

## Refereed papers

# Adoption of information technology in primary care physician offices in New Zealand and Denmark, part 1: healthcare system comparisons

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### ABSTRACT

Denmark and New Zealand are two small countries whose primary care physicians are at the forefront of the use of electronic medical records (EMRs). This is the first of a series of five papers which contrasts the health care systems in Denmark and New Zealand. Though the delivery of care at the patient level is virtually the same in New Zealand and Denmark the way in which the health care is financed, administered and managed does vary.

This paper highlights the differences, particularly in terms of the approaches taken to primary care and out-of-office-hours services.

**Keywords:** access and evaluation, comparisons, computerised, Danish health care system, health-care quality, medical informatics, medical records systems, New Zealand health care system, out-of-hours services, primary care

### Introduction

Denmark and New Zealand are two small countries whose primary care physicians are at the forefront of the use of electronic medical records (EMRs). Danish physicians became energised with the potential for EMRs during a period when the Danish citizen was willing to have personal medical records captured electronically and when the county (i.e. provincial) Danish governments were supportive of 'point-to-point' exchange of information between health practitioners. Virtually all Danish physicians use computers to record their clinical notes and to send and receive clinical electronic messages. Their national health network (MedCom) is used by almost all the healthcare sector, involving over 10 000 users in more than 4000 different organisations. Over 90% of the

country's primary sector clinical communications with the secondary care sector are exchanged over the network.

Major changes in New Zealand health care in the early 1990s heralded a rapid shift towards the implementation of a primary-care led health system. The transition from a traditional western healthcare model was significantly aided by the availability of computerisation and point-to-point electronic communications. A catalyst for change was the Government's requirement that patient registers and fee-for-service claims be submitted electronically in order to receive subsidies. Between 1992 and 2000 all of New Zealand's general practices and a large proportion of other healthcare providers began to use EMR software and

started using point-to-point electronic communications. More than 3500 New Zealand healthcare organisations use HealthLink which is a privately owned communications network providing electronic communications over the internet. Today a general practice is likely to use the HealthLink service to interchange data with up to 50 other organisations. Approximately 75% of hospitals are sending electronic discharge summaries. A growing number of referrals to hospitals and specialists are also electronic.

This is the first of a series of five papers which:

- contrasts the healthcare systems in Denmark and New Zealand
- documents the history of computing in primary care
- contrasts the EMR functionality of physician office systems
- identifies the benefits being achieved
- compares the overall capabilities of primary care computing in the two countries.

## Healthcare systems

Though the delivery of care at the patient level is virtually the same in New Zealand and Denmark the way in which the health care is financed, administered and managed does vary.<sup>1</sup> Table 1 summarises some of the characteristics of the respective healthcare systems.

Historically, the Danish healthcare system was predominantly financed through local (regional and municipal) taxation with integrated funding and provision of health care at the local (regional) level. Most primary care is provided by privately practicing general practitioners (GPs), who are paid on a combined capitation and fee-for-service basis, but the number and location of GPs is controlled by the counties; GPs' fees and working conditions are negotiated centrally. Hospital care is mainly provided by hospitals owned and run by the regions. Private hospital providers are limited, accounting for less than 1% of hospital beds. Access to GPs and hospital care is free at the point of use for all Danish residents. It is not possible for Danish residents to opt out of the statutory healthcare system.

New Zealand's health system is financed predominantly from general taxation and covers all residents in the country. Public hospital outpatient and inpatient services are free; however, most people meet some of the costs of primary health care (although some groups are exempt) and make a co-payment for pharmaceuticals. As in Denmark, New Zealand's primary care system is funded on a combined capitation and fee-for-service basis. Primary care groups also receive funding for health promotion activities and chronic care management. New Zealand targets subsidies for primary care and prescriptions towards low-income patients (using concession cards), children and high users of services. Health services are delivered by a mix

**Table 1** Health system characteristics

	Denmark	New Zealand
Population (millions)	5.5	4.1
Area of jurisdiction (1000 km <sup>2</sup> )	43	268
Total expenditure as % of GDP (2005 OECD)	9.1%	8.2%
Public expenditure as % of total expenditure (2005 OECD)	84%	83%
Per capita healthcare expenditures (2005 OECD \$US)	3108	1886
Life expectancy at birth (2004 OECD) in years	77.9	
Number of health regions	5	21
Number of acute care hospitals	63	85
Number of acute care beds/1000 population (2004 OECD)	3.1	2.0
Number of pharmacies	321	850
Number of primary care physicians	3440	2600
Number of practices	2000	1100
% of primary care physicians who work alone	25%	15%
Practising physicians per 1000 population (2004 OECD)	3.6	2.4

of public and private providers. Despite having one of the lowest levels of healthcare expenditure per capita of OECD countries, New Zealand performs well in international comparisons such as the Commonwealth Fund reports.<sup>2</sup>

## Oversight of healthcare delivery

Since 1970, most decisions regarding the form and content of healthcare activity in Denmark have been made at county and municipal level. Up until 2007, counties and local authorities financed healthcare services partly through taxes, which they levied themselves, and partly through block grants from the Government allocated according to objective criteria (including population demographics). Municipalities were responsible for home care, long-term care and social care.

Working in close co-operation with the Government and 275 municipalities, the 14 counties were responsible for 65 hospitals and their physicians. Acute care is mainly provided by hospitals (the smallest being 25 beds) owned and run by the counties (or the Copenhagen Hospital Corporation in the Copenhagen area which was disbanded in 2007). Private hospital providers are limited, accounting for less than 1% of hospital beds.

In January 2007, the counties were replaced by five Health Regions who do not have taxation powers as the counties did. The number of municipalities was reduced from 275 to 98 at the same time.

In the early 1990s, the New Zealand health system underwent radical reforms aimed at reducing the overall cost of health care and slowing cost growth. The restructuring of New Zealand's health system occurred as part of a much wider program of 'corporatising' government activities. A period of radical structural reform between 1987 and 1995 was needed to correct New Zealand's poor economic track record – economic growth was 25% below the OECD average and the rate of inflation was considerably higher than that of its trading partners.

Key planks of successive Governments' health reform strategies were to define the role of primary care and to change funding allocation based upon the defined needs of local communities. Government funded organisations were created to support delivery of primary care and the Government began to focus upon the need for better information management at all levels within the sector. A key component of the healthcare reforms was the 2001 New Zealand Primary Health Care Strategy (PHCS); an explicit effort to shift resources into primary health care. Today, 50% of New Zealand's public healthcare expenditure is channelled through primary care.

New Zealand is served by 21 district health boards (DHBs), each of which run and maintain one or more

public hospitals and various public health services. Primary care is administered by 85 primary healthcare organisations (PHOs) each of which is contracted by one or more DHBs to deliver primary healthcare services and run healthcare delivery programmes.

Primary health care is funded by a blend of systems; it combines fee-for-service payments with a capitated funding system based upon the wealth and health status of the patients. Nearly all New Zealanders (97%) are enrolled with a PHO which substantially funds delivery of their health care.

Public hospitals are free and they are generally used for acute and emergency care. A small number of hospitals, most of them owned by or linked to health insurers, provide elective surgery and rent their facilities to private specialists.

## Primary care

Most primary care in Denmark is provided by privately practising primary care physicians, who are paid on a combined capitation and fee-for-service basis. The number and location of primary care physicians is controlled by the regions; primary care physicians' fees and working conditions are negotiated nationally.

Denmark has in the order of 3400 primary care physicians in 2000 practices. Danish primary care physicians do not need to refer patients to all specialists; Danes are able to go directly to ear, nose and throat specialists and ophthalmologists. Danish citizens are all free to select which hospital they would like to go to. They are also guaranteed not to wait more than one month for any treatment.

Approximately 25% of Danish primary care physicians work alone. A typical primary care physician has 1400–1500 patients up to a maximum of about 2400. A typical office visit lasts 8–10 minutes. Approximately 15% of a primary care physician's income is based on the number of patients on the physician's list while the rest is fee-for-service. The annual income for Danish primary care physicians is in the order of 800 000 DKK (€107 000).

Primary care physicians are paid to be at the phone from 8–9 am every day to take calls from their patients. Both primary care physicians and specialists are now also being paid a fee for email communications with their patients. The fee for each email consultation and/or email (currently primarily about lab results) is twice that for telephone calls. Currently, there are some 50 000 emails each month exchanged between physicians and their patients. Use of email technology by physicians will be mandatory as of the end of 2008.

New Zealand's general practices are mostly privately owned and managed small businesses, although it is expected that new primary practice ownership models will emerge during the next few years. New Zealand

has approximately 3000 GPs operating from 1100 general practices. Approximately 15% of New Zealand primary care physicians work alone. A typical primary care physician has 1500 patients, up to a maximum of 3000. A typical office visit lasts 12–15 minutes. The annual gross income for New Zealand primary care physicians (including in the region of 50% overhead expenses) is in the order of NZ\$197 000 (€105 000) per annum.

While patient enrolment is relatively new, it has proved very successful. Patients are encouraged to stay with one GP and form a relationship with them, moving to another either when they move home or if have reason for wanting a change of GP. The number of GPs and practices is no longer controlled by the Government; 'market forces' apply whereby GPs must be able to enrol enough patients in order to receive sufficient income (from subsidies and patient co-payments).

New Zealand GPs are neither encouraged to nor discouraged from performing email consultations, although capitation funding has indirectly provided incentives for meeting patient needs without necessarily requiring a face-to-face consultation. The emergence of patient enrolment is encouraging a closer one-to-one relationship and a number of practitioners are using email to consult with their patients.

Efforts are under way to develop practice management software that will allow patients to communicate with their GPs via web-based portals, enabling them to request appointments, ask questions, obtain repeat prescriptions etc. – a service becoming increasingly common in the United States.<sup>3</sup>

### Out of office hours services

In 1997, the Danish Doctors Association and the Denmark's County Association negotiated the creation of an Out of Office Hours (OOH) service for the country. At that time, 30 OOH services were established which provide patients with access to a primary care physician between 1600 and 0800 hours daily and during weekends and holidays. There are no walk-in clinics in Denmark. Some of the OOH services are based at hospitals while others are in offices adjacent to a primary care physician practice. Patients are encouraged to call their OOH service before going to the hospital emergency department.

All OOH services use the same computer system (funded by the regions) and all primary care physicians had to learn how to use it if they wanted to be paid for their time at the OOH service. The primary clinical purposes of the OOH computer system are to:

- send medication prescriptions directly to a pharmacy (there is currently no decision support built in)

- generate a report, which is sent electronically to the appropriate primary care physician's office system.

In New Zealand there are a number of local initiatives formed to offer after-hours services. In some cases these services are owned and administered by the local GP groups, in other cases they are provided by primary care organisations that specialise in delivery of after-hours care. Additionally most of New Zealand's 84 public hospitals have an emergency department to which patients can present for emergency care. Nearly all of these facilities are capable of sending an electronic message to the patient's own GP.

### Laboratories

Most lab work in Denmark is done in the hospitals – the only private labs are in Copenhagen.

Community pathology and radiology services delivered within New Zealand are owned by three companies, two of which are publicly listed companies whose shares are traded on the New Zealand and Australian stock exchanges. Each hospital has its own laboratory but most of the community pathology work is undertaken by the private pathology companies. All laboratory tests are 100% subsidised although most contracts with laboratories are capitated – thus laboratories assume the risk of an increase in laboratory usage.

### Pharmacies

There are 321 pharmacies in Denmark. Rural physicians are able to dispense medications. Patients may be discharged from hospital with a supply of medications.

There are 850 pharmacies in New Zealand. The majority of them are small, privately-owned businesses or small chains. There are a number of purchasing and marketing co-operatives that work as franchises; these create larger groupings of individually owned businesses. The number of pharmacies has dropped steadily over the past decade and this trend is expected to continue.

### Unique identifiers

Every Danish citizen has had a unique national person identification number since 1966; it is used for health and many other jurisdictions such as taxation. When first introduced there was a reluctance to give out the number; however, today it is part of the fabric of the Danish culture and its widespread use is apparently not an issue.

Since 1993, New Zealand has had a national health index (NHI) giving each citizen (and visitor) a unique health identifier. The NHI number is now universally used and it is required on all claims, referrals, pathology requests and prescriptions. Privacy legislation prohibits the NHI number from being used for non-health-related purposes.

## Conclusion

The Danish healthcare system has undergone gradual changes, but not radical reforms, between 1970 and 2004. Theoretically, the development can be viewed from the perspective of fiscal federalism, decentralisation and incentives embodied in reimbursement systems.

The Danish healthcare system was decentralised politically, financially and operationally. The 15 counties, which became five regions in 2007, were responsible for health care, and financed it out of county income and property taxes along with block grants from the state; in 2007, the regions were funded by only block grants from the state. Hospitals are publicly owned while GPs are private entrepreneurs working on contract with the regions. Hospital services and GP and specialist services are free, while there are co-payments for drugs, adult dental care, physiotherapy etc. Co-payments make up nearly 19% of total health expenditures.

The system has been characterised by expenditure control, reasonable positive development in productivity and a high degree of patient and citizen satisfaction, despite waiting lists. Free choice of hospital was introduced more than ten years ago. It has recently been expanded so that after waiting one month for treatments such as elective surgery at public hospitals, citizens may choose either private hospitals or go abroad with full payment from public funds.

Primary care is very accessible in Denmark. A mixed capitation fee-for-service method of paying generalist physicians in Denmark assures that everyone has a primary care physician, and generalist physicians are responsive to providing services quickly, typically offering same-day appointments. An organised off-hours service assures accessible care 24 hours a day, seven days a week. Denmark has very high public satisfaction with health care, reflecting the value placed on accessibility of primary care.<sup>4</sup> Inpatient hospital care consumes a disproportionate share of Danish health expenditure, and global budgets provide little incentive for hospital or surgical productivity.

New Zealand's health sector has been significantly restructured three times within ten years. The most recent has involved a PHSG, launched in 2001. PHOs,

administered by 21 DHBs, are the local structures for implementing the PHSG. Ninety-three percent of the New Zealand population is now enrolled with 79 PHOs.

Although there was initial widespread support for the philosophy underlying the PHSG, there are concerns amongst GPs and their professional organisations relating to its implementation. However, many GPs are feeling positive regarding the opportunities PHOs offer, particularly for being involved in the provision of a wider range of community health services. The key lessons appear to be:

- active engagement of GPs and their professional organisations
- the need for infrastructural support, including information technology and quality systems
- robust management and governance arrangements.<sup>5</sup>

## CONFLICTS OF INTEREST

None.

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