **NHS Centre for Reviews and Dissemination**. *The management of colorectal cancers* 2004;**8**.

561 **Gatta G**, Capocaccia R, Sant M, *et al*. Understanding variations in survival for colorectal cancer in Europe: a eurocare high resolution study. *Gut* 2000;**47**:533–8.
562 **Shah RJ**, Fenoglio-Preiser C, Bleau BL, *et al*. Usefulness of colonoscopy with biopsy in the evaluation of patients with chronic diarrhea. *Am J Gastroenterol* 2001;**96**:1091–5.
563 **Erickson RA**, Glick ME. Why have controlled trials failed to demonstrate a benefit of esophagogastroduodenoscopy in acute upper gastrointestinal bleeding? A probability model analysis. *Dig Dis Sci* 1986;**31**:760–8.
564 **Parry SD**, Welfare MR, Cobden I, *et al*. Push enteroscopy in a UK district general hospital: experience of 51 cases over 2 years. *Eur J Gastroenterol Hepatol* 2002;**14**:305–9.
565 **Yasui W**, Yokozaki H, Shimamoto F, *et al*. Molecular-pathological diagnosis of gastrointestinal tissues and its contribution to cancer histopathology. *Pathol Int* 1999;**49**:763–74.
566 **Lang M**, Niskanen M, Miettinen P, *et al*. Outcome and resource ultilisation in gastroenterological surgery. *Br J Surg* 2001;**88**:1006–14.
567 **Schofield P**. Medical negligence in coloproctology. *Colorectal Dis* 1999;**1**:60–3.
568 **Jeffery G**, Hickey B, Hider P. Follow-up strategies for patients treated for non-metastatic colorectal cancer. *Cochrane Database Syst Rev* 2002;(1):CD002200.
569 **Limburg PJ**, Ahlquist DA. Second primary colorectal cancer: the consequence of management failure at several potential levels. *Ann Intern Med* 2002;**136**:335–7.
570 **Allum WH**, Griffin SM, Watson A, Colin-Jones D, Association of Upper Gastrointestinal Surgeons of Great Britain and Ireland; British Society of Gastroenterology; British Association of Surgical Oncology. Guidelines for the management of oesophageal and gastric cancer. *Gut* 2002;**50**(Suppl V):v1–23.
571 **Ahmed N**, Ahmedzai S, Vora V, *et al*. Supportive care for patients with gastrointestinal cancer. *Cochrane Database Syst Rev* 2004;(3):CD003445.
572 **Bardou M**, Barkun AN, Ghosn J, *et al*. Effect of chronic intake of NSAIDs and cyclooxygenase 2-selective inhibitors on esophageal cancer incidence. *Clin Gastroenterol Hepatol* 2004;**2**:880–7.
573 **Smith AM**, Maxwell-Armstrong CA, Welch NT, *et al*. Surveillance for Barrett's oesophagus in the UK. *Br J Surg* 1999;**86**:276–80.
574 **BSG**. Dyspepsia management guidelines. *BSG News* 2002.
575 **Spiegel BM**, Vakil NB, Ofman JJ. Dyspepsia management in primary care: a decision analysis of competing strategies. *Gastroenterology* 2002;**122**:1270–85.
576 **Bodger K**, Eastwood PG, Manning SI, *et al*. Dyspepsia workload in urban general practice and implications of the British Society of Gastroenterology Dyspepsia guidelines. *Aliment Pharmacol Ther* 2000;**14**:413–20.
577 **NICE**. *Dyspepsia: managing adult patient in primary care*. London: NICE, 2003.
578 **Parry JM**, Foy RC, Woodman CB. How might general practitioner knowledge of patient Helicobacter pylori status change the management of dyspepsia in primary care? *J Public Health Med* 1998;**20**:133–6.
579 **Delaney BC**, Moayyedi P, Forman D. Initial management strategies for dyspepsia. *Cochrane Database Syst Rev* 2004;**3**.
580 **Banait G**, Sibbald B, Thompson D, Summerton C, Hann M, Talbot S; Salford and Trafford Ulcer Research Network. Modifying dyspepsia management in primary care: a cluster randomised controlled trial of educational outreach compared with passive guideline dissemination. *Br J Gen Pract* 2003;**53**:94–100.
581 **McNamara DA**, Buckley M, O'Morain CA. Nonulcer dyspepsia: current concepts and management. *Gastroenterol Clin North Am* 2000;**29**:807–18.
582 **Delaney BC**. Role of Helicobacter pylori in gastrointestinal disease: implications for primary care of a revolution in management of dyspepsia. *Br J Gen Pract* 1995;**45**:489–94.
583 **Tremaine WJ**, Sandborn WJ, Loftus EV, *et al*. A prospective cohort study of practice guidelines in inflammatory bowel disease. *Am J Gastroenterol* 2001;**96**:2401–6.
584 **Carter MJ**, Lobo AJ, Travis SP, IBD Section BSoG. Guidelines for the management of inflammatory bowel disease in adults. *Gut* 2004;**53**(Suppl V):v1–v16.
585 **Moum B**. Medical treatment: does it influence the natural course of inflammatory bowel disease? *Eur J Intern Med* 2000;**11**:197–203.
586 **Wright J**, Manning AP, Bolus J, *et al*. Do all patients in primary care who may benefit from eradication of Helicobacter pylori have access to effective care? *Public Health* 2001;**115**:282–5.
587 **Milne R**, Logan RP, Harwood D, *et al*. Helicobacter pylori and upper gastrointestinal disease: a survey of gastroenterologists in the United Kingdom. *Gut* 1995;**37**:314–8.
588 **Verma S**, Giaffer MH. Helicobacter pylori eradication ameliorates symptoms and improves quality of life in patients on long-term acid suppression. A large prospective study in primary care. *Dig Dis Sci* 2002;**47**:1567–74.
589 **Whitaker MJ**, Brun J, Carelli F. Controversy and consensus in the management of upper gastrointestinal disease in primary care. The International Gastro Primary Care Group. *Int J Clin Pract* 1997;**51**:239–43.
590 **Paton S**. Cost-effective treatment of gastro-oesophageal reflux disease—a comparision of two therapies commonly used in general practice. *Br J Med Economics* 1995;**8**:85–95.
591 **Conio M**, Demarquay JF, De Luca L, *et al*. Endoscopic treatment of pancreatico-biliary malignancies. *Crit Rev Oncol Hematol* 2001;**37**:127–35.
592 **Drossman DA**, Li Z, Toner BB, *et al*. Functional bowel disorders. A multicenter comparison of health status and development of illness severity index. *Dig Dis Sci* 1995;**40**:986–95.
593 **Raine R**, Carter S, Sensky T, *et al*. General practitioners' perceptions of chronic fatigue syndrome and beliefs about its management, compared with irritable bowel syndrome: qualitative study. *BMJ* 2004;**328**:1354–7.
594 **Ryder SD**. Guidelines for the diagnosis and treatment of hepatocellular carcinoma (HCC) in adults. *Gut* 2003;**52**(Suppl 3):iii1–8.
595 **Feuer D**. Management of intestinal obstruction. *CME Bull Palliat Med* 1999;**1**:35–40.
596 **Bodger K**, Daly MJ, Heatley RV. Prescribing patterns for dyspepsia in primary care: a prospective study of selected general practitioners. *Aliment Pharmacol Ther* 1996;**10**:889–95.
597 **MacKenzie S**, Norrie J, Vella M, *et al*. Randomized clinical trial comparing consultant-led or open access investigation for large bowel symptoms. *Br J Surg* 2003;**90**:941–7.
598 **Rockall TA**, Logan RF, Devlin HB, *et al*. Selection of patients for early discharge or outpatient care after acute upper gastrointestinal haemorrhage. *Lancet* 1996;**347**:1138–40.
599 **Fisher DA**, Jeffreys A, Grambow SC, *et al*. Mortality and follow-up colonoscopy after colorectal cancer. *Am J Gastroenterol* 2003;**98**:901–6.
600 **Wexner SD**, Eisen GM, Simmang C. Principles of privileging and credentialing for endoscopy and colonoscopy. *Surg Endosc* 2002;**16**:367–9.
601 **Manes G**, Balzano A, Marone P, *et al*. Appropriateness and diagnostic yield of upper gastrointestinal endoscopy in an open-access endoscopy system: a prospective observational study based on the Maastricht guidelines. *Aliment Pharmacol Ther* 2002;**16**:105–10.
602 **Axon AT**, Bell GD, Jones RH, *et al*. Guidelines on appropriate indications for upper gastrointestinal endoscopy. Working Party of the Joint Committee of the Royal College of Physicians of London, Royal College of Surgeons of England, Royal College of Anaesthetists, Association of Surgeons, the British Society of Gastroenterology, and the Thoracic Society of Great Britain. *BMJ* 1995;**310**:853–6.
603 **Association of Coloproctology of GB and Ireland**. Design for coloproctology. 3rd ed. London: Association of Coloproctology of GB and Ireland, 1999.
604 **Probert CS**, Jayanthi V, Mayberry JF. British gastroenterologists' care profile for patients with inflammatory bowel disease: the need for a patients' charter. *J R Soc Med* 1993;**86**:271–2.
605 **Department of Health**. *Renal services information implementation strategy*. London: Department of Health, 2004.
606 **Kubba AK**, Whyman MR. Upper gastro-intestinal disease in Scotland: a survey of practice amongst Scottish gastroenterologists. *J R Coll Surg Edinb* 1996;**41**:302–6.
607 **Garvican L**. Planning for a possible national colorectal cancer screening programme. *J Med Screen* 1998;**5**:187–94.
608 **Rozen P**, Winawer SJ, Waye JD. Prospects for the worldwide control of colorectal cancer through screening. *Gastrointest Endosc* 2002;**55**:755–9.
609 **Mandel JS**, Bond JH, Church TR, *et al*. Reducing mortality from colorectal cancer by screening for fecal occult blood. Minnesota Colon Cancer Control Study. *N Engl J Med* 1993;**328**:1365–71.
610 **UK Colorectal Cancer Screening Pilot Group**. Results of the first round of a demonstration pilot of screening for colorectal cancer in the United Kingdom. *BMJ* 2004;**329**:133.
611 **Mpofu C**, Watson A, Rhodes J. Strategies for detecting colon cancer and-or dysplasia in patients with inflammatory bowel disease. *Cochrane Database Syst Rev* 2004;(2):CD000279.
612 **Gross CP**, Canto MI, Hixson J, *et al*. Management of Barrett's esophagus: a national study of practice patterns and their cost implications. *Am J Gastroenterol* 1999;**94**:3440–7.
613 **Lin OS**, Mannava S, Hwang KL, *et al*. Reasons for current practices in managing Barrett's esophagus. *Dis Esophagus* 2002;**15**:39–45.
614 **Mason J**, Axon AT, Forman D, *et al*. The cost-effectiveness of population Helicobacter pylori screening and treatment: a Markov model using economic data from a randomized controlled trial. *Aliment Pharmacol Ther* 2002;**16**:559–68.
615 **Gerson LB**, Groeneveld PW, Triadafilopoulos G. Cost-effectiveness model of endoscopic screening and surveillance in patients with gastroesophageal reflux disease. *Clin Gastroenterol Hepatol* 2004;**2**:868–79.
616 **Duncan A**, Morris AJ, Cameron A, *et al*. Laxative induced diarrhoea—a neglected diagnosis. *J R Soc Med* 1992;**85**:203–5.
617 **Ramsey SD**, Mandelson MT, Berry K, *et al*. Cancer-attributable costs of diagnosis and care for persons with screen-detected versus symptom-detected colorectal cancer. *Gastroenterology* 2003;**125**:1645–50.
618 **Renehan AG**, O'Dwyer ST, Whynes DK. Cost effectiveness analysis of intensive versus conventional follow up after curative resection for colorectal cancer. *BMJ* 2004;**328**:81.
619 **Pignone M**, Saha S, Hoerger T, *et al*. Cost-effectiveness analyses of colorectal cancer screening: a systematic review for the U.S. Preventive Services Task Force. *Ann Intern Med* 2002;**137**:96–104.
620 **Nietert PJ**, Silverstein MD, Mokhashi MS, *et al*. Cost-effectiveness of screening a population with chronic gastroesophageal reflux. *Gastrointest Endosc* 2003;**57**:311–8.
621 **Loeve F**, Brown ML, Boer R, *et al*. Endoscopic colorectal cancer screening: a cost-saving analysis. *J Natl Cancer Inst* 2000;**92**:557–63.
622 **Atkin WS**. Flexible sigmoidoscopy as a mass screening tool. *Eur J Gastroenterol Hepatol* 1998;**10**:219–23.
623 **Dubinsky MC**, Johanson JF, Seidman EG, *et al*. Suspected inflammatory bowel disease—the clinical and economic impact of competing diagnostic strategies. *Am J Gastroenterol* 2002;**97**:2333–42.
624 **Bejes C**, Marvel MK. Attempting the improbable: offering colorectal cancer screening to all appropriate patients. *Fam Pract Res J* 1992;**12**:83–90.

625 **Helm J**, Choi J, Sutphen R, *et al*. Current and evolving strategies for colorectal cancer screening. *Cancer Control* 2003;**10**:193–204.
626 **Ganz PA**, Farmer MM, Belman M, *et al*. Improving colorectal cancer screening rates in a managed care health plan: recruitment of provider organizations for a randomized effectiveness trial. *Cancer Epidemiol Biomarkers Prev* 2003;**12**:824–9.
627 **Kronborg O**. Screening guidelines for colorectal cancer. *Scand J Gastroenterol* 1992;**27**(Suppl 192):123–9.
628 **Hill J**, Walsh S, Evans DG. Screening of patients at high risk of colorectal cancer. *Colorectal Dis* 2001;**3**:308–11.
629 **Taylor T**, Williamson S, Wardle J, *et al*. Acceptability of flexible sigmoidoscopy screening in older adults in the United Kingdom. *J Med Screen* 2000;**7**:38–45.
630 **Rae LC**. Community screening for colorectal cancer in north-eastern New South Wales, 1987–1996. *Med J Aust* 1998;**168**:382–5.
631 **Sonnenberg A**. Cost effectiveness of competing strategies to prevent or treat GORD-related dysphagia. *Pharmacoeconomics* 2000;**17**:391–401.
632 **Macafee DA**, Scholefield JH. Population based endoscopic screening for colorectal cancer. *Gut* 2003;**52**:323–6.
633 **Doria-Rose VP**, Levin TR, Selby JV, *et al*. The incidence of colorectal cancer following a negative screening sigmoidoscopy: implications for screening interval. *Gastroenterology* 2004;**127**:714–22.
634 **Hur C**, Gazelle GS, Zalis ME, *et al*. An analysis of the potential impact of computed tomographic colonography (virtual colonoscopy) on colonoscopy demand. *Gastroenterology* 2004;**127**:1312–21.
635 **Cotton PB**, Durkalski VL, Pineau BC, *et al*. Virtual colonoscopy: good results and not so good results—why the difference? *JAMA* 2004;**291**:1713–9.
636 **Cairnes, Scholefield JH**. Guidelines for col-rectal cancer screening in high risk groups. *Gut* 2002;**51**.
637 **Department of Health**. *Screening for bowel cancer (colorectal cancer) UK*, London, 2005.(http://www.cancerscreening.nhs.uk/colorectal/screening.html#programme, accessed 26 December 2006).
638 **Dunlop MG**, British Society for Gastroenterology, Association of Coloproctology for Great Britain and Ireland. Guidance on large bowel surveillance for people with two first degree relatives with colorectal cancer or one first degree relative diagnosed with colorectal cancer under 45 years. *Gut* 2002;**51**(Suppl 5):v17–20.
639 **Dunlop MG**, British Society for Gastroenterology, Association of Coloproctology for Great Britain and Ireland. Guidance on gastrointestinal surveillance for hereditary non-polyposis colorectal cancer, familial adenomatous polypolis, juvenile polyposis, and Peutz-Jeghers syndrome. *Gut* 2002;**51**(Suppl 5):v21–7.
640 **Bradshaw N**, Holloway S, Penman I, *et al*. Colonoscopy surveillance of individuals at risk of familial colorectal cancer. *Gut* 2003;**52**:1748–51.
641 **Mowat AM**. Coeliac disease-a meeting point for genetics, immunology, and protein chemistry. *Lancet* 2003;**361**:1290–2.
642 **Newman B**, Siminovitch KA. Recent advances in the genetics of inflammatory bowel disease. *Curr Opin Gastroenterol* 2005;**21**:401–7.
643 **Ahmad T**, Marshall S, Jewell D. Genotype-based phenotyping heralds a new taxonomy for inflammatory bowel disease. *Curr Opin Gastroenterol* 2003;**19**:327–35.
644 **Brueckl WM**, Heinze E, Milsmann C, *et al*. Prognostic significance of microsatellite instability in curatively resected adenocarcinoma of the small intestine. *Cancer Lett* 2004;**203**:181–90.
645 **Ahmad T**, Tamboli CP, Jewell D, *et al*. Clinical relevance of advances in genetics and pharmacogenetics of IBD. *Gastroenterology* 2004;**126**:1533–49.
646 **Anwar S**, Frayling IM, Scott NA, *et al*. Systematic review of genetic influences on the prognosis of colorectal cancer. *Br J Surg* 2004;**91**:1275–91.
647 **Westra JL**, Plukker JT, Buys CH, *et al*. Genetic alterations in locally advanced stage II/III colon cancer: a search for prognostic markers. *Clin Colorectal Cancer* 2004;**4**:252–9.
648 **Charara M**, Edmonston TB, Burkholder S, *et al*. Microsatellite status and cell cycle associated markers in rectal cancer patients undergoing a combined regimen of 5-FU and CPT-11 chemotherapy and radiotherapy. *Anticancer Res* 2004;**24**:3161–7.
649 **Clark AJ**, Barnetson R, Farrington SM, *et al*. Prognosis in DNA mismatch repair deficient colorectal cancer: are all MSI tumours equivalent? *Fam Cancer* 2004;**3**:85–91.
650 **Bataille F**, Rummele P, Dietmaier W, *et al*. Alterations in p53 predict response to preoperative high dose chemotherapy in patients with gastric cancer. *Mol Pathol* 2003;**56**:286–92.
651 **Hulscher M**, Wensing M, van der Weijden T, *et al*. Interventions to implement prevention in primary care. *The Cochrane Library* 2004;**3**.
652 **Muller AD**, Sonnenberg A. Prevention of colorectal cancer by flexible endoscopy and polypectomy. A case-control study of 32,702 veterans. *Ann Intern Med* 1995;**123**:904–10.
653 **Thomson MA**, Booth IW. Treatment of traveller's diarrhoea: economic aspects. *Pharmacoeconomics* 1996;**9**:382–91.
654 **O'Connor H**, Sebastian S. The burden of Helicobacter pylori infection in Europe. *Aliment Pharmacol Ther* 2003;**18**(Suppl 3):38–44.
655 **Thornton J**. Traditional or systematic reviews? *Rev Gynaecol Pract* 2002;**2**:3.
656 **Wagenaar AC**. Importance of systematic reviews and meta-analyses for research and practice. *Am J Prev Med* 1999;**16**:9–11.
657 **Dixon-Woods M**, Agarwal S, Jones D, *et al*. Synthesising qualitative and quantitative evidence: a review of possible methods. *J Health Serv Res Policy* 2005;**10**:45–53.
658 **Davies P**. The relevance of systematic reviews to educational policy and practice. *Oxford Review of Education* 2000;**26**:365–78.
659 **Gough D**, Elbourne D. Systematic research synthesis to inform policy, practice, and democratic debate. *Social Policy & Society* 2002;**1**:225–36.
660 **Centre for Reviews**, Dissemination (CRD). *Undertaking systematic reviews of research on effectiveness*, 2nd ed. York: Centre for Reviews and Dissemination (CRD), 2001, No 4..
661 **Horvath AR**, Pewsner D. Systematic reviews in laboratory medicine: principles, processes and practical considerations. *Clin Chim Acta* 2004;**342**:23–39.
662 **Khan K**, Popay J, Kleijnen J. Phase 2—development of a review protocol. York: Centre for Reviews and Dissemination, 2001, No 4..
663 **Verhagen AP**, de Vet HC, de Bie RA, *et al*. The art of quality assessment of RCTs included in systematic reviews. *J Clin Epidemiol* 2001;**54**:651–4.
664 **Appraisal of Guidelines Research and Evaluation Collaboration**. *AGREE instrument*, 2001 (http://www.agreecollaboration.org/, accessed 26 December 2006).
665 **Verhagen AP**, de Vet HC, de Bie RA, *et al*. The Delphi list: a criteria list for quality assessment of randomized clinical trials for conducting systematic reviews developed by Delphi consensus. *J Clin Epidemiol* 1998;**51**:1235–41.
666 **Jadad A**. *Randomised controlled trials*. London: BMJ Publishing, 1998.
667 **AGREE Collaboration (Cluzeau F, Burgers J, Brouwers M, et al)**. Development and validation of an international appraisal instrument for assessing the quality of clinical practice guidelines: the AGREE project. *Qual Health Care* 2003;**12**:18–23.
668 **Pallant J**. *SPSS survival manual*: Buckingham, UK: Open University Press 2001.
669 **Cohen J**. A coefficient of agreement for nominal scales. *Educ Psychol Measure* 1960;**20**:37–46.
670 **Evans D**. Hierarchy of evidence: a framework for ranking evidence evaluating healthcare interventions. *J Clin Nurs* 2003;**12**:77–84.
671 **NICE**. *Guideline development methods. Information for national collaborating centres and guideline developers*. London: NICE, 2004.
672 **Cook JR**, Drummond M, Glick H, *et al*. Assessing the appropriateness of combining economic data from multinational clinical trials. *Stat Med* 2003;**22**:1955–76.
673 **Department of Health**. *National standards, local action. Health and social care standards and planning framework*. London: Department of Health, 2004.
674 **Department of Health**. *Improving chronic disease management*. London: Department of Health, 2004.
675 **Ham C**, York N, Sutch S, *et al*. Hospital bed utilisation in the NHS, Kaiser Permanente, and the US Medicare programme: analysis of routine data. *BMJ* 2003;**327**:1257–60.
676 **Rubin GP**, Hungin AP, Chinn D, *et al*. Quality of life in patients with established inflammatory bowel disease: a UK general practice survey. *Aliment Pharmacol Ther* 2004;**19**:529–35.
677 **Royal College of Physicians of London, Royal College of General Practitioners and NHS Alliance**. *Clinicians, services and commissioning in chronic disease management in the NHS: the need for coordinated management programmes*. London and Nottingham: Royal College of Physicians of London, Royal College of General Practitioners, and NHS Alliance, 2004, (http://www.rcgp.org.uk/PDF/Corp_chronic_disease_nhs.pdf, accessed 26 December 2006).
678 **Singh D**. *Making the shift: key success factors. A rapid review of best practice in shifting hospital care into the community*. Birmingham: Health Services Management Centre, University of Birmingham and NHS Institute for Innovation and Improvement, 2006.
679 **Williams JG**, Cheung WY, Russell IT, *et al*. Open access follow up for inflammatory bowel disease: pragmatic randomised trial and cost effectiveness study. *BMJ* 2000;**320**:544–8.
680 **Robinson A**. Review article: inflammatory bowel disease—empowering the patient and improving outcome. *Aliment Pharmacol Ther* 2004;**20**(Suppl 4):84–7.
681 **Robinson A**, Thompson DG, Wilkin D, *et al*. Guided self-management and patient-directed follow-up of ulcerative colitis: a randomised trial. *Lancet* 2001;**358**:976–81.
682 **Kennedy AP**, Nelson E, Reeves D, *et al*. A randomised controlled trial to assess the effectiveness and cost of a patient orientated self management approach to chronic inflammatory bowel disease. *Gut* 2004;**53**:1639–45.
683 **Kennedy AP**, Nelson E, Reeves D, *et al*. A randomised controlled trial to assess the impact of a package comprising a patient-orientated, evidence-based self-help guidebook and patient-centred consultations on disease management and satisfaction in inflammatory bowel disease. *Health Technol Assess* 2003;**7**:1–113.
684 **Kennedy A**, Robinson A, Rogers A. Incorporating patients' views and experiences of life with IBS in the development of an evidence based self-help guidebook. *Patient Educ Counsel* 2003;**50**:303–10.
685 **NACC**. *Adolescence into adulthood in inflammatory bowel disease (IBD): the transition from paediatric to adult care*. London: NACC, 2005.
686 **Evans JP**, Steinhart AH, Cohen Z, *et al*. Home total parenteral nutrition: an alternative to early surgery for complicated inflammatory bowel disease. *J Gastrointest Surg* 2003;**7**:562–6.
687 **De Rooy EC**, Toner BB, Maunder RG, *et al*. Concerns of patients with inflammatory bowel disease: results from a clinical population. *Am J Gastroenterol* 2001;**96**:1816–21.
688 **O'Hanrahan T**, Irving MH. The role of HPN in the management of intestinal failure—report of 400 cases. *Clin Nutr* 1992;**11**:331–6.
689 **Shepperd S**, Iliffe S. Hospital at home versus in-patient hospital care. *The Cochrane Library* 2004;**3**.
690 **NHS Modernisation Agency**. *Practitioners with special interests—a step-by-step guide to setting up a GPwSI service*. London: NHS Modernisation Agency, 2003.
691 **Department of Health and Royal College of General Practitioners**. *Implementing a scheme for GPSI*. London: Department of Health and Royal College of General Practitioners, 2002.

692 **Scott A**, Vale L. Increased general practice workload due to a primary care led National Health Service: the need for evidence to support rhetoric. *Br J Gen Pract* 1998;**48**:1085–8.
693 **Kernick DP**. Developing intermediate care provided by general practitioners with a special interest: the economic perspective. *Br J Gen Pract* 2003;**53**:553–6.
694 **Scott A**. Primary or secondary care? What can economics contribute to evaluation at the interface? *J Public Health Med* 1996;**18**:19–26.
695 **Bass C**, Hyde G, Bond A, *et al*. A survey of frequent attenders at a gastroenterology clinic. *J Psychosom Res* 2001;**50**:107–9.
696 **Levy RL**, Von Korff M, Whitehead WE, *et al*. Costs of care for irritable bowel syndrome patients in a health maintenance organization. *Am J Gastroenterol* 2001;**96**:3122–9.
697 **Haycox A**, Butterworth M, Walley T, *et al*. Development of an economic model for the management of upper gastrointestinal disease in primary care. Preliminary findings. *Pharmacoeconomics* 1998;**14**(Suppl 2):11–23.
698 **Primary Care Society for Gastroenterology**. *Endoscopy in primary care*, Primary Care Society for Gastroenterology, 2001.(http://www.pcsg.org.uk/downloads/Endoscopy%20in%20primary%20care%202001.pdf, accessed 26 December 2006).
699 **Nocon A**, Leese B. The role of UK general practitioners with special clinical interests: implications for policy and service delivery. *Br J Gen Pract* 2004;**54**:50–6.
700 **Littlewood J**, Webb E, Beer N, *et al*. A survey of postgraduate education programmes and research interests of GPs in community trusts in an inner city area. *J R Soc Health* 2000;**120**:96–9.
701 **Jones RH**, Bartholomew J. General practitioners with special clinical interests: a cross-sectional survey. *Br J Gen Pract* 2002;**52**:833–4.
702 **Gerada C**, Harris L. Appraisal and revalidation of general practitioners with special interests (GPwSIs). *Education for Primary Care* 2003;**14**:572–6.
703 **Gerada C**, Limber C. General practitioners with special interests:implications for clinical governance. *Qual Primary Care* 2003;**11**:47–52.
704 **Provenzale D**, Ofman J, Gralnek I, *et al*. Gastroenterologist specialist care and care provided by generalists—an evaluation of effectiveness and efficiency. *Am J Gastroenterol* 2003;**98**:21–8.
705 **Aly EA**, Milne R, Johnson CD. Non-compliance with national guidelines in the management of acute pancreatitis in the United kingdom. *Dig Surg* 2002;**19**:192–8.
706 **Bohra S**, Byrne MF, Manning D, *et al*. A prospective analysis of inpatient consultations to a gastroenterology service. *Ir Med J* 2003;**96**:263–5.
707 **Quirk DM**, Barry MJ, Aserkoff B, *et al*. Physician specialty and variations in the cost of treating patients with acute upper gastrointestinal bleeding. *Gastroenterology* 1997;**113**:1443–8.
708 **Bassi A**, Dodd S, Williamson P, *et al*. Cost of illness of inflammatory bowel disease in the UK: a single centre retrospective study. *Gut* 2004;**53**:1471–8.
709 **Moore R**, Phillips C. Cost of NSAID adverse effects of the UK national health service. *J Med Economics* 1999;**2**:45–55.
710 **Meyer GS**, Cheng EY, Elting J. Differences between generalists and specialists in characteristics of patients receiving gastrointestinal procedures. *J Gen Intern Med* 2000;**15**:188–94.
711 **Pathmakanthan S**, Murray I, Smith K, *et al*. Nurse endoscopists in United Kingdom health care: a survey of prevalence, skills and attitudes. *J Adv Nurs* 2001;**36**:705–10.
712 **Smale S**, Bjarnason I, Forgacs I, *et al*. Upper gastrointestinal endoscopy performed by nurses: scope for the future? *Gut* 2003;**52**:1090–4.
713 **McKinlay A**, MacKenzie J, Mowat N. *Modernisation of the gastroenterology service in Scotland: towards European standards*, Scottish Society of Gastroenterology, 2003.
714 **Moshakis V**, Ruban R, Wood G. Role of the nurse endoscopist in colorectal practice. *Br J Surg* 1996;**83**:1399.
715 **Schoenfeld P**, Lipscomb S, Crook J, *et al*. Accuracy of polyp detection by gastroenterologists and nurse endoscopists during flexible sigmoidoscopy: a randomised trial. *Gastroenterology* 1999;**117**:312–8.
716 **Bachmann M**, Peters TJ, Harvey IM. Costs and concentration of cancer care: evidence for pancreatic, oesophageal and gastric cancers in National Health Service hospitals. *J Health Serv Res Policy* 2003;**8**:75–82.
717 **Chen SC**, Rex DK. Registered nurse-administered propofol sedation for endoscopy. *Aliment Pharmacol Ther* 2004;**19**:147–55.
718 **BSG**. Non-medical endoscopists. *A report of the working party of the British Society of Gastroenterology*. London: BSG, 2005.
719 **Axon AT**. Cancer surveillance in ulcerative colitis—a time for reappraisal. *Gut* 1994;**35**:587–9.
720 **Lim CH**, Dixon MF, Vail A, *et al*. Ten year follow up of ulcerative colitis patients with and without low grade dysplasia. *Gut* 2003;**52**:1127–32.
721 **Senate of Surgery of GB and Ireland**. *Reconfiguration of surgical, accident and emergency and trauma services in the UK*, Senate of Surgery of GB and Ireland, 2004.(http://www.rcseng.ac.uk/rcseng/content/publications/docs/reconfiguration.html, accessed 26 December 2006).
722 **Williams R**. *Provision of specialist liver services in England: a survey of their siting and extent*, Foundation for Liver Research and the British Liver Trust.(www.bsg.org.uk/pdf_word_docs/hepservices.doc, accessed 26 December 2006).
723 **Bachmann M**, Alderson D, Edwards D, *et al*. Cohort study in South and West England of the influence of specialization on the management and outcome of patients with oesophageal and gastric cancers. *Br J Surg* 2002;**89**:914–22.
724 **Delaney BC**, Wilson S, Roalfe A, *et al*. Cost effectiveness of initial endoscopy for dyspepsia in patients over age 50 years: a randomised controlled trial in primary care. *Lancet* 2000;**356**:1965–9.
725 **Duxbury MS**, Brodribb AJ, Oppong FC, *et al*. Management of colorectal cancer: variations in practice in one hospital. *Eur J Surg Oncol* 2003;**29**:400–2.
726 **Senapati PS**, Bhattarcharya D, Harinath G, *et al*. A survey of the timing and approach to the surgical management of cholelithiasis in patients with acute biliary pancreatitis and acute cholecystitis in the UK. *Ann R Coll Surg Engl* 2003;**85**:306–12.
727 **Davenport M**, De Ville de Goyet J, Stringer MD, *et al*. Seamless management of biliary atresia in England and Wales (1999–2002). *Lancet* 2004;**363**:1354–7.
728 **Majeed AW**, Price C. Resource and manpower calculations for the provision of hepatobiliary surgical services in the UK. *Ann R Coll Surg Engl* 2004;**86**:91–5.
729 **Parks RW**, Bettschart V, Frame S, *et al*. Benefits of specialisation in the management of pancreatic cancer: results of a Scottish population-based study. *Br J Cancer* 2004;**91**:459–65.
730 **Bachmann MO**, Alderson D, Peters TJ, *et al*. Influence of specialization on the management and outcome of patients with pancreatic cancer. *Br J Surg* 2003;**90**:171–7.
731 **Neoptolemos JP**, Russell RC, Bramhall S, *et al*. Low mortality following resection for pancreatic and periampullary tumours in 1026 patients: UK survey of specialist pancreatic units. *Br J Surg* 1997;**84**:1370–6.
732 **Andren-Sandberg A**, Neoptolemos J. Resection for pancreatic cancer in the new millennium. *Pancreatology* 2002;**2**:431–9.
733 **Ferguson B**, Posnett J, Sheldon T. *Concentration and choice in the provision of hospital services: summary support*. York: NHS Centre for Reviews and Dissemination, 1997.
734 **Grilli R**, Minozzi S, Tinazzi A, *et al*. Do specialists do it better? The impact of specialization on the processes and outcomes of care for cancer patients. *Ann Oncol* 1998;**9**:365–74.
735 **Hutchins RR**, Kojodjojo P, Ho R, *et al*. Short and long-term outcome of pancreatic surgery in a district general hospital. *J R Coll Surg Edinb* 2002;**47**:548–51.
736 **Sowden A**. *Relationship between volume and quality of health care: a review of the literature*. York: NHS Centre for Reviews and Dissemination, 1995.
737 **Bodger K**. Cost of illness of Crohn's disease. *Pharmacoeconomics* 2002;**20**:639–52.
738 **Ward FM**, Bodger K, Daly MJ, *et al*. Clinical economics review: medical management of inflammatory bowel disease. *Aliment Pharmacol Ther* 1999;**13**:15–25.
739 **Wells NE**, Hahn BA, Whorwell PJ. Clinical economics review: irritable bowel syndrome. *Aliment Pharmacol Ther* 1997;**11**:1019–30.
740 **Akehurst RL**, Brazier JE, Mathers N, *et al*. Health-related quality of life and cost impact of irritable bowel syndrome in a UK primary care setting. *Pharmacoeconomics* 2002;**20**:455–62.
741 **Creed F**, Ratcliffe J, Fernandez L, *et al*. Health-related quality of life and health care costs in severe, refractory irritable bowel syndrome. *Ann Intern Med* 2001;**134**(Pt 2):860–8.
742 **Haycox A**, Dubois D, Butterworth M. Customising an international disease management model to the needs of individual countries. Application to upper gastrointestinal disease. *Pharmacoeconomics* 1998;**14**(Suppl 2):39–56.
743 **Duggan AK**. Modelling different approaches to the management of upper gastrointestinal disease. *Pharmacoeconomics* 1998;**14**(Suppl 2):25–37.
744 **Morant SV**, McMahon AD, Cleland JG, *et al*. Cardiovascular prophylaxis with aspirin: costs of supply and management of upper gastrointestinal and renal toxicity. *Br J Clin Pharmacol* 2003;**57**:188–98.
745 **Sheridan WG**, White AT, Havard T, *et al*. Non-specific abdominal pain: the resource implications. *Ann R Coll Surg Engl* 1992;**74**:181–5.
746 **McLoughlin R**, Sebastian SS, Qasim A, *et al*. Coeliac disease in Europe. *Aliment Pharmacol Ther* 2003;**18**(Suppl 3):45–8.
747 **Moayyedi P**, Mason J. Clinical and economic consequences of dyspepsia in the community. *Gut* 2002;**50**(Suppl 4):iv10–2.
748 **Logan RF**, Delaney B. ABC of the upper gastrointestinal tract: implications of dyspepsia for the NHS. *BMJ* 2001;**323**:675–7.
749 **Somasekar K**, Shankar PJ, Foster ME, *et al*. Costs of waiting for gall bladder surgery. *Postgrad Med J* 2002;**78**:668–9.
750 **Valori RM**, Brown CM, Strangeways P, *et al*. Reducing community dyspepsia drug costs: a controlled trial. *Gut* 2001;**49**:495–501.
751 **Delaney BC**, Wilson S, Roalfe A, *et al*. Randomised controlled trial of Helicobacter pylori testing and endoscopy for dyspepsia in primary care. *BMJ* 2001;**322**:898–901.
752 **Bowles CJ**, Leicester R, Romaya C, *et al*. A prospective study of colonoscopy practice in the UK today: are we adequately prepared for national colorectal cancer screening tomorrow? *Gut* 2004;**53**:277–83.
753 **Association of Coloproctology of GB and Ireland**. *Resources for coloproctology*. London: Association of Coloproctology of GB and Ireland, 2001.
754 **South Wales Cancer Network**. *Service development plan for adult cancer services*, South Wales Cancer Network, 2003.
755 **Burling D**, Halligan S, Taylor SA, *et al*. CT colonography practice in the UK: a national survey. *Clin Radiol* 2004;**59**:39–43.
756 **Sawczenko A**, Lynn R, Sandhu BK. Variations in initial assessment and management of inflammatory bowel disease across Great Britain and Ireland. *Arch Dis Child* 2003;**88**:990–4.
757 **Burnett CA**, Juszczak E, Sullivan PB. Nurse management of intractable functional constipation: a randomised controlled trial. *Arch Dis Child* 2004;**89**:717–22.
758 **Maule WF**. Screening for colorectal cancer by nurse endoscopists. *N Engl J Med* 1994;**330**:183–7.
759 **Melleney EM**, Willoughby CP. Audit of a nurse endoscopist based one stop dyspepsia clinic. *Postgrad Med J* 2002;**78**:161–4.

760 **Richards DM**, Deeks JJ, Sheldon TA, *et al*. Home parenteral nutrition: a systematic review: *Health Technol Assess* 1997;**1**:1–59.
761 **Puntis JW**. The economics of home parenteral nutrition. *Nutrition* 1998;**14**:809–12.
762 **British Society of Gastroenterology Information Working Party**. *Specification of core requirements for clinical information systems in support of gastroenterology*. London: BSG, 2001.
763 **Williams JG**, Cheung WY. Clinical information processes and information use in gastroenterology in the United Kingdom. *Gastroenterol Today* 2001;**11**:82–6.
764 **Mann RY**, Williams JG. Standards in medical record keeping. *Clin Med* 2003;**3**:329–32.
765 **Croft GP**, Williams JG. Breaking the cycle of poor data quality. *Clin Med* 2005;**5**:47–9.
766 **Lewsey JD**, Leyland AH, Murray GD, *et al*. Using routine data to complement and enhance the results of randomised controlled trials. *Health Technol Assess* 2000;**4**:1–55.
767 **Williams JG**, Cheung WY, Cohen D, *et al*. The value of routine data in health technology assaessment: can randomised trials rely on electronic data? *Health Technol Assess* 2003;**7**.
768 **Ellis BW**. Management importance of common treatments: contribution of top 20 procedures to surgical workload and cost. *BMJ* 1991;**302**:882–4.
769 **Beard SM**, Holmes M, Majeed A, *et al*. *Hepatic resection as a treatment for liver metastases in colorectal cancer*. Nottingham: Trent Institute for Health Services Research, 1999.
770 **Jones RH**. Clinical economics review: gastrointestinal disease in primary care. *Aliment Pharmacol Ther* 1996;**10**:233–9.
771 **Read AM**, Stone MA, Rathbone BJ, *et al*. Production and evaluation of guidelines for the management of inflammatory bowel disease: the Leicester experience. *Postgrad Med J* 1999;**75**:147–50.
772 **Moody GA**, Mann R, Gay S, *et al*. The gastroenterology service: a survey of general practitioners' requirements. *J R Soc Med* 1993;**86**:26–7.
773 **Hungin AP**, Thomas PR, Bramble MG, *et al*. What happens to patients following open access gastroscopy? An outcome study from general practice. *Br J Gen Pract* 1994;**44**:519–21.
774 **Parry JM**, Foy RC, Woodman CBJ, *et al*. A randomised contolled trial to assess the impact of a printed summary of research findings in general practice. *Br J Gen Pract* 1999;**49**:634–8.
775 **Smith GD**, Steinke DT, Kinnear M, *et al*. A comparison of irritable bowel syndrome patients managed in primary and secondary care: the Episode IBS Study. *Br J Gen Pract* 2004;**54**:503–7.
776 **Guillou PJ**, Windsor AJ, Nejim A. Clinical economics review: the health-care economic implications of minimal access gastrointestinal surgery. *Aliment Pharmacol Ther* 1996;**10**:707–13.
777 **Moayyedi P**, Wardman M, Toner J, *et al*. Establishing patient preferences for gastroenterology clinic reorganization using conjoint analysis. *Eur J Gastroenterol Hepatol* 2002;**14**:429–33.
778 **Mathew J**, Shankar P, Aldean IM. Audit on flexible sigmoidoscopy for rectal bleeding in a district general hospital: are we over-loading the resources? *Postgrad Med J* 2004;**80**:38–40.
779 **Roderick P**, Davies R, Raftery J, *et al*. Cost-effectiveness of population screening for Helicobacter pylori in preventing gastric cancer and peptic ulcer disease, using simulation. *J Med Screen* 2003;**10**:148–56.
780 **Moayyedi P**, Soo S, Deeks J, *et al*. Pharmacological interventions for non-ulcer dyspepsia. *Cochrane Database Syst Rev* 2004;(3):CD002301.
781 **Paterson C**, Ewings P, Brazier J, *et al*. Treating dyspepsia with acupuncture and homeopathy: reflections on a pilot study by researchers, practitioners and participants. *Complement Ther Med* 2003;**11**:78–84.
782 **Bate CM**, Riley SA, Chapman RW, *et al*. Evaluation of omeprazole as a cost-effective diagnostic test for gastro-oesophageal reflux disease. *Aliment Pharmacol Ther* 1999;**13**:59–66.
783 **Dominitz JA**, Young JC, Boyko EJ. Outcomes of infants born to mothers with inflammatory bowel disease: a population-based cohort study. *Am J Gastroenterol* 2002;**97**:641–8.
784 **De Lillo AR**, Rose S. Functional bowel disorders in the geriatric patient: constipation, fecal impaction, and fecal incontinence. *Am J Gastroenterol* 2000;**95**:901–5.
785 **Hislop WS**, Heading R. Impact of alcohol related disease and inpatient workload of gastroenterologists in Scotland. *Scott Med J* 2004;**49**:57–60.
786 **Plevris J**, Schina M, Hayes P. The management of acute liver failure [review]. *Aliment Pharmacol Ther* 1998;**12**:405–18.
787 **Morris C**. Non-ulcer dyspepsia. *J Psychosom Res* 1991;**35**:129–40.
788 **American Gastroenterogical Association**. The burden of gastrointestinal diseases. New York, USA: American Gastroenterogical Association, 2001.
789 **Ghanchi FD**, Rembacken BJ. Inflammatory bowel disease and the eye. *Surv Ophthalmol* 2003;**48**:663–76.
790 **Mamula P**, Telega GW, Markowitz JE, *et al*. Inflammatory bowel disease in children 5 years of age and younger. *Am J Gastroenterol* 2002;**97**:2005–10.
791 **Wong WM**, Lai KC, Lam KF, *et al*. Prevalence, clinical spectrum and health care utilisation of gastro-oesophageal reflux disease in a Chinese population: a population-based study. *Aliment Pharmacol Ther* 2003;**18**:595–604.
792 **Pimentel M**, Chow EJ, Lin HC. Eradication of small intestinal bacterial overgrowth reduces symptoms of irritable bowel syndrome. *Am J Gastroenterol* 2000;**95**:3503–6.
793 **Russel MG**. Changes in the incidence of inflammatory bowel disease: what does it mean? *Eur J Intern Med* 2000;**11**:191–6.
794 **Moum B**, Ekbom A. Epidemiology of inflammatory bowel disease—methodological considerations. *Dig Liver Dis* 2002;**34**:364–9.
795 **Farrokhyar F**, Swarbrick ET, Irvine EJ. A critical review of epidemiological studies in inflammatory bowel disease. *Scand J Gastroenterol* 2001;**36**:2–15.
796 **Lapane KL**, Spooner JJ, Pettitt D. The effect of nonsteroidal anti-inflammatory drugs on the use of gastroprotective medication in people with arthritis. *Am J Manag Care* 2001;**7**:402–8.
797 **Chiang DT**, Anozie A, Fleming WR, *et al*. Comparative study on acute pancreatitis management. *ANZ J Surg* 2004;**74**:218–21.
798 **Fass R**, Fullerton S, Tung S, *et al*. Sleep disturbances in clinic patients with functional bowel disorders. *Am J Gastroenterol* 2000;**95**:1195–200.
799 **Parry SD**, Stansfield R, Jelley D, *et al*. Is irritable bowel syndrome more common in patients presenting with bacterial gastroenteritis? A community-based, case-control study. *Am J Gastroenterol* 2003;**98**:327–31.
800 **Bernstein CN**, Blanchard JF, Rawsthorne P, *et al*. The prevalence of extraintestinal diseases in inflammatory bowel disease: a population-based study. *Am J Gastroenterol* 2001;**96**:1116–22.
801 **Payne N**, Saul C. What common disorders do those reporting limiting long-term illness experience, and what is their survival and health service utilization experience? *J Public Health Med* 2000;**22**:324–9.
802 **Ruigomez A**, Wallander MA, Johansson S, *et al*. One-year follow-up of newly diagnosed irritable bowel syndrome patients. *Aliment Pharmacol Ther* 1999;**13**:1097–102.
803 **ONS**. *Cancer trends in England and Wales, 1950–1999*, 2001 (http://www.ons.org/, accessed 27 December 2006).
804 **Blower AL**, Brooks A, Fenn GC, *et al*. Emergency admissions for upper gastrointestinal disease and their relation to NSAID use. *Aliment Pharmacol Ther* 1997;**11**:283–91.
805 **Sawczenko A**, Sandhu BK, Logan RF, *et al*. Prospective survey of childhood inflammatory bowel disease in the British Isles. *Lancet* 2001;**357**:1093–4.
806 **Griffin M**, McCulloch P, Davies S, *et al*. *AUGIS database report 2002*. London: Association of Upper Gastrointestinal Surgeons of GB and Ireland, 2002.
807 **Cooper DL**, Smith GE, O'Brien SJ, *et al*. What can analysis of calls to NHS direct tell us about the epidemiology of gastrointestinal infections in the community? *J Infect* 2003;**46**:101–5.
808 **CSCG Board Meeting**. *Response to NICE service guidance: upper gastro-intestinal cancers*, CSCG Board Meeting, 2003.
809 **Jones RH**. Likely impacts of recruitment site and methodology on characteristics of enrolled patient population: Irritable Bowel Syndrome Clinical Trial Design. *Am J Med* 1999;**107**:85–90S.
810 **Department of Health**, NICE. *Improving outcomes in colorectal cancers*. London: Department of Health and NICE, 2004.
811 **Ashorn M**. Gastrointestinal diseases in the paediatric age groups in Europe: epidemiology and impact on healthcare. *Aliment Pharmacol Ther* 2003;**18**(Suppl 3):80–3.
812 **Delvaux M**. Digestive health in the elderly: faecal incontinence in adults. *Aliment Pharmacol Ther* 2003;**18**(Suppl 3):84–9.
813 **Delvaux M**. Functional bowel disorders and irritable bowel syndrome in Europe. *Aliment Pharmacol Ther* 2003;**18**(Suppl 3):75–9.
814 **Munkholm P**. The incidence and prevalence of colorectal cancer in inflammatory bowel disease [review]. *Aliment Pharmacol Ther* 2003;**18**(Suppl 2):1–5.
815 **Davis DL**, Hoel D, Fox J, *et al*. International trends in cancer mortality in France, West Germany, Italy, Japan, England and Wales, and the USA. *Lancet* 1990;**336**:474–81.
816 **Stanley K**, Stjernsward J, Koroltchouk V. Cancers of the stomach, lung and breast: mortality trends and control strategies. *World Health Stat Q* 1988;**41**:107–14.
817 **Khan SA**, Taylor-Robinson SD, Toledano MB, *et al*. Changing international trends in mortality rates for liver, biliary and pancreatic tumours. *J Hepatol* 2002;**37**:806–13.
818 **Cucino C**, Sonnenberg A. Occupational mortality from inflammatory bowel disease in the United States 1991–1996. *Am J Gastroenterol* 2001;**96**:1101–5.
819 **Maroun J**, Ng E, Berthelot JM, *et al*. Lifetime costs of colon and rectal cancer management in Canada. *Chronic Dis Can* 2003;**24**:91–101.
820 **Fernandez E**, La Vecchia C, Porta M, *et al*. Trends in pancreatic cancer mortality in Europe, 1955–1989. *Int J Cancer* 1994;**57**:786–92.
821 **La Vecchia C**, Lucchini F, Franceschi S, *et al*. Trends in mortality from primary liver cancer in Europe. *Eur J Cancer* 2000;**36**:909–15.
822 **Maheswaran R**, Strachan DP, Dodgeon B, *et al*. A population-based case-control study for examining early life influences on geographical variation in adult mortality in England and Wales using stomach cancer and stroke as examples. *Int J Epidemiol* 2002;**31**:375–82.
823 **Payne JN**, Coy J, Milner PC, *et al*. Are deprivation indicators a proxy for morbidity? A comparison of the prevalence of arthritis, depression, dyspepsia, obesity and respiratory symptoms with unemployment rates and Jarman scores. *J Public Health Med* 1993;**15**:161–70.
824 **Sharp L**, Black RJ, Muir CS, *et al*. Will the Scottish cancer target for the year 2000 be met? The use of cancer registration and death records to predict future cancer incidence and mortality in Scotland. *Br J Cancer* 1996;**73**:1115–21.
825 **Pye JK**, Crumplin MK, Charles J, *et al*. One-year survey of carcinoma of the oesophagus and stomach in Wales. *Br J Surg* 2001;**88**:278–85.
826 **Association of Upper Gastrointestinal Surgeons of GB and Ireland**. *Provision of upper gastrointestinal surgical services*. London: Association of Upper Gastrointestinal Surgeons of GB and Ireland, 1999.
827 **Tekkis PP**, Poloniecki JD, Thompson MR, *et al*. Operative mortality in colorectal cancer: prospective national study. *BMJ* 2003;**327**:1196–9.
828 **Payne JN**, Coy J, Patterson S, *et al*. Is use of hospital services a proxy for morbidity? A small area comparison of the prevalence of arthritis, depression, dyspepsia, obesity, and respiratory disease with inpatient admission rates for these disorders in England. *J Epidemiol Community Health* 1994;**48**:74–8.

829 **McCulloch P**, Ward J, Tekkis PP, *et al.* Mortality and morbidity in gastro-oesophageal cancer surgery: initial results of ASCOT multicentre prospective cohort study. *BMJ* 2003;**327**:1192–6.
830 **Talley NJ**, Holtmann G, Agreus L, *et al.* Gastrointestinal symptoms and subjects cluster into distinct upper and lower groupings in the community: a four nations study. *Am J Gastroenterol* 2000;**95**:1439–47.
831 **Levenstein S**, Li Z, Almer S, *et al.* Cross-cultural variation in disease-related concerns among patients with inflammatory bowel disease. *Am J Gastroenterol* 2001;**96**:1822–30.
832 **Longobardi T**, Jacobs P, Bernstein CN. Work losses related to inflammatory bowel disease in the United States: results from the National Health Interview Survey. *Am J Gastroenterol* 2003;**98**:1064–72.
833 **Longobardi T**, Jacobs P, Wu L, *et al.* Work losses related to inflammatory bowel disease in Canada: results from a National Population Health Survey. *Am J Gastroenterol* 2003;**98**:844–9.
834 **Danese S**, Sans M, Fiocchi C. Inflammatory autoimmune bowel disease: the role of environmental factors. *Autoimmun Rev* 2004;**3**:394–400.
835 **McKinney P**, Sharp L, Macfarlane G, *et al.* Oesophageal and gastric cancer in Scotland 1960–1990. *Br J Cancer* 1995;**71**:411–5.
836 **Dean BB**, Crawley JA, Schmitt CM, *et al.* The burden of illness of gastro-oesophageal reflux disease: impact on work productivity. *Aliment Pharmacol Ther* 2003;**17**:1309–17.
837 **Bernstein CN**, Kraut A, Blanchard JF, *et al.* The relationship between inflammatory bowel disease and socioeconomic variables. *Am J Gastroenterol* 2001;**96**:2117–25.
838 **Vaughn C**, Leff J, Sarner M. Relatives' expressed emotion and the course of inflammatory bowel disease. *J Psychosom Res* 1999;**47**:461–9.
839 **Crane C**, Martin M. Social learning, affective state and passive coping in irritable bowel syndrome and inflammatory bowel disease. *Gen Hosp Psychiatry* 2004;**26**:50–8.
840 **Casati J**, Toner BB. Psychosocial aspects of inflammatory bowel disease. *Biomed Pharmacother* 2000;**54**:388–93.
841 **Sewitch MJ**, Abrahamowicz M, Bitton A, *et al.* Psychological distress, social support, and disease activity in patients with inflammatory bowel disease. *Am J Gastroenterol* 2001;**96**:1470–9.
842 **Soo S**, Moayyedi P, Deeks J, *et al.* Psychological interventions for non-ulcer dyspepsia (Cochrane review). *Cochrane Database Syst Rev* 2004;(3):CD002301.
843 **Guthrie E**. Psychodynamic-interpersonal therapy for functional bowel disorders. *International Congress Series* 2002;**1241**:121–5.
844 **Kisely S**. Multiple readmissions: an analysis of patients using routine contracting data. *Clinician in Management* 1999;**8**:211–219.
845 **Tojek TM**, Lumley MA, Corlis M, *et al.* Maternal correlates of health status in adolescents with inflammatory bowel disease. *J Psychosom Res* 2002;**52**:173–9.
846 **Jahnsen J**, Falch JA, Mowinckel P, *et al.* Body composition in patients with inflammatory bowel disease: a population-based study. *Am J Gastroenterol* 2003;**98**:1556–62.
847 **Hatch ML**. Conceptualization and treatment of bowel obsessions: two case reports. *Behav Res Ther* 1997;**35**:253–7.
848 **Guthrie E**, Creed F, Fernandes L, *et al.* Cluster analysis of symptoms and health seeking behaviour differentiates subgroups of patients with severe irritable bowel syndrome. *Gut* 2003;**52**:1616–22.
849 **Drossman DA**. Do psychosocial factors define symptom severity and patient status in irritable bowel syndrome? *Am J Med* 1999;**107**:41–50S.
850 **Pachler J**, Wille-Jorgensen P. Quality of life after rectal resection for cancer, with or without permanent colostomy. *Cochrane Database Syst Rev* 2004;(3):CD004323.
851 **Yacavone RF**, Locke GR 3rd, Provenzale DT, *et al.* Quality of life measurement in gastroenterology: what is available? *Am J Gastroenterol* 2001;**96**:285–97.
852 **Simren M**, Axelsson J, Gillberg R, *et al.* Quality of life in inflammatory bowel disease in remission: the impact of IBS-like symptoms and associated psychological factors. *Am J Gastroenterol* 2002;**97**:389–96.
853 **Hahn BA**, Yan S, Strassels S. Impact of irritable bowel syndrome on quality of life and resource use in the United States and United Kingdom. *Digestion* 1999;**60**:77–81.
854 **Blondel-Kucharski, Chircop C, Marquis P, et al**. Health-related quality of life in Crohn's disease: a prospective longitudinal study in 231 patients. *Am J Gastroenterol* 2001;**96**:2915–20.
855 **Gonsalkorale WM**, Toner BB, Whorwell PJ. Cognitive change in patients undergoing hypnotherapy for irritable bowel syndrome. *J Psychosom Res* 2004;**56**:271–8.
856 **El-Serag HB**, Olden K, Bjorkman D. Health-related quality of life among persons with irritable bowel syndrome: a systematic review. *Aliment Pharmacol Ther* 2002;**16**:1171–85.
857 **O'Keefe EA**, Talley NJ, Zinsmeister AR, *et al.* Bowel disorders impair functional status and quality of life in the elderly: a population-based study. *J Gerontol A Biol Sci Med Sci* 1995;**50**:M184–9.
858 **Gralnek I**, Hays R, Kilbourne A, *et al.* The impact of irritable bowel syndrome on health-related quality of life. *Gastroenterology* 2000;**119**:654–60.
859 **Pfau PR**, Cooper GS, Carlson MD, *et al.* Success and shortcomings of a clinical care pathway in the management of acute nonvariceal upper gastrointestinal bleeding. *Am J Gastroenterol* 2004;**99**:425–31.
860 **Slade PE**, Davidson AR, Steel A, *et al.* Reducing the endoscopic workload: does serological testing for Helicobacter pylori help? *Eur J Gastroenterol Hepatol* 1999;**11**:857–62.
861 **Lamy V**, McNamara D. Gastroenterology and hepatology services in Europe. *Aliment Pharmacol Ther* 2003;**18**(Suppl 3):90–2.
862 **Rayner HC**, Temple RM, Marshall T, *et al.* A comparison of hospital readmission rates between two general physicians with different outpatient review practices. *BMC Health Serv Res* 2002;**2**:12.
863 **Westbrook JI**, Rushworth RL, Rob MI, *et al.* Diagnostic procedures and health outcomes. Upper gastrointestinal tract investigations in the elderly. *Med J Aust* 1993;**159**:242–5.
864 **Grassi A**. Tracking regional endoscopy activity. *Gastrointest Endosc* 2002;**55**:298–300.
865 **BSG**. Future requirements for colonoscopy in Britain. Report by the Endoscopy Section Committee of the British Society of Gastroenterology. *Gut* 1987;**28**:772–5.
866 **Parente F**, Bargiggia S, Bianchi Porro B. Prospective audit of gastroscopy under the 'three day rule': a regional initiative in Italy to reduce waiting time for suspected malignancy. *Aliment Pharmacol Ther* 2002;**16**:1011–4.
867 **Quine MA**, Bell GD, McCloy RF, *et al.* Prospective audit of perforation rates following upper gastrointestinal endoscopy in two regions of England. *Br J Surg* 1995;**82**:530–3.
868 **Mulcahy HE**, Hennessy E, Connor P, *et al.* Changing patterns of sedation use for routine out-patient diagnostic gastroscopy between 1989 and 1998. *Aliment Pharmacol Ther* 2001;**15**:217–20.
869 **Rockey DC**, Paulson E, Niedzwiecki D, *et al.* Analysis of air contrast barium enema, computed tomographic colonography, and colonoscopy: prospective comparison. *Lancet* 2005;**365**:305–11.
870 **Halligan S**, Atkin W. Unbiased studies are needed before virtual colonoscopy can be dismissed. *Lancet* 2005;**365**:275–6.
871 **Meineche-Schmidt V**. Empiric treatment with high and standard dose of omeprazole in general practice: two-week randomized placebo-controlled trial and 12-month follow-up of health-care consumption. *Am J Gastroenterol* 2004;**99**:1050–8.
872 **Milne RP**, Logan R, Harwood D, *et al.* Helicobacter pylori and upper gastrointestinal disease: a survey of gastroenterologists in the United Kingdom. *Gut* 1995;**37**:314–18.
873 **Forman D**, Stockton D, Moller H, *et al.* Cancer prevalence in the UK: results from the EUROPREVAL study. *Ann Oncol* 2003;**14**:648–54.
874 **Sant M**, Capocaccia R, Coleman MP, *et al.* Cancer survival increases in Europe, but international differences remain wide. *Eur J Cancer* 2001;**37**:1659–67.
875 **Askling J**, Dickman PW, Karlen P, *et al.* Colorectal cancer rates among first-degree relatives of patients with inflammatory bowel disease: a population-based cohort study. *Lancet* 2001;**357**:262–6.
876 **Lynch HT**, de la Chapelle A. Hereditary colorectal cancer. *N Engl J Med* 2003;**348**:919–32.
877 **Rhodes JM**, Campbell BJ. Inflammation and colorectal cancer: IBD-associated and sporadic cancer compared. *Trends Mol Med* 2002;**8**:10–6.
878 **Lewis JD**. Prevention and treatment of colorectal cancer: pay now or pay later. *Ann Intern Med* 2000;**133**:647–9.
879 **Sonnenberg A**, Inadomi JM, Becker LA. Economic analysis of step-wise treatment of gastro-oesophageal reflux disease. *Aliment Pharmacol Ther* 1999;**13**:1003–13.
880 **Polito II J**, Rees R, Childs B, *et al.* Preliminary evidence for genetic anticipation in Crohn's disease. *Lancet* 1996;**347**:798–800.
881 **Morris-Yates A**, Talley NJ, Boyce PM, *et al.* Evidence of a genetic contribution to functional bowel disorder. *Am J Gastroenterol* 1998;**93**:1311–7.
882 **Faybush EM**, Blanchard JF, Rawsthorne P, *et al.* Generational differences in the age at diagnosis with Ibd: genetic anticipation, bias, or temporal effects. *Am J Gastroenterol* 2002;**97**:636–40.
883 **Greer S**. *Four way bet: how devolution has led to four different models for the NHS*. London: The Constitution Unit, University College London, 2004.
884 **Lilford R**, Mohammed MA, Spiegelhalter D, *et al.* Use and misuse of process and outcome data in managing performance of acute medical care: avoiding institutional stigma. *Lancet* 2004;**363**:1147–54.
885 **Rockall TA**, Logan RF, Devlin HB, *et al.* Risk assessment after acute upper gastrointestinal haemorrhage. *Gut* 1996;**38**:316–21.
886 **Johansen JF**, Schmitt CM, Deas TM Jr, *et al.* Quality and outcomes assessment in Gastrointestinal Endoscopy. *Gastrointest Endosc* 2000;**52**:827–30.
887 **Dougall A**, Russell A, Rubin G, *et al.* Rethinking patient satisfaction: patient experiences of an open access flexible sigmoidoscopy service. *Soc Sci Med* 2000;**50**:53–62.
888 **Feuer D**, Broadley K. Surgery for the resolution of symptoms in malignant bowel obstruction in advanced gynaecological and gastrointestinal cancer. *The Cochrane Library* 2004;**3**.
889 **Fletcher DR**. Peptic disease: Can we afford current management? *ANZ J Surg* 1997;**67**:75–80.
890 **Bodenheimer T**, Wagner EH, Grumbach K. Improving primary care for patients with chronic illness. *JAMA* 2002;**288**:1775–9.
891 **van der Eijk I**, Stockbrugger R, Russel M. Influence of quality of care on quality of life in inflammatory bowel disease (IBD): literature review and studies planned. *Eur J Intern Med* 2000;**11**:228–34.
892 **Gilmore IT**, Burroughs A, Murray-Lyon IM, *et al.* Indications, methods, and outcomes of percutaneous liver biopsy in England and Wales: an audit by the British Society of Gastroenterology and the Royal College of Physicians of London. *Gut* 1995;**36**:437–41.
893 **Kurlberg G**, Forssell H, Aly A. National registry of patients with short bowel syndrome. *Transplant Proc* 2004;**36**:253–4.
894 **Palmer K**, Morris AI. A snapshot of colonoscopy practice in England: stimulus for improvement. *Gut* 2004;**53**:163–5.
895 **Macarthur DC**, Nixon SJ, Aitken RJ. Avoidable deaths still occur after large bowel surgery. Scottish Audit of Surgical Mortality, Royal College of Surgeons of Edinburgh. *Br J Surg* 1998;**85**:80–3.

896 **van der Eijk I**, Verheggen FW, Russel MG, *et al.* ''Best practice'' in inflammatory bowel disease: an international survey and audit. *Eur J Intern Med* 2004;**15**:113–20.
897 **Eaden JA**, Ward BA, Mayberry JF. How gastroenterologists screen for colonic cancer in ulcerative colitis: an analysis of performance. *Gastrointest Endosc* 2000;**51**:123–8.
898 **Scott CM**, Verhoef MJ, Hilsden RJ. Inflammatory bowel disease patients' decisions to use complementary therapies: links to existing models of care. *Complement Ther Med* 2003;**11**:22–7.
899 **Hinton J**. Which patients with terminal cancer are admitted from home care? *Palliat Med* 1994;**8**:197–210.
900 **Barrett J**, Goh S, Todd C, *et al.* A description of an intermediate care service using routinely collected data. *J Nurs Manag* 2002;**10**:221–7.
901 **Gill AJ**, Martin IG. Survival from upper gastrointestinal cancer in New Zealand: the effect of distance from a major hospital, socio-economic status, ethnicity, age and gender. *ANZ J Surg* 2002;**72**:643–6.
902 **Whynes DK**, Thornton P. Measuring concentration in primary care. *Health Care Manag Sci* 2000;**3**:43–9.
903 **Gonsalkorale WM**, Houghton L, Whorwell P. Hypnotherapy in irritable bowel syndrome: a large-scale audit of a clinical service with examination of factors influencing responsiveness. *Am J Gastroenterol* 2002;**97**:954–61.
904 **van Dam J**, Cotton P, Johnson CD, *et al.* AGA future trends report: CT colonography. *Gastroenterology* 2004;**127**:970–84.
905 **Podolsky D**. The AGA and future trends in gastroenterology: CT colonography. *Gastroenterology* 2004;**127**:985–6.
906 **Baron TH**, Kimery BD, Sorbi D, *et al.* Strategies to address increased demand for colonoscopy: guidelines in an open endoscopy practice. *Clin Gastroenterol Hepatol* 2004;**2**:178–82.
907 **Cheung WY**, Dove J, Russell IT, *et al.* Shared care in gastroenterology: GPs' views of open access to out-patient follow-up for patients with inflammatory bowel disease. *Fam Pract* 2002;**19**:53–6.
908 **Smith GD**, Watson R, Roger D, *et al.* Impact of a nurse-led counselling service on quality of life in patients with inflammatory bowel disease. *J Adv Nurs* 2002;**38**:152–60.
909 **Ilnyckyj A**, Graff LA, Blanchard JF, *et al.* Therapeutic value of a gastroenterology consultation in irritable bowel syndrome. *Aliment Pharmacol Ther* 2003;**17**:871–80.
910 **Pasricha PJ**. The future of therapeutic endoscopy. *Clin Gastroenterol Hepatol* 2004;**2**:286–9.
911 **Axon A**. Open access endoscopy in Britain: a service in evolution. *Gastrointest Endosc* 1998;**48**:653–8.
912 **Department of Health**. *Improving outcomes in upper gastro-intestinal cancers*. London: Department of Health, 2001.
913 **Talley NJ**, Spiller R. Irritable bowel syndrome: a little understood organic bowel disease? *Lancet* 2002;**360**:555–64.
914 **Nord N**. Gastrointestinal endoscopy at the dawn of the new millennium. *Gastroenterol Endosc* 1999;**50**:721–5.
915 **Abuksis G**, Mor M, Segal N, *et al.* A patient education program is cost-effective for preventing failure of endoscopic procedures in a gastroenterology department. *Am J Gastroenterol* 2001;**96**:1786–90.
916 **Lewin van den Broek NT**, Numans ME, Buskens E, *et al.* A randomised controlled trial of four management strategies for dyspepsia: relationships between symptom subgroups and strategy outcome. *Br J Gen Pract* 2001;**51**:619–24.
917 **Delaney BC**, Moayyedi P. Dyspepsia—HCNA. *Health Care Needs Assessment*, Updated. Available at http://hcna.radcliffe-oxford.com/dyspepsia.htm, accessed 18 January 2007.
918 **Heaney A**, Collins JS, Watson RG. Open access gastroscopy—3 year experience of a new service. *Ir J Med Sci* 1998;**167**:136–7.
919 **Hansen JM**, Bytzer P, Bondesen S, *et al.* Efficacy and outcome of an open access endoscopy service. *Dan Med Bull* 1991;**38**:288–90.
920 **Paisley AM**, Madhavan KK, Paterson-Brown S, *et al.* Role of the surgical trainee in upper gastrointestinal resectional surgery. *Ann R Coll Surg Engl* 1999;**81**:40–5.
921 **Chin K**, Newton J. Survey of training in minimal access surgery in the West Midlands region of the UK. *Gynaecol Endosc* 1996;**5**:329–3.
922 **Pardo A**, Durandez R, Hernandez M, *et al.* Impact of physician specialty on the cost of nonvariceal upper GI bleeding care. *Am J Gastroenterol* 2002;**97**:1535–42.
923 **Waye JD**, Toouli J, Guelrud M, *et al.* Who is permitted to do endoscopy? *Gastrointest Endosc* 2001;**53**:267–9.
924 **Bini EJ**, Weinshel EH, Generoso R, *et al.* Impact of gastroenterology consultation on the outcomes of patients admitted to the hospital with decompensated cirrhosis. *Hepatology* 2001;**34**:1089–95.
925 **Eaden J**, Abrams K, McKay H, *et al.* Inter-observer variation between general and specialist gastrointestinal pathologists when grading dysplasia in ulcerative colitis. *J Pathol* 2001;**194**:152–7.
926 **Barrison I**, Bramble M, Wilkinson M, *et al. Provision of endoscopy related services in district general hospitals*, BSG Working Party, 2001.
927 **Lim AG**, Martin RM, Montileone M, *et al.* Helicobacter pylori serology and the management of young dyspeptics: a UK survey of gastroenterologists and general practitioners with an interest in gastroenterology. *Aliment Pharmacol Ther* 1997;**11**:299–303.
928 **Cockel R**, Colin Jones DG, Schiller KF. Gastrointestinal endoscopy services—a review of the 70s with predictions for the 80s. *Health Trends* 1982;**14**:46–9.
929 **Knight-Davis DK**, Fouweather MG, Srivastava ED, *et al.* Cross cover for physicians: an additional burden. *J R Coll Physicians Lond* 1998;**32**:130–2.
930 **Nightingale J**, Hogg P. The gastrointestinal advanced practitioner: an emerging role for the modern radiology service. *Radiography* 2003;**9**:151–60.
931 **Farthing MJ**, Williams R, Swan CH, *et al.* Nature and standards of gastrointestinal and liver services in the United Kingdom. *Gut* 1993;**34**:1728–39.
932 **Colin-Thome D**. The NHS plan: general practitioners with special interests. *Br J Cardiol* 2002;**9**:359–60.
933 **Birch K**. *Developing practitioners with special interest (PwSI) services: managing the risks*, Healthcare Standards Unit, Keele, NHS and NatPaCT, 2004;**53**:553–6.
934 **Pearson SD**, Moreno R, Trnka Y. Informal consultations provided to general internists by the gastroenterology department of an HMO. *J Gen Intern Med* 1998;**13**:435–8.
935 **Williams S**, Ryan D, Price D, *et al.* General practitioners with a special clinical interest: a model for improving respiratory disease management. *Br J Gen Pract* 2002;**52**:838–43.
936 **Department of Health and Royal College of General Practitioners**. *Guidelines for the appointment of GPSI. With the role of service development*. London: Department of Health and Royal College of General Practitioners, 2002.
937 **Ryan D**. Respiratory disease: why GPSIs are a breath of fresh air. *Primary Care Report* 2003;**5**:16–7.
938 **Gruffydd-Jones K**. The framework for general practitioners with a special interest in respiratory medicine. *Primary Care Resp J* 2003;**12**:35.
939 **Kernick DP**. The economic perspective of respiratory general practitioners with a special interest (GPwSIs): proceed with caution. *Primary Care Resp J* 2003;**12**:108–9.
940 **Richardson C**. Benefit or burden? The rise of GPs with a special interest. *Primary Care Report* 2002;**4**:38–9.
941 **Barry JD**, Edwards P, Lewis WG, *et al.* Special interest radiology improves the perceived preoperative stage of gastric cancer. *Clin Radiol* 2002;**57**:984–8.
942 **Fullerton S**. Functional digestive disorders (FDD) in the year 2000—economic impact. *Eur J Surg* 1998;(Suppl 582):62–4.
943 **Robinson A**, Lee V, Kennedy A, *et al.* A randomised controlled trial of self-help interventions in patients with a primary care diagnosis of IBS. *Gut* 2005;**55**:643–8.
944 **Norton C**, Kamm MA. Specialist nurses in gastroenterology. *J R Soc Med* 2002;**95**:331–5.
945 **Wade BE**. Colostomy patients: psychological adjustment at 10 weeks and 1 year after surgery in districts which employed stoma-care nurses and districts which did not. *J Adv Nurs* 1990;**15**:1297–304.
946 **Erwin-Toth P**, Spencer M. A survey of patient perception of quality of care. *J ET Nurs* 1991;**18**:122–5.

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