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TELERADIOLOGY IN NSW

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This article reports on work establishing, and planning the evaluation of, a teleradiology network centred around Wagga Wagga Base Hospital (WWBH) in the Riverina region of NSW. A basic network between WWBH and Sydney's St Vincent's Hospital (SVH) was set up in November 1991. A review of cases transmitted to Sydney during the first 19 months of operation suggested teleradiology had performed well and was worthy of extension. Supported by funds from the Commonwealth's Health Communication Network program, teleradiology facilities are being added to two hospitals in the Riverina to form a local regional network which will be examined in a formal evaluation of its costs and benefits.

Large distances between hospitals, particularly in country areas, and the difficulties of access to expert advice from larger hospitals have motivated the development of methods to improve communication in Australia. One of these methods is teleradiology — transmitting x-rays over large distances for management and diagnostic advice. These systems have potential benefits to medical care in Australia, such as improved patient management and reduced hospital costs[1,2]. In order to make decisions about the efficient use of this resource, these benefits and costs must be evaluated.

Several pilot teleradiology systems have already been installed in Australia. In November 1991 clinicians at WWBH, motivated by a desire to improve the management and outcome of patients with head injuries, established a teleradiology link between Wagga Wagga Base Hospital and St Vincent's Hospital with the principal objective to transmit brain CT scans of head-injured patients from WWBH to SVH for diagnostic and management advice.

PILOT STUDY REVIEW

We reviewed the records of 43 patients who had teleradiology consultations transmitted between WWBH and SVH in the first 19 months of the system. The aim of this review was to describe the use of teleradiology and identify potential benefits of the new system.

Twenty-four of these patient consultations involved head-injured cases and the transmission of head CT scans — accounting for just under one in five head-injured patients (17 per cent) admitted to WWBH during the review period. The remaining 19 consultations were for patients with a range of clinical conditions and included the transmission of images such as angiograms, chest x-rays and spinal x-rays.

Head-injured patients

Many of the head-injured patients for whom a teleradiology consultation was organised were aged between 15 and 24 years (33 per cent) and most were male (71 per cent), reflecting the demographics of serious head injury in NSW. Advice was sought predominantly on patients with intracranial haemorrhages (79 per cent). In all these cases teleradiology provided management rather than diagnostic advice.

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Initial and follow-up scans were transmitted from two hours up to 16 days after the injury incident. Patients with more severe injuries, i.e. those presenting in coma, were more likely to have scans transmitted within 24 hours of admission. However, in some cases the transmission of scans was delayed, due to the natural history of the injury, for example subdural haematomas that present with a slow deterioration, or to delays in finding the patient where the injury occurred in a remote area. These patients all had less severe injuries on admission to hospital.

Nine patients required craniotomies; three of these were done at WWBH. Eleven head-injured patients (48 per cent of consultation cases) were transferred to a tertiary referral centre in Sydney or Melbourne for further treatment. An additional six head-injured patients were transferred urgently before their x-rays were transmitted. This represents an overall transfer rate of 12 cases per 100 head-injured patients admitted to WWBH.

The length of hospital stay at WWBH (excluding rehabilitation) for the 24 patients ranged from one day to 47 days, with a median stay of three days. Those patients who were in a coma on admission stayed at WWBH for shorter periods due to earlier and more frequent transfer to a tertiary referral centre. Overall, two patients died — one at WWBH and one after transfer.

Non-head injured patients

A brief review of the 19 other patients indicated that 10 (53 per cent) were males and half were aged 65 years and over.

Nine consultations reported on cerebral CT scans for patients with intracranial pathology, two reported on carotid and cerebral angiograms, three on cervical CT scans of patients with secondary deposits, and the others included chest x-rays and CT scans, a cystogram and a post-colectomy sinogram. Fourteen (74 per cent) of these cases were transferred to Sydney.

Overall, the clinicians using the system reported that teleradiology had performed well and improved patient management and reduced the need for transfer in individual cases.

HEALTH COMMUNICATIONS NETWORK PROJECT

Following the success of this initial pilot, WWBH has recently obtained funds through the Commonwealth Department of Health, Housing and Local Government and Community Services' Health Communication Network (HCN) program to extend the teleradiology network to include Prince of Wales Children's Hospital and to develop and formally evaluate a regional service linking WWBH with Griffith and Tumut hospitals.

HCN is part of the Australian Health Ministers' Conference national health information management and technology strategy which aims to enhance health care delivery in Australia through forms of technology such as facsimiles, videos and medical images.

Proposed evaluation

The system was installed at Griffith Base Hospital in May 1993 and at Tumut in July 1993. For the HCN project, these links will focus on improving the management of orthopaedic trauma in the region.

The evaluation will be managed by staff of the Epidemiology and Health Services Evaluation Branch, working in collaboration with clinicians from Wagga Wagga Base Hospital and the HCN project team. The aim is to determine changes in patient management and associated costs that result from teleradiology use.

All orthopaedic cases diagnosed by x-ray at Griffith Base and Tumut hospitals for six months before and after the introduction of the teleradiology system and three months during the establishment of the system will be included in the study. Based on a review of one month's data we estimate that around 750 patients will be included — 300 in each of the before and after categories and 150 in the establishment phase.

The study comparing orthopaedic cases before and after the introduction of teleradiology will determine the impact of this technology on:

- hospitalisation and inter-hospital transfer rates;
- timeliness of inter-hospital transfer;
- appropriateness of inter-hospital transfer;
- type and timing of treatment — for example, operations;
- length of hospital stay;
- appropriateness and adequacy of treatment; and
- costs of treatment.

A review will also be conducted of all teleradiology consultations using information recorded on a standardised request form completed by the referring doctor and report form filled out by the orthopaedic specialist.

From this review we will report on the degree of urgency of the request, the purpose of the consultation and clinical details of the patient, the adequacy of the images in terms of quality, views and magnification, the diagnosis and treatment advice given to the referring doctor and the orthopaedic specialist's perception of the usefulness of the technology for individual cases.

The referring doctor will be sent a short consumer survey questionnaire after each consultation to assess attitudes about the perceived impact of teleradiology on the doctor's diagnosis and management of the patient, the referring doctor's satisfaction with the conduct of the consultation and satisfaction with its outcome.

In summary, teleradiology has the potential to provide benefits to medical care in Australia — particularly in a rural setting — such as improved patient management and reduced hospital costs. The HCN teleradiology project is a collaborative effort that will provide a description of the costs and benefits of the teleradiology system for orthopaedic patients in the Riverina district of NSW and, more important, contribute valuable information to decisions about the role of teleradiology in Australia.

ACKNOWLEDGMENTS

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PLANNING FOR BETTER HEALTH — THE WELSH WAY

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This article discusses the approach to health planning in Wales, which aims to define priorities and targets for health improvement, strengthen accountability for health outcomes and increase community involvement in service planning. The main influences that have shaped the NHS Wales approach are considered, as are possible implications for the NSW health system.

Like most health systems, the Welsh National Health Service (NHS) faces an ongoing challenge to improve its responsiveness to local health needs and community preferences, and to strengthen its accountability for improving health.

In the Welsh NHS a model of strategic planning has been developed in response to this challenge which combines clear national direction and leadership with participative local decision-making.

Strategic planning opens a window on the future. It helps to clarify priorities — distinguishing the essential from the merely important — and focuses attention on what the health system should be aiming to achieve for a defined population using a given level of resources.

The strategic planning model described here has taken root in Wales over the past three years. The processes involved are helping to:

- clarify priorities for health improvement;
- link investment decisions with priorities;
- promote collaborative working within the NHS, and with other agencies that can help deliver health gain; and
- build community involvement in strategic health decision-making.

BEST IN EUROPE

In 1990 the NHS committed itself to working to ensure that health status in Wales compares favourably with other European countries. This ambition was set out in a vision statement, called the *Strategic Intent*[1], which stated: "Working with others, the NHS aims to take the people of Wales into the 21st century with a level of health on course to compare with the best in Europe."

At the same time, a complementary statement of *Strategic Direction* was adopted, clarifying corporate values, and describing how the *Strategic Intent* would be pursued and won. This calls on the NHS in Wales to be:

- health-gain focused, requiring decision-making and organisational effectiveness to be assessed in terms of their impact on prolonging life and improving its quality;
- people-centred, committed to providing high-quality health services, and valuing people as individuals, including patients, their families, staff and others coming into contact with the NHS; and
- resource-effective, striving to ensure the most cost-effective balance in the use of available resources.

Achieving balance in resource use reflects a concern with allocative efficiency. Essentially, this involves working to ensure that the distribution of resources is appropriate at two levels:

- between services directed at different health conditions (e.g. between cancer and trauma services); and
- between preventive, diagnostic, curative and rehabilitative services directed at the same health condition.

Strengthening the Service's focus on health gain is held to be the most important of these core values, calling for a critical examination of the health benefits obtained from existing and proposed new services.

Responding to the challenge of the *Strategic Intent* and *Direction* has required a re-definition of the health service's role. From a public health perspective, this has a number of important implications, including:

- recognition that the primary goal of the health system in Wales is to improve health, not simply to provide health services effectively and efficiently. One consequence is that the system's accountability for public funds, and its effectiveness in responding to major health challenges, needs to be assessed in terms of health benefits gained for resources invested, in preference to traditional measures of performance, such as hospital through-put.
- recognition that major opportunities for achieving health gain lie in addressing wider determinants of health through collaborative working with other public and private agencies, the community, and individuals, e.g. through programs aimed at reducing the incidence or impact of injuries. Where responsibility for preventive action lies outside the health sector (e.g. road safety), the NHS can have an important role in advocating changes that are beneficial to the health of local communities.

NATIONAL DIRECTION

The *Strategic Intent* and *Direction* are a national health strategy for the NHS in Wales, but to succeed local commitment must be harnessed. To provide a framework for local decision-makers, 10 priority areas for achieving health gain were adopted in 1990, selected on the basis of the contribution they make to premature mortality or morbidity in Wales. They are:

- cardiovascular diseases
- cancers
- maternal and early child health
- injuries
- respiratory diseases
- mental health
- emotional health and relationships
- learning disabilities
- physical discomfort and disability
- healthy environments

Expert review panels have been convened to produce planning guidance, called protocols for investment in health gain, for each of the 10 priority areas. Copies of the protocols can be bought from the Welsh Health Planning Forum, 22 Newport Road, Cardiff, Wales, CF2 1DB (telephone: (0222) 460015; facsimile: (0222) 492046).

The protocols highlight opportunities for achieving health gain, blending expert research, clinical and managerial input with a concern to increase community and consumer participation in strategic service planning.

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Planning for better health

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To sharpen further the focus on health outcomes, each protocol identifies a series of key issues for priority attention and sets health gain and service delivery targets for achievement. The table below illustrates this approach, using an example from the injuries protocol[2].

TABLE 1

TARGETING HEALTH IMPROVEMENTS: AN EXAMPLE FROM INJURY PREVENTION

- **Key issue:** A stronger emphasis on the primary prevention of injuries among vulnerable groups is required.
- **Health gain target:** Achieve a 50 per cent reduction in the variation in injury rates among children from different socio-economic backgrounds by 2002.
- **Service delivery target:** NHS to identify local injury blackspots, and to work with local authorities, the police and other partners to implement strategies to improve prevention in those areas.

Target-setting is a familiar tool in public health. The report[3] on goals and targets for Australia's health in the year 2000 employs a similar approach.

In NHS Wales, the use of targets is not confined to preventive activities alone. Rather, they are used to promote improvements in performance across the full range of services provided, including in the diagnosis and treatment of disease and in rehabilitation and palliative care services.

For example, in relation to ischaemic heart disease, a key issue is to improve the response to an individual's need for rehabilitation after heart surgery. A target is to achieve a 95 per cent rate of return to work within six months of heart surgery for those patients who wish to do so and for whom this is a realistic option. Service agreements for cardiac services between purchasers and providers are required to specify how this is to be achieved and monitored locally.

A raft of such targets has been established across all health gain areas, aiding the definition of service development priorities directed at strategic health needs, as a counter-weight to provider-driven agendas.

LOCAL ACTION

District health authorities lead the response of the NHS at local levels to the *Strategic Intent* and *Direction* and to the protocols for investment. There are nine such authorities in Wales covering a total population of nearly three million people. This management tier is broadly equivalent to Area Health Services in NSW, though with notable differences in role definition as a result of the separation of purchaser and provider functions within the NHS.

The challenge for health authorities is substantial. Their task is to define a response to the priority health gain areas, key issues and targets, reflecting local epidemiological knowledge and consulting with community interests, local health care providers and other relevant agencies.

The aim is for each authority to lead the development of partnership-based local strategies. Covering all 10 priority health gain areas, local strategies establish a single planning framework within which the process of orienting available resources towards interventions and programs offering the best potential for maximising health gain can take place. Specifically, health authorities have been encouraged to examine the allocative efficiency of their investment decisions with a view to achieving an appropriate balance of resources between different health conditions and levels of intervention.

The nine local strategies have been in preparation since 1990, and in most cases are nearing completion. Once finalised, they will form locally based, long-term response strategies to the challenge of improving health in Wales. Their implementation will be phased over a 10-year period through a series of shorter-term rolling health plans and annual contracts for health care services.

In recognition of the substantial management challenge that a process of reorientation on this scale poses, considerable attention has gone into building consensus in the community and with key players in the health sector.

Furthermore, the 10-year implementation phase recognises that reorienting investment in a system dominated by a fixed structure of resources is best tackled through a program of marginal adjustments to budgets, achieved over a relatively long period.

INFLUENCES

Two major influences stand out among a myriad of others that have helped shape the NHS Wales approach:

- the role of leadership; and
- the separation of purchasers and providers within the health system.

Leadership

The new approach to health planning in Wales has been developed, and its implementation led, by a high-level multi-disciplinary group called the Welsh Health Planning Forum, which includes senior NHS managers and clinicians, consumer and academic interests and health promotion, primary, secondary and community care representation.

The breadth of interests represented at senior level on the Planning Forum has contributed to the ease with which the new direction has been accepted by clinicians and managers working in the Service, as well as among other agencies working to raise health status in Wales.

This leadership role has been seen at its clearest in the protocols for investment, developed under the Forum's direction, which have been a valuable and valued resource in local decision-making.

Purchaser-provider

The separation of purchasers and providers within the NHS has had significant implications. The move has facilitated the emergence of a management tier within the health system whose role has changed dramatically. Whereas previously health authorities were primarily concerned with managing the provision of services, their role now is to assess local health needs and plan the investment of resources to meet those needs.

This refocusing has been assisted by the introduction of self-government as an option for NHS hospitals and other health care providers. This effectively removes health authorities from any residual involvement in direct health

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CRANIOSYNOSTOSIS IN NSW

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Craniosynostosis is the premature closing of the cranial sutures in childhood. When a single suture is involved craniosynostosis results in an abnormally shaped skull. When multiple sutures are involved brain development may be affected as well, resulting in developmental delay. In early 1993 the AIHW National Perinatal Statistics Unit noted an increase in the reported number of cases of craniosynostosis in NSW in 1990 compared with previous years. A study was carried out to determine whether a true increase in incidence had occurred. Over the period 1988-1991 there was a rise in the incidence of craniosynostosis in NSW from 6.6 to 9.8/10,000 births, with an average of 8.1/10,000. The increase was not statistically significant. The rate of craniosynostosis is slightly higher in the South Eastern Region and Western Sydney Area compared with NSW as a whole due to the referral of relatively large numbers of children with a single lambdoid synostosis for assessment and/or surgery.

In February 1993 the AIHW National Perinatal Statistics Unit (NPSU) noted an increased rate of reporting of craniosynostosis in NSW for 1990 compared with previous years (8.6/10,000 births compared with 1.0/10,000 births)[1]. This rate was about five times higher than in the other States.

Before 1990 the NPSU was responsible for the collection and reporting of data on birth defects in NSW. The NPSU surveillance system included birth defects detected during pregnancy and up to 28 days of life. During 1989 the NSW Birth Defects Register (BDR) was established and surveillance of birth defects in NSW was transferred to the NSW Health Department. The BDR includes birth defects detected during pregnancy and up to one year of age.

While the increase in reporting of cases of craniosynostosis for 1990 could be explained by this change in the upper age limit for reporting of cases, a study was undertaken to determine whether there has been a real rise in the incidence of craniosynostosis in NSW.

METHODOLOGY

After obtaining permission from the hospital administration, cases of craniosynostosis were identified through review of medical records at The Prince of Wales Children's Hospital, The Children's Hospital, Camperdown, Westmead Hospital and The John Hunter Hospital.

Medical records for children who fulfilled the following criteria were reviewed:

- born between January 1988 and December 1992; and
- discharged with a 7560 ICD9CM code between January 1, 1988 and December 31, 1992 from one of the following hospitals: The Prince of Wales Children's Hospital, The Children's Hospital, Camperdown, Westmead Hospital or The John Hunter Hospital.

A case of craniosynostosis was defined by either:

- corrective surgery for craniosynostosis; or
- radiological confirmation of craniosynostosis either by radiological report or documentation of radiological confirmation in the medical admission notes.

Data were collected on demographic factors, type of delivery, birthweight, gestational age, family history, other birth defects, age at diagnosis and surgery (where applicable). Additional birth defects were recorded if they met the definition of a major birth defect as applied by the BDR[2].

Data were entered onto an EpiInfo database and univariate analysis was carried out using SAS software. Calculations for rates were based on the data for the years 1988-1991, as cases of craniosynostosis among infants born in 1992 may not be diagnosed until 1993 or later. Denominator populations for rates for the years 1988-1991 were obtained from the Australian Bureau of Statistics (ABS)[3]. Denominator rates for NSW Health Areas and Regions were obtained from the 1990 NSW Midwives Data Collection (MDC)[4] as a midpoint of the four-year period. Poisson confidence intervals around rates were calculated using the method described by Daly[5]. Analyses other than rates were based on craniosynostosis cases from the full 1988-92 period and data from the 1990 MDC for comparative purposes. Tests of significance were carried out using a chi-squared test for comparison of proportions and a t-test for comparison of means with a 5 per cent significance level as the cut-off point.

RESULTS

Nine hundred and ninety-eight medical records met the criteria for review. Ninety-nine per cent were available for review. A total of 346 records met the case definition.

There was a small, but non-significant, increase in the occurrence of craniosynostosis cases in NSW from 6.6 to 9.8/10,000 livebirths between 1988 and 1991 (Table 2). This increase is largely due to an increased number of children with a single lambdoid craniosynostosis referred to hospital for assessment and/or treatment (Table 3).

The incidence of craniosynostosis varied from 2.4/10,000 births in the North Coast Region to 21.4/10,000 births in the South Eastern Region (Table 4). The South Eastern Region and Western Sydney Area had incidences of craniosynostosis significantly higher than NSW as a whole, while the North Coast Region had a lower rate than NSW as a whole. The excess of cases in the South Eastern Region and Western Sydney Area is due to the referral of relatively large numbers of children with single lambdoid synostoses (Table 5).

Among the 346 cases identified, 237 (68.5 per cent) were males and 109 (31.5 per cent) were females. The proportion of males affected is significantly higher than expected when compared with the sex distribution of NSW births ($X^2=39.4, p<0.001$).

Information on maternal age was available for 287 cases (82.9 per cent) and usually related to the mother's age at the time of the child's first admission. Average maternal age was 29.3 years. This is not significantly different from the average maternal age in NSW of 28.4 years. Paternal age was available for 280 cases (80.9 per cent). Average paternal age was 32.2 years. There are no data available on paternal age in NSW for comparative purposes.

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TABLE 2

CRANIOSYNOSTOSIS CASES BY YEAR OF BIRTH, NSW, 1988-1992

Year of birth	Number (a)	Rate per 10,000 livebirths (b)	95% confidence interval
1988	56	6.6	5.0-8.6
1989	60	7.0	5.3-9.0
1990	75	8.3	6.5-10.4
1991	86	9.8	7.8-12.2
1992	68	(c)	

Notes:
(a) Excludes one case where information on date of birth was not available.
(b) Denominator births for rates were obtained from the Australian Bureau of Statistics[3].
(c) The rate for 1992 was not calculated because additional cases among infants born in 1992 may not be diagnosed until 1993 or later.

Craniosynostosis in NSW

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Information on type of delivery was available for 332 cases (96.0 per cent). Of these, 228 (68.7 per cent) were reported as having been born by normal vaginal delivery, 65 (19.6 per cent) by caesarean section, 33 (9.9 per cent) by instrumental delivery and six (1.8 per cent) by vaginal breech delivery. There was no significant difference between the pattern of type of delivery among craniosynostosis cases and NSW births as a whole.

Cases were assumed to be singleton births unless otherwise recorded. There were 335 singleton births, 10 twins and one triplet. Of cases, 3.2 per cent were multiple births. The proportions of singleton and multiple births are not significantly different from NSW births.

Information on birthweight was available for 317 cases (91.6 per cent). The average birthweight of cases was 3,346 grams. This is not significantly different from the average birthweight in NSW of 3,358 grams.

Information on gestational age at birth was available for 335 cases (96.8 per cent). The average gestational age of cases was 39.3 weeks. This is not significantly different from the average gestational age in NSW of 39.2 weeks.

The age at diagnosis of craniosynostosis was recorded for 242 cases (69.9 per cent). The age at diagnosis ranged from 0 to 16 months, the average age being 1.7 months. Ninety-seven cases (28.2 per cent) were diagnosed at birth or in the first month of life, and 67.9 per cent were diagnosed by six months of age. Only two cases were diagnosed after 12 months of age.

Among the 346 children affected there were 368 craniosynostoses because some children had more than one suture involved. The overall distribution of suture involvement was as follows: coronal 48 (19.8 per cent), sagittal 98 (28.3 per cent), lambdoid 195 (56.4 per cent) and metopic 27 (7.8 per cent).

Multiple sutures were involved in 48 cases (13.9 per cent). This includes cases with bilateral involvement of coronal or lambdoid sutures. Single suture involvement accounted for the remaining 86.1 per cent of cases and was distributed as follows: coronal 23 (6.6 per cent), sagittal 85 (24.6 per cent), lambdoid 167 (48.3 per cent) and metopic 21 (6.1 per cent).

In 93.1 per cent of cases craniosynostosis was the only birth defect present. In eight cases it was part of a known syndrome: Crouzon syndrome (4), Pfeiffer syndrome (2), Apert syndrome (1) and Saethre-Chotzen syndrome (1), all of which are associated with autosomal dominant inheritance. One further case had Goldenhar syndrome, which does not usually feature craniosynostosis.

Birth defects in addition to craniosynostosis were present in 24 cases (6.9 per cent). Of these, five were associated with syndromes described above. In the remaining 19 infants, an additional 22 defects were reported: anomalies of brain development (5), anomalies of the heart and great vessels (6), musculoskeletal anomalies (3), anomalies of larynx/trachea (3), renal anomalies (2), cleft lip/palate (2), other (1).

Craniosynostosis was reported among three parents of children with craniosynostosis. In each it was related to syndromes with known autosomal dominant inheritance (Crouzon syndrome 2, Saethre-Chotzen syndrome 1).

Of the 347 cases, 247 (71.4 per cent) were reported to have siblings. Of these siblings, 16 (6.5 per cent) were reported to have craniosynostosis, including one family where two siblings were affected. In only one of these families was the index child reported as having an autosomal dominant inherited condition.

The surgery rate for cases was 98.0 per cent. Sixty-six cases had two operations and 17 cases had three or more operations. The age at first operation ranged from one to 24 months, with an average of five months.

DISCUSSION

Craniosynostosis usually occurs as an isolated primary birth defect. It may be associated with a recognised syndrome, microcephaly, shunt operations for hydrocephalus, metabolic diseases (such as hyperthyroidism, rickets, mucopolysaccharidoses, mucolipidoses), haematologic disorders (such as thalassaemias, sickle cell anaemia, congenital haemolytic jaundice, polycythemia vera) and exposure to certain medications (for example, aminopterin, diphenylhydantoin, retinoic acid and valproic acid). There is some evidence that foetal head constraint in utero may cause craniosynostosis[6].

In current practice a child with multiple craniosynostoses which are not related to an underlying deficiency in cerebral development (such as microcephaly) will be referred for surgical correction in order to prevent developmental disability. Surgery has been recommended as early as four to six weeks of age on the basis of rapid rate of bone growth in the first six months and the relative ease of surgical bone remodelling in the early weeks of life compared with later ages[7,8]. The possibility of developmental disability and raised intracranial pressure occurring from the premature closure

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TABLE 3

CRANIOSYNOSTOSIS CASES BY TYPE OF SUTURE INVOLVEMENT AND YEAR OF BIRTH, 1988-1991 (A)

Year of birth	Suture involvement											
	Multiple	rate/ 10,000	Coronal	rate/ 10,000	Sagittal	rate/ 10,000	Lambdoid	rate/ 10,000	Metopic	rate/ 10,000	Total	rate/ 10,000
1988	9	4.0	4	1.8	15	7.0	23	9.9	5	1.9	56	24.6
1989	12	4.4	3	0.9	12	6.5	29	15.2	4	3.0	60	30.0
1990	6	3.9	6	2.5	21	7.6	34	15.2	6	3.4	75	34.3
1991	18	9.3	8	4.8	17	7.5	40	18.9	3	1.1	86	41.6

Note:
(A) Excludes one case where information on date of birth was not available. Denominator births for rates were obtained from the Australian Bureau of Statistics[3].

TABLE 4

INCIDENCE OF CRANIOSYNOSTOSIS CASES BY NSW HEALTH AREA/REGION OF RESIDENCE, 1988-1991

Health Area/Region	Average no. of cases per year	Rate per 10,000 livebirths (a)	99% confidence interval
Central Sydney	4.3	9.2	4.4-16.6
Eastern Sydney	2.3	6.4	2.2-14.2
South Western Sydney	7.5	6.9	4.1-10.8
Western Sydney	13.3	14.0	9.5-19.7
Southern Sydney	3.5	4.5	2.0-8.7
Northern Sydney	10.5	12.7	8.2-18.7
Wentworth	5.0	9.8	5.1-17.0
Central Coast	2.8	7.6	3.0-15.7
Hunter	3.0	4.1	1.7-8.3
Illawarra	2.8	5.9	2.3-12.2
New England Region	2.3	6.0	2.1-13.4
South Eastern Region	5.8	21.4	11.7-35.8
North Coast Region	1.3	2.4	0.5-6.8
Orana and Far West Region	2.8	11.4	4.5-23.7
Central Western Region	1.3	4.7	1.0-13.2
South West Region	1.3	3.3	0.7-9.4
NSW	69.3	8.1	6.9-9.4

Note:
(a) Denominator births for rates were obtained from the NSW Midwives Data Collection[4] for 1990 as the mid-point for the four-year period.

TABLE 5

CRANIOSYNOSTOSIS BY TYPE OF SUTURE INVOLVEMENT AND HEALTH AREA/REGION OF RESIDENCE, 1988-1991 (A)

Health Area/Region	Suture involvement											
	Multiple	rate/ 10,000	Coronal	rate/ 10,000	Sagittal	rate/ 10,000	Lambdoid	rate/ 10,000	Metopic	rate/ 10,000	Total	rate/ 10,000
Central Sydney	3	1.6	1	0.5	2	1.1	10	5.4	1	0.5	17	9.2
Eastern Sydney	1	0.7	1	0.7	2	1.4	4	2.8	1	0.7	9	6.4
South Western Sydney	6	1.4	2	0.5	11	2.5	9	2.1	2	0.5	30	6.9
Western Sydney	4	1.1	5	1.3	9	2.4	35	9.2	0	0.0	53	14.0
Southern Sydney	1	0.3	1	0.3	5	1.6	6	1.9	1	0.3	14	4.5
Northern Sydney	9	2.7	1	0.3	6	1.8	22	6.7	4	1.2	42	12.7
Wentworth	5	2.5	1	0.5	6	2.9	6	2.9	2	1.0	20	9.8
Central Coast	0	0.0	2	1.4	2	1.4	5	3.5	1	0.7	11	7.7
Hunter	3	1.0	2	0.7	6	2.1	1	0.3	0	0.0	12	4.1
Illawarra	3	1.6	1	0.5	4	2.1	1	0.5	2	1.1	11	5.9
New England Region	3	2.0	0	0.0	2	1.3	2	1.3	2	1.3	9	6.0
South Eastern Region	3	2.8	1	0.9	3	2.8	16	14.9	0	0.0	23	21.4
North Coast Region	0	0.0	1	0.5	3	1.4	1	0.5	0	0.0	5	2.4
Orana and Far West Region	2	2.1	1	1.0	2	2.1	4	4.2	1	1.0	11	11.4
Central West Region	2	1.9	0	0.0	1	0.9	1	0.9	1	0.9	5	4.7
South West Region	0	0.0	1	0.7	1	0.7	3	2.0	0	0.0	5	3.3
NSW	45	21.6	21	9.9	65	28.6	127	59.4	18	9.3	277	130.4

Note:
(A) Rates per 10,000 livebirths. Denominator births for rates were obtained from the NSW Midwives Data Collection[4] 1990 as the mid-point for the four-year period.

Craniosynostosis in NSW

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of a single suture has not been convincingly shown[7]. However, children with single suture involvement will frequently be referred for surgery for cosmetic reasons and to prevent psychological problems in later life.

Craniosynostosis accounts for about 4.5 per cent of reported major birth defects in NSW[2]. In this study, craniosynostosis was found to occur about twice as frequently among males as females. This has been noted previously by Alderman et al, who found males were affected about one and a half times more frequently than females[9]. Craniosynostosis cases did not differ from the population of births in NSW in 1990 for type of delivery, maternal age, gestational age at birth or birthweight.

The incidence of craniosynostosis was found to be 8.1/10,000 livebirths over the period 1988-1991. This is consistent with rates reported elsewhere, which vary from 3 to 26/10,000 births[9,10]. As only about one-quarter of craniosynostosis cases are detected in the first month of life, the increase in the reported rate of craniosynostosis in NSW is almost certainly due to the change in the upper age limit for reporting of birth defects in NSW in 1989, from 28 days to one year.

The most common suture involvement was synostosis of a single lambdoid suture. This differs from the two published case series where a single sagittal suture synostosis was most common[9,11].

The rate of craniosynostosis was found to be higher in the South Eastern Region and Western Sydney Area. This is due to the referral of relatively large numbers of children with single lambdoid synostosis for assessment and/or surgery. The management of a single lambdoid synostosis is based on cosmetic concern as there is no evidence that a single lambdoid synostosis causes developmental delay. As the rates of multiple suture involvement, and involvement of single coronal, sagittal, and metopic sutures are fairly uniform across NSW Health Areas and Regions, the higher rate of craniosynostosis in these two areas is likely to be due to differences in clinical management practice, with a higher rate of surgical correction for milder degrees of lambdoid synostosis, rather than a real difference in the incidence of craniosynostosis.

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Planning the Welsh way

► Continued from page 112

care management, leaving them to concentrate on their planning role. Arguably, it has also opened the way to greater objectivity in resource allocation by ending the accountability that health authorities previously had for the financial performance of providers.

Health authorities in Wales are thus able to define their accountability in terms of the health status of their resident populations, in a way that Area Health Services in NSW probably cannot to the same extent, given their more direct involvement in operational health care management.

Relevance for NSW

The planning model outlined here has been developed in response to challenges that are generic to most health systems. These issues are equally relevant for NSW, as is clearly shown by the recent report[4] on health funding by the NSW Parliament's Public Accounts Committee, which calls for greater emphasis on strategic planning, outcomes and community involvement in health decision-making.

The recent NHS Wales experience shows that adopting a stronger focus on outcomes across the health system in its entirety can be an achievable goal. Moreover, this can be progressed as part of a policy that requires the system to measure its performance in terms of the contribution it makes to improving health within a defined population.

The main messages are these:

- It is important to have strong, credible leadership when reorienting the health system towards better accountability for health improvement;
- The leadership must embrace direction-setting and the identification of very clear priorities for attention;
- A commitment to building partnerships is also essential, both in setting the direction for the system as a whole and in local decision-making;
- Within a clear framework of direction and priorities, local flexibility in implementation is important to encourage responsiveness and innovation, and to build accountability for health at the community level.

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3. Nutbeam D et al (1993). Goals and Targets for Australia's Health in the Year 2000 and Beyond. Department of Public Health, University of Sydney.
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INFECTIOUS DISEASES

NOTIFICATIONS

MEASLES

During the first nine months of 1993 all Area Health Services and Regions received notifications for measles.

The annual notification rate for the State is 18.4/100,000 population. Western Sydney has received notifications at a rate of 68.9/100,000 population.

Measles notifications peaked in epiweeks six to 10 and again in epiweeks 17 and 18. The increase in notifications that began in week 23 continues unabated. Most measles notifications have been for the Blacktown Local Government Area.

WHOOPING COUGH

During the first nine months of 1993 all Areas and Regions received notifications for whooping cough.

The annual notification rate for the State is 10.3/100,000 population. Central West Region has received notifications at a rate of 23.0/100,000 population. Northern Sydney Area has received notifications at a rate of 15.3/100,000.

RUBELLA

During 1993 all Area Health Services and Regions except Orana and Far West, representing 98 per cent of the NSW population, received notifications for rubella.

Notifications for rubella have continued at low levels. Thirty-two per cent of the year's notifications were for January.

The notification rate for the State for 1993 remains at 4.5/100,000 population for the third month.

TUBERCULOSIS

Two hundred and thirteen notifications were received for the first nine months of the year, for a rate of 4.8/100,000 population. Western Sydney Area has a notification rate of 7.8/100,000 population. The Central West Region has received notifications at a rate of 4.0/100,000 population.

TABLE 6

SITE OF INFECTION FOR 1993 NOTIFICATIONS

SITE	NUMBER	PERCENTAGE
Respiratory	113	53
Miliary	4	2
Primary	5	2
Genitourinary	7	3
Meningitis	5	2
Bone	3	2
Gastrointestinal	4	2
Other/unspecified	72	33

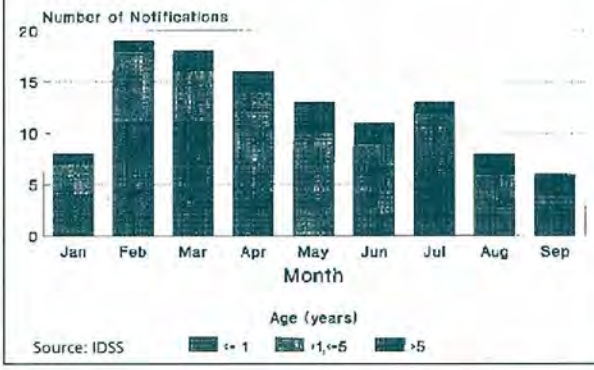
JAPANESE ENCEPHALITIS VACCINE

The Overseas Service Bureau has brought to our attention the fact that Japanese Encephalitis vaccine is available at Fairfield Hospital, Melbourne. Details can be obtained by telephoning (02) 280 2222.

This information supercedes information contained in the article on Travel Health, in the August 1993 NSW Public Health Bulletin.

FIGURE 1

HAEMOPHILUS INFLUENZAE TYPE B
NSW, 1993



HAEMOPHILUS INFLUENZA TYPE B IMMUNISATION

A total of 168,510 doses of vaccine against Haemophilus influenzae type b (Hib) were distributed through the State Vaccine Centre between July 1 and October 6. This vaccine has been used for the infant immunisation schedule since May 1, and for the "catch-up" program for children aged less than five years of age since September 1.

Notifications for Hib have decreased significantly during 1993. Only four notifications were received for September, compared with 18 for September 1992 – a decrease of 78 per cent.

INFLUENZA SURVEILLANCE

Surveillance of influenza in NSW shows that activity appears to have peaked and begun to decline during September. Reports of influenza-like illness (ILI) for September from the NSW GP sentinel surveillance network were received from six Public Health Units (PHUs). State mean levels fell from a peak of 2.3 per cent of consultations in August to 1.8 per cent by mid-September. New England PHU reported the highest level of 4.7 per cent. The State mean peak for 1992 was 13 per cent. Reports from the national ASPREN network also peaked at the end of August. Absenteeism surveillance in 11 schools through five PHUs showed only a small increase during the winter and autumn months. The Eastern Sydney Area laboratory surveillance system showed a predominance of influenza A during 1993 (65 per cent of total influenza isolates), in contrast to national surveillance through CDI which showed a predominance of influenza B. Laboratory reports of adenovirus and respiratory syncytial virus have been more numerous than influenza. It has been a quiet year for influenza.

BUG BREAKFAST – DECEMBER 3 – 8.15 AM, NSW HEALTH DEPARTMENT

Using MapInfo in infectious diseases surveillance and control

The desktop mapping software MapInfo has been used by the Northern Sydney Area Public Health Unit to map infectious diseases notifications for almost three years. The presentation will take the form of a practical demonstration of how MapInfo accesses, maps and analyses infectious diseases data. This will include the mapping of IDDS data, council cooling towers databases, and EpiInfo files. The use of CDATA91 for MapInfo will also be examined.

Continued on page 118

Infectious diseases

► *Continued from page 117*

TABLE 7

INFECTIOUS DISEASE NOTIFICATIONS BY SELECTED MONTH OF ONSET FOR 1993

Condition	Month			
	Jun	Jul	Aug	Total
Adverse event after immunisation	4	–	2	6
AIDS	19	26	21	66
Arboviral infection	19	9	6	34
Brucellosis	–	–	1	1
Foodborne illness (NOS)	12	3	2	17
Gastroenteritis (instit.)	83	14	9	106
Gonorrhoea	21	24	28	73
H influenzae epiglottitis	5	3	4	12
H influenzae meningitis	3	6	6	15
H influenzae septicaemia	1	2	3	6
H influenzae infection (NOS)	2	2	–	4
Hepatitis A – acute viral	42	46	36	124
Hepatitis B – acute viral	5	9	4	18
Hepatitis B – unspecified	279	326	329	934
Hepatitis C – acute viral	1	3	2	6
Hepatitis C – unspecified	478	540	506	1,524
Hepatitis D – unspecified	1	2	–	3
Hepatitis, acute viral (NOS)	1	1	–	2
HIV infection	80	79	73	232
Hydatid disease	1	–	–	1
Legionnaires' disease	2	2	3	7
Leprosy	–	–	1	1
Leptospirosis	–	1	1	2
Listeriosis	1	1	–	2
Measles	62	83	170	315
Meningococcal meningitis	7	4	13	24
Meningococcal septicaemia	2	3	8	13
Meningococcal infection (NOS)	–	2	1	3
Mumps	–	–	1	1
Mycobacterial – atypical	25	10	5	40
Mycobacterial tuberculosis	33	29	16	78
Mycobacterial infection (NOS)	8	7	2	17
Pertussis	43	86	87	216
Q fever	32	39	34	105
Rubella	14	15	22	51
Salmonella (NOS)	33	39	35	107
Salmonella bovis morbificans	1	2	3	6
Salmonella typhimurium	24	14	4	42
Syphilis	58	61	69	188
Tetanus	–	–	1	1
Total	1,402	1,494	1,508	4,404

TABLE 8

SUMMARY OF NSW INFECTIOUS DISEASE NOTIFICATIONS SEPTEMBER 1993

Condition	Number of cases notified			
	Period		Cumulative	
	Sep 1992	Sep 1993	Sep 1992	Sep 1993
Adverse reaction	2	2	30	20
AIDS	27	7	249	200
Arboviral infection	7	2	319	589
Brucellosis	1	1	2	4
Cholera	–	–	–	–
Diphtheria	–	–	–	–
Foodborne illness (NOS)	13	–	165	85
Gastroenteritis (instit.)	8	19	380	228
Gonorrhoea	55	3	277	244
H influenzae epiglottitis	4	–	37	31
H influenzae B – meningitis	10	–	82	44
H influenzae B – septicaemia	3	1	23	20
H influenzae infection (NOS)	1	3	24	13
Hepatitis A	65	12	395	425
Hepatitis B	272	135	2,505	2,500
Hepatitis C	363	173	3,173	3,787
Hepatitis D	–	–	5	7
Hepatitis, acute viral (NOS)	1	–	13	5
HIV infection	40	24	551	407
Hydatid disease	–	–	5	1
Legionnaires' disease	1	3	85	48
Leprosy	–	–	5	1
Leptospirosis	1	1	19	12
Listeriosis	4	–	13	6
Malaria*	16	N/A	120	N/A
Measles	64	253	328	814
Meningococcal meningitis	9	11	60	52
Meningococcal septicaemia	3	2	12	27
Meningococcal infection (NOS)	1	1	9	9
Mumps	2	1	20	3
Mycobacterial tuberculosis	34	7	333	213
Mycobacterial – atypical	30	–	422	186
Mycobacterial infection (NOS)	–	4	24	42
Pertussis	23	38	120	458
Plague	–	–	–	–
Poliomyelitis	–	–	–	–
Q fever	23	7	162	264
Rubella	40	4	90	199
Salmonella infection (NOS)	43	7	680	639
Syphilis	62	15	760	482
Tetanus	1	–	2	5
Typhoid and paratyphoid	2	1	27	15
Typhus	–	–	–	–
Viral haemorrhagic fevers	–	–	–	–
Yellow fever	–	–	–	–

* from Malaria Register

TABLE 9

VACCINE PREVENTABLE DISEASE NOTIFICATIONS BY PUBLIC HEALTH UNIT, CUMULATIVE 1993

Condition	CSA	SSA	ESA	SWS	WSA	WEN	NSA	CCA	ILL	HUN	NCR	NER	OFR	CWR	SWR	SER	U/K	Total
H. Influenzae epiglottitis	2	7	1	–	–	2	4	1	2	2	2	2	1	–	2	3	–	31
H. Influenzae meningitis	3	4	–	7	3	3	3	2	6	1	3	3	1	3	1	1	–	44
H. Influenzae septicaemia	1	3	1	8	1	–	1	–	1	2	–	2	–	–	–	–	–	20
H. Influenzae infection (NOS)	–	–	2	–	2	1	3	2	–	2	–	–	1	–	–	–	–	13
Measles	66	56	10	107	298	76	34	18	26	36	18	6	41	4	10	8	–	814
Mumps	–	–	–	2	–	–	–	–	–	1	–	–	–	–	–	–	–	3
Pertussis	21	21	30	75	49	28	84	6	24	21	28	13	21	29	4	4	–	458
Rubella	5	15	12	21	22	17	23	4	3	18	24	20	–	4	4	7	–	199
Tetanus	–	1	–	–	–	–	–	–	–	–	2	–	1	–	–	1	–	5

TABLE 10

RARELY NOTIFIED INFECTIOUS DISEASES BY PUBLIC HEALTH UNIT, CUMULATIVE 1993

Condition	CSA	SSA	ESA	SWS	WSA	WEN	NSA	CCA	ILL	HUN	NCR	NER	OFR	CWR	SWR	SER	U/K	Total
Brucellosis	1	1	–	–	–	–	1	–	–	–	1	–	–	–	–	–	–	4
Hydatid disease	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Leprosy	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1
Leptospirosis	–	–	–	–	–	–	–	–	–	2	4	2	1	–	3	–	–	12
Listeriosis	2	–	–	2	1	–	–	–	–	1	–	–	–	–	–	–	–	6

TABLE 11

INFECTIOUS DISEASE NOTIFICATIONS BY PUBLIC HEALTH UNIT CUMULATIVE 1993

Condition	CSA	SSA	ESA	SWS	WSA	WEN	NSA	CCA	ILL	HUN	NCR	NER	OFR	CWR	SWR	SER	U/K	Total
Adverse event after immunisation	1	2	1	–	5	–	1	–	–	2	–	1	–	5	2	–	–	20
AIDS	34	5	73	12	9	5	24	1	2	2	21	1	2	3	6	–	–	200
Arboviral Infection	1	1	1	1	1	3	3	1	1	26	51	26	102	13	354	4	–	589
Foodborne Illness (NOS)	6	3	–	17	23	10	–	2	6	–	–	2	11	–	5	–	–	85
Gastroenteritis (Instit)	64	6	–	9	13	4	–	21	–	39	–	17	3	20	32	–	–	228
Gonorrhea	40	12	94	12	14	4	17	4	3	6	11	7	10	6	1	3	–	244
Hepatitis A – Acute viral	42	17	37	42	97	19	36	10	14	11	39	42	6	5	5	3	–	425
Hepatitis B – Acute viral	6	3	18	1	5	1	–	–	–	–	26	3	–	–	2	2	–	67
Hepatitis B – Unspecified	375	299	–	764	382	30	347	29	19	61	43	32	15	11	17	9	–	2,433
Hepatitis C – Acute viral	1	–	–	–	3	–	–	1	1	–	2	3	1	1	–	3	–	16
Hepatitis C – Unspecified	539	283	484	427	398	87	414	176	140	305	253	58	24	50	83	50	–	3,771
Hepatitis D – Unspecified	2	1	2	–	–	–	–	–	–	1	–	1	–	–	–	–	–	7
Hepatitis acute viral (NOS)	–	–	1	–	–	–	–	–	–	1	–	1	–	2	–	–	–	5
HIV infection	59	11	157	17	11	8	31	8	3	12	10	1	1	–	2	1	75	407
Legionnaires' disease	8	1	–	13	13	–	3	1	3	2	1	–	1	–	1	1	–	48
Meningococcal meningitis	1	3	1	8	8	1	3	3	2	2	5	4	1	2	1	7	–	52
Meningococcal septicaemia	4	5	1	1	2	3	3	–	2	1	1	2	1	–	–	1	–	27
Meningococcal infection (NOS)	–	–	1	–	–	–	1	2	1	1	–	–	2	1	–	–	–	9
Mycobacterial atypical	39	12	7	9	23	3	23	1	7	27	21	7	1	1	4	1	–	186
Mycobacterial tuberculosis	29	31	13	34	36	6	25	8	4	14	2	2	3	5	–	1	–	213
Mycobacterial infection (NOS)	7	–	1	1	3	–	11	4	7	1	3	1	1	–	2	–	–	42
Q fever	–	–	1	1	3	–	1	–	1	20	55	80	73	11	4	14	–	264
Salmonella (NOS)	21	43	44	36	21	5	48	25	10	62	45	35	23	5	10	7	–	440
Salmonella bovis morbificans	1	3	2	–	2	–	2	–	–	10	–	–	–	1	1	–	–	22
Salmonella typhimurium	18	25	15	17	13	10	17	2	1	21	7	5	13	–	8	5	–	177
Syphilis	62	30	61	130	19	6	23	5	6	6	35	25	60	4	7	3	–	482
Typhoid and paratyphoid	1	1	4	1	–	2	2	–	–	1	2	–	–	1	–	–	–	15

TABLE 12

NOTIFICATIONS OF NON-NOTIFIABLE SEXUALLY TRANSMITTED DISEASES JANUARY-SEPTEMBER 1993
(Diagnoses from sexual health centres unless otherwise stated in footnote)

AHS Infection		CSA + SSA[1]	ESA[2]	SWS[3]	WSA[2] + WEN	NSA[3]	CCA[3]	ILL[2]	HUN[1]	NCR[3]	NER[2]	OFR[3]	CWR[4]	SWR[5]	SER[6]
Chlamydia trachomatis	Male	2	64	3	21	1	–	8	11	2	4	13	–	6	
	Female	4	52	6	13	1	–	4	32	2	10	13	–	22	
	Total	**6**	**116**	**9**	**34**	**2**	**–**	**12**	**43**	**4**	**14**	**26**	**–**	**28**	**4**
Donovanosis	Male	–	–	–	–	–	–	–	–	–	–	–	–	–	
	Female	–	–	–	–	–	–	–	–	–	–	–	–	–	
	Total	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
*Genital herpes	Male	12	222	3	29	11	5	7	21	3	2	3	–	1	
	Female	6	143	2	18	3	5	8	24	4	5	5	–	10	
	Total	**18**	**365**	**5**	**47**	**14**	**10**	**15**	**45**	**7**	**7**	**8**	**–**	**11**	**3**
*Genital warts	Male	61	490	57	132	20	22	62	93	34	15	20	–	–	
	Female	49	214	24	55	15	13	25	37	20	14	15	–	–	
	Total	**110**	**704**	**81**	**187**	**35**	**35**	**87**	**130**	**54**	**29**	**35**	**–**	**–**	**12**
Nongonococcal urethritis	Male	9	525	11	253	11	9	52	69	16	4	13	–	1	
	Female	–	–	3	3	4	5	–	–	4	–	1	–	–	
	Total	**9**	**525**	**14**	**256**	**15**	**14**	**52**	**69**	**20**	**4**	**14**	**–**	**1**	**–**
Lymphogranuloma venereum	Male	–	–	–	–	–	–	–	–	–	–	–	–	–	
	Female	–	–	–	–	–	–	–	–	–	–	–	–	–	
	Total	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**

* First diagnosis; 1. 01/01/93-31/08/93; 2. 01/01/93-31/05/93; 3. 01/01/93-31/07/93; 4. 01/01/93-30/06/93; 5. No SHC in Region;
6. No SHC in Region. Laboratory data 01/01/93-31/08/93; 7. No SHC in Region. Data from GP network 01/01/93-19/09/93.

HEPATITIS A IMMUNISATION

Hepatitis A is a viral infection of the liver which may cause symptoms of malaise, aches and pains, fever, nausea, anorexia, abdominal discomfort and darkening of the urine, followed within a few days by jaundice. Most cases are mild or anicteric with asymptomatic disease common in children.

The incubation period is usually four weeks, with a range of two-seven weeks. The illness usually lasts from one to three weeks and is followed by complete recovery. People are usually infectious from two weeks before the development of symptoms until one week after the appearance of jaundice – a period of about three-four weeks. The peak in viral shedding occurs immediately before jaundice.

Very large amounts of the hepatitis A virus (HAV) are found in faeces during the infectious period and the disease is endemic in countries where sanitation is poor and the virus contaminates water and food.

The HAV may be spread to household contacts if foodstuffs or eating utensils are handled by infected individuals. Contact with faeces and oral/anal sex also transmit the virus. Generally, young children and developmentally disabled individuals are much more likely than adults to transmit the virus within the household, day care centre or residential institution.

Travel to countries where the disease is endemic is an important risk factor and homosexual sexual practices have been associated with recent outbreaks of hepatitis A.

HEPATITIS A VACCINE

A formaldehyde-inactivated vaccine is prepared from the HM 175 strain of hepatitis A virus grown in human diploid cells. It is not a blood-derived product.

INDICATIONS

Hepatitis A vaccine is indicated for active immunisation against HAV in susceptible people older than five years and at risk of exposure. No paediatric dose is yet available.

Primary immunisation course

Two 1 mL doses of vaccine given two-four weeks apart. The vaccine is given by intramuscular (IM) injection in the deltoid region.

The antibody response may be impaired in people whose immune system is compromised, such as HIV positive individuals.

Booster doses

Antibodies produced in response to the primary immunisation course last for at least 12 months. A booster dose between six and 12 months after the primary course results in more persistent antibodies. The duration of antibody persistence following the booster dose is unknown.

ANTIBODY TESTS

Pre-immunisation testing

HAV infection induces lifelong immunity. Immunisation of people who have antibodies to HAV from prior infection is not necessary but will not cause adverse effects.

Testing for anti-HAV IgG before immunisation may be worthwhile for those born in developed countries before 1945, for people born or raised in areas of high or moderate hepatitis A endemicity, or for those who have a history of jaundice.

Post-immunisation testing

Due to the high immunogenicity (about 100 per cent) observed with inactivated hepatitis A vaccines, post-immunisation testing for serologic response is not indicated.

RECOMMENDATIONS FOR USE OF HEPATITIS A VACCINE

Recommendations on the use of hepatitis A vaccine in outbreaks or contacts of cases cannot be made as data are not yet available on its effectiveness, alone or in combination with IG.

Travellers

People who travel to areas of high or moderate hepatitis A endemicity are at risk of acquiring hepatitis A. In general, travellers to the USA, Canada, Western Europe, Japan and New Zealand do not have a significantly increased risk of hepatitis A infection, and therefore IG prophylaxis or immunisation is not warranted.

Travellers to other areas should receive hepatitis A vaccine before departure especially for travel of longer than three months, and for those who travel repeatedly.

Travellers for whom hepatitis A vaccine is indicated and who present for immunisation less than two weeks before departure may be given a single dose of vaccine plus normal (human) immunoglobulin (IG), and should complete the course of immunisation on their return.

People with chronic liver disease

Since clinical hepatitis A may be more severe in persons with chronic liver disease due to hepatitis viruses or other aetiologies, use of hepatitis A vaccine in these persons may be considered.

Side effects

The side effects are usually mild and confined to the first few days after immunisation. Common side effects are soreness, redness and induration at the injection site. Less common side effects are fever, malaise, fatigue, headache, nausea and loss of appetite.

Precautions and contraindications

Immunisation should be postponed in people with severe febrile infections.

Use in pregnancy

The effect of hepatitis A vaccine on foetal development has not been assessed. Since it is an inactivated vaccine, the risk to the foetus is likely to be negligible, but it should not be given unless there is a definite risk of infection.

Use in lactation

The effect on breast-fed infants of the administration of hepatitis A vaccine to their mothers has not been evaluated. Hepatitis A vaccine should be used with caution in breast-feeding women.

Use with normal (human) immunoglobulin (IG)

The concomitant administration of IG with the first dose of hepatitis A vaccine does not affect the seroconversion rate. However, this may result in a lower anti-HAV antibody titre than if hepatitis A vaccine is given alone and may affect the duration of protection.