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Report 3

The Planning Population for childhood
Illnesses potentially requiring admission.

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Developing Catchments for Acute Paediatric Services

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1. Background

The provision of services for infants, children and adolescents takes place in a dynamic environment in which a range of factors stimulate change. There is now a groundswell of informed opinion which sees the NHS acute sector of the future as one in which changes to hospital configuration are expected. The debate has been taken up with a number of stakeholders and has produced a range of reviews and reports on potential pathways for change. The government has set down a ten year strategy for modernisation, and substantial contribution from various clinical working parties has been made particularly in the area of paediatric, surgical, anaesthetic, trauma and intensive care services. (NHS July 2000, Royal College of Surgeons in England (RCSE) Nov 2000, RCSE Dec 2000, RCSE BOA July 2000, JWP BMA, RCP Lon. RCSE, July 1998, Royal Surgical Colleges of Great Britain and Ireland, July 1998, RCSE June 1997, Royal College of Anaesthetists and RCSE 1996, Royal College of Nursing 2000, Department of Health 1996). This has been against a background, nationally, of increasing concerns regarding the quality of services for children.

There are common issues which effect service configuration nationally, however, any specific catchment is going to have issues which are unique to itself. Much of the recent literature on re-configuration of services has emphasised the importance of locally derived solutions. (Smith 1999).

One of the more considered propositions for future hospital configurations has been the networking model put forward in the Royal College of Surgeons of England's report on the provision of elective surgical services, (RCSE 2000). While acknowledging that the optimal population catchments, recommended for paediatric surgery and trauma centres are c.1.5 million, it is considered that the feasibility of configuring the nation's acute hospitals solely around single centres with such catchments is considered totally impractical. The need for both demographic and service responsiveness, led the report's contributors to favour a more practical alternative, which would be to develop hospital networks serving populations of 500,000. (Even this is a challenging proposition in a system where 60% of hospitals are currently serving populations of 300,000 or less and only 10% serve a population of 500,000 or more.) This would see services with different emphases distributed across networks of hospitals, where separation was more related to intensity of care and severity of risk than in the traditional clinical divisions based on speciality alone. Elective and lower risk care does not necessarily require a full complement of acute support services and may be better served by appropriate levels of back up (eg. high dependency support services and rapid retrieval systems with appropriate referral policies and guidance).

2. Method

The method chosen to address this issue is a *problem oriented approach*. There is no simple formula which can be applied to the question. For example there is no direct method for looking at the South East Region and saying , 'If we fit the population to this structure it will provide a series of acute paediatric catchments for the South East which can be used as a template on which to reconfigure services. That is not to say that re-configuration is not possible. However, it is likely to be a negotiated process derived from local needs, demands and priorities, and to be built upon existing structures. What is possible is to define the structure of existing services in terms of their catchments so that when options for reconfiguration models are to be constructed they can be constructed from the existing basic

building blocks. In the text that follows an example of an existing acute service taken and its catchment is derived. Using the same methods it is possible to define all the catchments of all the existing acute services in a region.

3. Determining a catchment for Acute Paediatric Services

The main issues to be considered in determining a catchment for paediatric services are:

- the *current population* of children served by these services and its expected growth in coming years
- the *options* for networking or reconfiguring existing services
- past current and *projected activity* in the secondary care sector
- trends in *primary care* provision and organisation
- the effect of *advances in the treatment* of acutely ill children on the complexity of care, site of care and lengths of stay
- *manpower planning* issues in respect of junior doctor hours, post graduate education and training and accreditation of posts, nursing guidelines on quality of care
- *recommendations* from standing committees, professional bodies, NHSE, research and other sources
- *experience* of successful changing practice in other localities

The first challenge in reconfiguring any major complex system is to know where to start. The provision of public hospital services across a country or a region is an elaborate human endeavour, which may have been complicated by the historical and sometimes, seemingly, haphazard development that has gone on in the past. Configurations determined by pre-existing infrastructure, often have overlaps or gaps between one provider and the next, and frequently find it to meet modern quality guidelines because of pre-existing constraints which were not a consideration in the past, (eg. modern catchment recommendations for Paediatric Surgery and Intensive Care).

Identifying a modern catchment for acute paediatric services is a question of reconfiguration. The most important step is to define existing catchments. Thereafter models can be constructed, which rearrange services, according to current requirements. Multiple options may be designed which then require consideration by stakeholders before preferred options can be put forward .

The point of departure, on which to construct new models or options, is the current catchment. We suggest that the primary exercise in reconfiguration is to divide up the existing service into its basic building blocks.

The methodology required for defining catchments, (with post code matrices), can be used to reconstruct new models according to current requirements.

In the following section we demonstrate how to devise a catchment model using, as an example, the catchment of a current service which experiences many of the complicating factors referred to above.

4. Modelling an existing catchment for acute paediatric services

The acute paediatric service at Brighton is an example of a difficult catchment exercise. The service is one of three acute trusts within its health authority boundaries, and it lies close to the border with the neighbouring health authority. It is in the largest of the local towns (now designated a city). The catchment is geographically limited. Brighton Healthcare is in an Acute Trust which has some sub-regional level provision of care. This includes paediatric surgery and a limited paediatric intensive care facility, both of which at the time of the exercise were experiencing difficulty with national throughput guidelines. The service drains a catchment wider than its immediate locality, some patients come elsewhere within the local health authority and some from the neighbouring health authority.

The services in Brighton are currently subject to various constraints relating to long established arrangements on split sites, and to ageing infra-structure at the childrens' hospital, the Royal Alexandra.

5. The Catchment

The aim of this exercise was to configure the specific catchment for the existing acute child health services in 1997 and for the next ten years and produce a profile of the client population.

5.1 Estimating the existing population

We have used ONS mid year estimates for 1996

The population of children aged 0-16 in Brighton, Hove and Lewes was estimated at

62,037

This accounts for 44% of the total population of all the children aged 0-16 in East Sussex (140,618)

Mid-year estimates for 1996 show that there are 62,037 children aged 0-16 resident in Brighton, Hove & Lewes). This is nearly half of the children living in ESBHHA. The number aged under 1 (taken as a proxy for the number of births) are as follows:

Brighton, Hove & Lewes - 3620,
Eastbourne & Wealden - 2183,
Hastings & Rother - 1893.

Historical activity data demonstrate that Acute Paediatrics in Brighton Hospitals provide services to a wider more diffuse catchment (beyond the local population). This role is not expected to diminish in the near future. Acute services in Brighton account for 5.76% of such services provided to the other children aged 0-16 in East Sussex . (Although this may not be exclusive, in that some children may experience services from more than one provider, it is considered a valid factor with which to estimate the wider catchment. Its use is justified on the grounds that the amount of duplication is considered small.)

The population of children aged 0-16 in East Sussex served by Acute Paediatric Services in Brighton was estimated at

66,493

This accounts for 47.3% of the total population of all the children aged 0-16 in East Sussex (140,618)

(Although a small proportion of this usage is represented by sub- regional speciality cases the overall effect of these numbers was considered negligible in estimating the general services catchment).

Historical activity data also demonstrates that Acute Paediatrics in Brighton Hospitals provide services to a further diffuse catchment (beyond East Sussex). Again this role is not expected to diminish in the near future. Acute services in Brighton account for 8.49% of such services provided to the children aged 0-16 in West Sussex.

The population of children aged 0-16 in East and West Sussex served by Acute Paediatric Services in Brighton was estimated at

78,951

There is a small but estimable proportion of children aged 0-16 in Brighton, Hove and Lewes who are served by acute paediatric services elsewhere. As far as can be ascertained from the available data, the majority of these are receiving tertiary specialist services not available locally or care on a temporary resident basis. These are very small numbers. The temporary residents (T R s) are ignored as they also constitute small numbers and are considered a permanent background feature of any service, often offset by incoming T R s.

The numbers of inpatient admissions for children aged 0-16 in 1996-97 which arose from the East and West Sussex catchment served by the Acute Paediatric Services in Brighton were

7,289

a catchment hospital admission rate of

92.3 admissions per 1000 children per annum

5.2 Projecting forward to the year 2006

We have used the projected population data provided by ESCC

It is estimated that the population of children aged 0-16 in Brighton, Hove and Lewis in 2006 will be

64,980

This will account for 46% of the total population of all the children aged 0-14 in East Sussex (140,656)

The projected numbers of children living in Brighton, Hove & Lewes in 2006

The overall number of children is expected to rise by 4.5% from 62,037 to 64,980

The number of children under 1 year is expected to drop by 2% from 3,620 to 3,552

The number of children 1-4 years is expected to drop by 4.5% from 14,878 to 14,207

The number of children 4-16 years is expected to rise by 8% from 43,539 to 47,221

A similar rationale to that used above has been employed to estimate the overall projected catchment.

The population of children aged 0-16 in East Sussex in 2006 to be served by Acute Paediatric Services in Brighton is estimated at

69,315

The population of children aged 0-16 in East and West Sussex in 2006 to be served by Acute Paediatric Services in Brighton is estimated at

81,408

With a catchment hospital admission rate of

92.3 admissions per 1000 children per annum

The projected number of admissions would be:

7514

6. Factors for Consideration in reconfiguring.

6.1 Appropriateness

In the background section we have discussed trends in paediatric care as they have been demonstrated in recent decades. As numbers of admissions increased and lengths of stays shortened, queues discharge delays and cancellations have become common features of many hospital inpatient services. This has led to interest in understanding how services are utilised. In configuring services for the future, effective utilisation is a issue of importance. There is a substantial body of evidence on this subject and methods for improving utilisation.

The development of Utilisation Review in North America, (an external mechanism for reviewing the care purchased), gave rise to various techniques for reviewing the intensity and

level of care provided and the appropriateness of its use. The rationale for admitting individual patients to hospital care and the appropriateness of continuing days of stay have been subjected to a battery of evaluations. Techniques include the use of interviews with medical, nursing staff, patients, their carers and their GPs to elicit their implicit judgements or by the use of a structured form of interview checking against specific criteria. Similarly explicit criteria audits of appropriateness were designed for evaluating care by screening medical records.

Paediatric studies in Canada demonstrated inappropriate admissions and days of stay in the region of 20 - 30 % (Smith et al 1993, Gloor et al 1993) with adequate evidence of instrument validation. In this country the adult versions of these instruments have been modified for local practice and validated (Coast 1995, Bristow 1997).. Use in paediatric care in this country has been more difficult. Direct testing of the Paediatric Appropriateness Evaluation Protocol (PAEP) for validity in the NHS environment only gave moderate levels of agreement when compared with British paediatric practice (Wernicke et al 1997) and the authors cautioned against direct use of instruments designed for another environment. Poor agreement rates are also a problem with unstructured implicit judgement by clinicians and others (Sanazarro 1980, Rajaratnum 1991).

One study (Rajaratnum *ibid*) has suggested that there is a need for local speciality specific admission policies to ensure cost effective use of facilities. However, even when appropriateness instruments have been modified to UK practice it may be difficult to manage paediatric risk with a purely dogmatic policy response to 'inappropriate admissions' as defined by criteria audit because of the way that services are staffed and the different perceptions of risk and appropriateness held by different types and seniority of staff. Addressing the inefficiency of inappropriate admissions purely by keeping them out may be an inadequate response to the risk perceived by the clinical staff providing the service at the time of demand.

A retrospective study of the appropriateness of 267 consecutive admissions at a DGH (McFaul et al 1994) found that 1 in 5 were inappropriate. Approximately a quarter of all admissions were for less than 24 hours. Of these short stay admissions 1 in 2 were inappropriate according to the criteria audit. Conversely less than 1 in 11 of those admitted for longer than 24 hours were considered inappropriate on the criteria audit.

In adult care much effort is being expended on the prevention of appropriate hospital admissions by preventing breakdown of care in the community before it reaches the stage of requiring hospital admission (). This has been seen in the many and diverse initiatives that have been developed to deal with winter pressures. In paediatric practice in the UK and elsewhere children's health has been improved through increasingly effective management of risk which has seen the lowering of admission thresholds (Hill *ibid*) at a time of decreasing mortality and morbidity. Lengths of stay have come down at the same time as admission rates have gone up. There is evidence, however, that, given appropriate facilities, the lengths of stay could come down even further as the needs for risk management of acute conditions is in most cases very short .

Numa et al (1991) studied a cohort of children admitted to hospital for medical conditions for less than 24 hours over 12 months. Four diagnostic groups accounted for nearly 80% of admissions. They found that 87.7% had justifiable conditions at the point of admission. These were asthma, ingestions, infections and convulsions. Rapid recovery/resolution is a common feature of such admissions and only 35% were not fit for discharge within 12 hours.

The hospital in question did not have a short stay facility and their mean duration of admission was 17 hours. A majority of these patients (65%) satisfied the criteria for admission to a short stay observation area. The authors concluded that brief hospitalisation for relatively minor illness was a significant requirement in modern paediatric care. Inpatient administration and medical review often lengthens inpatient stay unnecessarily. Significant cost savings are possible with short stay facilities.

A study of such a ward showed the following results in its first year of operation. (Brown and Penna 1996).

Admissions to a short stay emergency ward for rapid stabilisation were reviewed.

No of admissions - 1300

Period of study - 12 months

Admitted to inpatient beds for further care - 4%

Stayed over 24 hours 3%

Average LOS - 17.5 hours.

Main users - Children under 3 years (58%).

Critical incidents recorded during the whole period - 0

Levels of appropriateness were not determined.

The length of stay was considerably longer than that expected in the study by Numa et al. However the base line from which they were starting was not the same and one year's activity may still be considered transitional. Average estimates of the value of bed days saved through the introduction of the service as compared to previous running costs was put at £250,000. (Such estimates need to be treated with caution if they depend on theoretical allocations of average bed day cost. They do not necessarily address all the implications of fixed costs being freed up for reinvestment).

Another study (Beverly et al 1997) at about the same time demonstrated the following:

Admissions to a paediatric day assessment ward were reviewed for the first year of operation.

No of admissions - 1731

Period of study - 12 months

Admissions to inpatient beds overnight 3% reduction in paediatrics

7% reduction in surgery

Midnight occupancy 17.7% reduction in paediatrics

25.4% reduction in surgery

Inpatient admission not required in 38% of all attendances

Adverse events recorded during the whole period - 0

Levels of appropriateness were not determined.

Average estimates of the value of bed days saved through the introduction of the service £32,000

An earlier study of a similar type showed the following results in its first year of operation. (Dawson et al 1991).

Admissions to a short stay emergency ward for rapid stabilisation were reviewed.

No of admissions - 1308

Period of study - 12 months

Admitted to inpatient beds within week for further assessment - 4%

Stayed over 24 hours 59.4%

Average LOS - 4.5 hours.

Main users -

Critical incidents recorded during the whole period -

Levels of appropriateness were not determined

McFaul et al (1994) in a study of appropriateness of 267 consecutive admissions at a DGH found that overall 80.5% were judged appropriate. The rate of direct attendance to GP referral was approximately equal. The appropriateness level was found to be similar in these two groups although the direct attendances had proportionally more representation of disadvantaged families. Approximately a quarter of all admissions were less than 24 hours. Of these however, half were admitted unnecessarily compared with a fifth of overall admissions.

Another study which looked at the appropriateness of care in a paediatric short stay ward (Beattie and Moir 1993) over a 1 year period reported a level of 7% inappropriate admissions.

6.2 Quality Standards

A list of principles and standards have been extracted from a range of health authority child health care strategies and policies. They reflect some important common themes. Under each, in italics, we have added potential strategic options which arise from the literature on effective utilisation. Any reconfiguration strategy, while identifying the new catchment, should also consider this sort of evidence of in modelling service options.

Guiding principles:

- reduce hospital admissions and move towards ambulatory care and home nursing,

Consider the establishment of a paediatric short stay facility at RSC

- developing the skills of primary health care teams,

Identify GP practice profiles in wards with high deprivation and address the strengthening of primary care, through primary care management of particular target groups, (children at risk of hospital admission), by consensus development of integrated strategies and guidelines.

- keep lengths of stay in hospital as short as possible,

Consider the establishment of a paediatric observational /short stay facilities.

- move toward integrated child health services,

Through integrated strategies and guidelines as part of strategic commissioning.

- need for paediatric oversight of all children in hospital,

Appropriate specialist cover at all sites.

- need to demonstrate capacity to provide high quality services,

Addressing standards of practice and accreditation.

- retain existing services where they can be justified on outcome or cost (especially applies to tertiary and out of area services),
- use outcomes data before commissioning new services and to check existing services,

The opportunity to audit the outcomes of the changing management for particular conditions (eg. glue ear) The use of the methodology described by Numa et al for identifying the potential impact of a paediatric short stay facility is recommended. Where such a facility is established it is considered important that studies such as those described by Brown et al and Beverly et al be incorporated in the evaluation from the outset.

- choice for older children and adolescents,

The establishment of a formal services for adolescents.

- Relevant reports on the rights of the child.

These should be reflected in strategies

- Child protection issues,

A child protection strategy and service specification with which the strategy meets needs, and seeks to continuously enhance co-ordination between key workers, is a prerequisite to developing or redeveloping a service.

- RCP&CH, RCN and other professional guidance.

Such guidance should be reviewed and addressed within commissioning strategies and targets set for meeting outstanding recommendations

- Strategic commissioning.

There is a need to develop care group specific, integrated commissioning strategies which address primary, community and secondary care and to include key indicators. The timing and development need to be accommodated within other strategic developments as set down in various strategic advice. These include the development of Health Action Zones, Health Improvement Plans,, National Service Frameworks, Primary Care Trusts and Groups developments, Clinical Governance and specialist service guidelines such as the Paediatric Intensive Care Framework recommended by the National Co-ordinating Group.

6.3 Staffing and Specialist Cover and Facilities

- Facilities separate from adults, (inpatient, outpatient and day care),

- Adolescents' accommodation separate from children, eg adjacent, private rooms,
- Staffed with paediatric trained nurses,
- Paediatric oversight should be mandatory for all children admitted to hospital, regardless of speciality of admission,
- 24 hour cover by a senior paediatrician and a dedicated RSCN nurse in A&E,
- RSCN present in out-patient clinics at all times,
- Children's wards should have at least 2 staff members per shift who are RSCNs (RCN 1990),
- Experienced resident paediatric medical staff available to provide adequate 24 hour cover,
- Children should only be taken by ambulance to A&E departments where there is a same site paediatric department,
- Care of critically ill requires 1 cot/48,000 (BPA) or 1 cot/40,000 (PICS) children,
- PIC should have appropriate throughput.
- Facilities for at least one parent to sleep at the hospital per intensive bed or cot,
- Neonatal/special care staffing and equipment laid down by BPA/BAPM,
- Surgeons operating on children should have at least 6 months training in paediatric surgery and maintain continuing medical education,
- Surgeons and anaesthetists should be suitably trained and treat children on a regular basis,
- 24 hour cover by experienced anaesthetists should be provided for emergency surgery,
- Suitable transport services and referral protocols should be available for transfer and referral (including supervisory staff).

6.4 Location of Care

The Royal College of Paediatrics and Child Health has recommended the following with regards to service configurations.

Services which need paediatrics on the same hospital site:

Maternity

A&E

Surgical Specialities

Services needed by Paediatrics on the same site are:

- General Surgery
- Anaesthetics
- Imaging
- Pathology
- Pharmacy
- Allied health professionals and teachers

6.5 Accreditation (training, services)

The appropriate model of paediatric care is outlined in the report the Joint Working Party on Services for Children and subsequently supported by the House of Commons Committee is a combined child health service. The general hospital element should provide:

- Neonatal services
- A&E services
- IP, DP, OP and peripheral clinic services
- Level 2 intensive stabilisation care prior to transfer
- Advice to other specialities
- Collaboration with primary and community care
- Child protection service
- Child and adolescent psychiatry and clinical psychology services
- Hospital outreach services
- Services for adolescents

The Joint Consultative Committee the Pattern of Medical Series for Children: Medical Staffing and Training (1997) describes small, medium and large units.

The recommended catchment for Paediatric Surgery (BAPS, 1995) is one surgeon per 500,000 population and four paediatric surgeons plus a paediatric urologist per unit. This would require a catchment for the Brighton service of say East and West Sussex and parts of Kent and Surrey.

The Royal College of Anaesthetists recommends that the anaesthetics service for children be led at all times by consultants who anaesthetise children regularly.

6.6 Paediatric Intensive Care

The recommendations of the National Co-ordinating Group (NCG) on Paediatric Intensive Care are summarised as follows:

Trusts and Health Authorities to conduct detailed audit of -

- The numbers of children needing intensive care
- The profile of demand
- The current configuration of services
- Average lengths of stay
- Predictability of services in advance
- The extent of need for high dependency beds

Identify the organisation of the appropriate level of service

(In the case of Brighton example this falls between DGH and Lead Centre and is population dependant.)

Measure compliance with standards

- Medical and Nursing training
- Specific treatment competencies and equipment
- On site access to specialities
- Families facilities
- On site support services
- Training and quality control requirements

6.7 Services for Adolescents

Adolescents require appropriate care for their age and the National Association for the Welfare of Children in Hospital has identified the following issues in relation to the care of adolescents in hospital:

- The needs of adolescents regarding flexibility and growing independence are often at variance with the needs of younger children and are not met by the facilities provided in a normal childrens ward.
- The provision of designated adolescent care is cost-effective.
- The BPA estimated 15 adolescent beds for a DGH serving a population of c. 200,000. (Excluding Obstetric and Psychiatric care). Care requires individual specialist care and consultant paediatrician (with an interest in adolescents) oversight and available psychological, social work and mental health support.
- Separate self contained accommodation with privacy and disabilities addressed. It should be linked to the paediatric department. Education facilities are required. Day rooms are needed. Flexible catering should be addressed. Cultural needs should be catered for in visiting arrangements, dress, communication etc.
- Staff should have specialist training, be preferably both sexes and be led by an RSCN.
- Adolescent specific information for audit should be collected.
- Consumer information should be collected.

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