Quality assurance in preschool surveillance

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Abstract

A quality assurance programme was used to evaluate community and primary care based preschool surveillance using the National Child Health Computer System in 40 examination centres. Quarterly reports were generated from returns from clinical medical officers and general practitioners to list non-attenders, uptake, and timeliness for the four preschool checks. These provided rapid and comparative feedback on personal performance for participating health professionals and led to marked rises in recorded timeliness and uptake against preset targets.

Pre-existing uptake was highest at the 6 week check with least overall improvement. Greatest improvements occurred at the 18 month health visitor check but, in general, results plateaued when the programme had been in use for 12 to 18 months. Particular problems such as data legibility and mobile populations were identified and solutions formulated. It is postulated that improvements in performance were due to enhanced professional motivation as no other factors changed. This system provides a valuable contribution in the light of changing patterns of service provision.

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Providers of preschool surveillance programmes must compete for scarce resources, provide a high quality service, and demonstrate that they are doing so. Quality is a much used but little understood term. A universally useful definition is the degree to which the service or product meets the client's needs. In a medical context, quality can be regarded as what is best and what is right for patients, families, providers, and purchasers. Problems arise because of the conflict between perceptions and needs of the different groups.

Improved health care depends upon continuous improvement in quality of the services offered by providers. Quality assurance is planned and systematic action directed towards the attainment and improvement of quality of the service with the declared intention of minimising deficiencies.¹ Important factors include completeness and accuracy, accessibility, availability and equity of provision, effectiveness, efficiency, and acceptability.² Quality assurance sets out to evaluate current practice against best practice: it is the role of research to discover and define best practice.³

A key issue in health service quality assurance is to motivate professionals to adhere to best practice without infringing their

professional autonomy. A 1985 World Health Organisation report stated that 'The active participation of health care professionals in programmes to improve the quality of services can be an important mechanism for analysing and explaining differences in patterns of practice and results of care. These differences in performance can stimulate intellectual curiosity and be a first step towards improving their performance'.⁴

Preschool surveillance concerns the prevention of disease, early detection of problems affecting growth, development, and educational achievement as well as the positive promotion of health. To achieve these goals, it is necessary to specify appropriate activities that are carried out by suitably trained staff.⁵

Preschool surveillance programmes vary from district to district but core assessments occur at the ages of 6 weeks, 8 months, the second year of life, and preschool. Since the 1990 new contract for general practice, increasing numbers of general practitioners (GPs) have been encouraged to perform their own preschool surveillance.⁶ Payment is on a capitation basis. Responsibility for monitoring targets remains with the purchaser using information from the National Child Health Computer System (NCHCS).

The purchase/provider split makes it essential that providers demonstrate high levels of performance and quality to the purchaser in order to ensure continued contracts.

The NCHCS is an NHS system in widespread use in the UK, providing a powerful and flexible tool for the management and administration of community based child health services. It was developed in 1974 to support community health functions, with service delivery modules introduced in 1985. Its child register aims to create an accurate dynamic record of all children resident in a specified area while the preschool module is used to generate the infrastructure for developmental surveillance. The system is designed to integrate the delivery of community and primary health care through a comprehensive record for each child.⁷

Problems arise due to limitations in statistical output and general user unfriendliness. Integration of external data is extremely complex, rendering most audit projects viable on a research basis only.⁷ It is a classic example of excessive data providing insufficient information.

The Child Health System Consortium inaugurated a Quality Assurance Group fostering comparative studies within the UK using the NCHCS and recently on a European scale for a project on advanced informatics in medicine.⁸ The work of this group laid the foundations of the current study.

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Figure 1 Application of quality assurance model to preschool surveillance.⁹

Application of quality assurance to preschool surveillance

The generalised model of quality assurance may be used as a basis for its application to preschool surveillance (fig 1).

(1) AIMS AND POLICY

Aims and policy for preschool surveillance are derived from a number of sources: purchasers, providers, and national authorities such as the Joint Working Party on Child Surveillance and the British Paediatric Association (BPA). The development of the aims and policy will take place within a scientifically acceptable framework – recognising the need for effective use of limited resources while respecting the role of the professional.

BPA guidelines for services to preschool children specify the following aims:

- To work in partnership with parents to promote the physical, mental, social, and emotional wellbeing of all children and their families.
- To inform and assist parents in providing a healthy upbringing for their children.
- To achieve high standards of practice through training opportunities, consultation, and cooperation.¹⁰

(2) PLANNING, TARGET SETTING, AND RESOURCE ALLOCATION

These involve defining target populations, appropriate medical and education objectives at each check, and resources available to achieve such targets. Quality standards as defined by the BPA include uptake of surveillance checks, age of referral of key conditions, parental satisfaction, and staff case-loads.

Definition and quantification of target populations and uptake is important as non-attenders are often a high risk population.

(3) PERFORMANCE OF SERVICE

Performance of service links computer systems, health professionals, and families and should reflect the needs and concerns of all participants. The service includes the application of appropriate clinical tests by suitably trained staff in a suitable environment. The outcome must be clearly documented with timely update of clinical records and follow up plans.

(4) MONITOR AGAINST PLANNED TARGETS

This is, for example, percentage uptake of preschool surveillance, completeness of computer returns, timeliness, and accuracy of documentation (requiring comparison with clinical referrals and diagnoses). Timeliness of assessments is essential in preschool surveillance because it monitors time related achievements. Assessments performed too early may result in false positives, causing parental anxiety and creating the need for retesting. Late assessments may lead to delayed diagnosis or indicate poor organisation or inadequate resources.

(5) TAKE ACTION TO IMPROVE SERVICE

This may take various forms, for example increasing the scope of assessments performed, increasing uptake targets, professional education, or extra equipment. It may, however, take the form of maintaining targets while reducing resources, thereby releasing them for other uses.

Shaw highlights the need for audit in community paediatrics, while acknowledging that surveillance represents a complicated interface between community care, primary care, and the family health services authority (FHSA). The need for adequate liaison and joint funding of audit projects in order to prevent duplication of activities is stressed.¹¹

Community audit, as described by Hall, is the process of monitoring overall delivery and effectiveness of the preschool programme by examining information returned to the FHSA by GPs and child health clinics.⁵

This paper deals with two important aspects of service performance, namely uptake and timeliness, and their evaluation through community audit. The effectiveness of improving performance by providing health professionals with feedback on performance indicators is discussed.

Subjects and methods

Basingstoke and North Hants Health Authority had a population of 46 000 children under 14 years with 3100 births per year. Preschool surveillance was performed regularly by 40 examination centres (a combination of 26 GPs, their designated health visitors and nine clinical medical officers (CMOs) working from 31 GP surgeries and nine health clinics). After

the introduction of the new GP contracts in 1990 the involvement of GPs became more significant in relation to the previous CMO workload. Since January 1991 the majority of assessments were performed by GPs or health visitors, although many of these were involved with small numbers of eligible children.

In Basingstoke, accreditation of GPs by the FHSA depended on their use of the national computer system. An ICL version produced by Welsh Health Common Services Authority

was managed by Southeast Thames Computing. Responsibility for monitoring the programme rested with the district health authority and FHSA. Documentation training was given to all participating professionals before using the system.

In the normal course of events, the only regular documentary feedback between the NCHCS and participating health professionals concerned non-attenders. To enable monitoring, the Basingstoke system used a software package designed by Southeast Thames Computing providing analysis of returns from examination centres. The aim of this package was to ensure that the target proportion of eligible children was examined by monitoring the performance of individual centres and providing feedback on comparative performance.

Data collection for preschool surveillance in Basingstoke began in January 1991 and provided the basis for this study. Quarterly reports sent to individual examination centres gave details of unchecked eligible children. For example, initial information on quarter 1 (January–March 1991) was provided in early July 1991 with revised/updated figures including late checks produced six months later.

Table 1 documents ages at assessment, type of examiner, minimum and maximum acceptable ages, and target uptakes defined for the purposes of the study. Uptake targets and timeliness criteria were defined by the system review committee before the start of the study. The NCHCS provided the infrastructure for preschool surveillance (fig 2). It generated clinic lists of eligible children for health professionals with simultaneous invitations sent to parents. After assessment, documents were returned for coding and computer update, noting review or referral plans and details of non-attenders.

Three monthly tables of comparative performance were sent to all participating GPs and CMOs giving uptake (in numbers and percentages to avoid distortion by individual centres with small numbers of children), timeliness of checks performed, and details of unchecked eligible children.

These reports formed the basis for dialogue between the system review committee and health professionals, who were expected to feedback information on recent movements in or out, known reasons for non-attendance and the result of remedial actions taken. A regular newsletter encouraged liaison and compliance, promoting rapid update and feedback of organisational problems.

This study used the reports generated to analyse uptake and proportion of untimely checks performed (as specified in table 1).

Table 1 Preschool surveillance checks in Basingstoke

Age	Examiner	Minimum acceptable age (weeks)	Maximum acceptable age (weeks)	Target uptake (%)
6 Weeks	GP/CMO	6	11	95
8 Months	Health visitor	28	40	95
18 Months	Health visitor	74	92	90
39 Months	GP/CMO	169	189	90

Figure 2 Infrastructure for preschool surveillance.

Table 2 6 Week check (GP/CMO clinic)

Quarter	Time period	% Age uptake (target 95%)	% Too early (<6 weeks)	% Too late (>11 weeks)
1	1.1.91–31.3.91	83.9 (665)	10.8 (72)	2.4 (16)
2	1.4.91–30.6.91	85.9 (676)	12.8 (87)	2.7 (18)
3	1.7.91–30.9.91	87.9 (717)	10.2 (73)	3.2 (23)
4	1.10.91–31.12.91	89.9 (722)	14.1 (102)	2.6 (19)
5	1.1.92–31.3.92	88.9 (668)	14.8 (99)	2.3 (16)
6	1.4.92–30.6.92	93.5 (744)	13.8 (103)	2.0 (16)
7	1.7.92–30.9.92	84.2 (707)	18.5 (131)	0.3 (2)
8	1.10.92–31.12.92	88.8 (697)	15.3 (107)	1.4 (7)
9	1.1.93–31.3.93	88.3 (604)	14.4 (92)	1.5 (9)

Results

Results for the four age checks are shown in tables 2–5. Overall percentage uptake (numbers of children checked as a percentage of total eligible population) and percentage performed too early or late (as a percentage of total checks performed) are displayed for successive quarters.

Table 3 8 Month check (health visitor clinic)

Quarter	Time period	% Age uptake (target 95%)	Too early (<28 weeks)	Too late (>40 weeks)
1	1.1.91–31.3.91	38.9 (309)	0	16.2 (50)
2	1.4.91–30.6.91	85.7 (720)	0.3 (1)	20.4 (147)
3	1.7.91–30.9.91	88.4 (780)	0.5 (4)	12.2 (95)
4	1.10.91–31.12.91	92.1 (710)	1.4 (10)	8.2 (55)
5	1.1.92–31.3.92	89.3 (710)	0.8 (6)	9.9 (70)
6	1.4.92–30.6.92	89.4 (731)	0.3 (2)	10.1 (74)
7	1.7.92–30.9.92	91.8 (718)	1.2 (9)	11.6 (83)
8	1.10.92–31.12.92	90.2 (692)	0.4 (3)	10.4 (72)
9	1.1.93–31.3.93	91.3 (705)	0.6 (4)	10.8 (76)

For the 6 week checks there was a high pre-existing uptake rate with a trend towards more early checks. These were usually performed in the sixth week of age, often in small practices holding monthly clinics. Recorded uptake improved steadily until quarter 6 with oscillations thereafter (table 2).

The highest absolute uptake of any check was displayed at the 8 month health visitor check but still did not meet the 95% target. Very few checks were performed too early. The percentage of late checks began to fall from quarter 3 onwards (table 3).

The 18 month health visitor check represented the most consistently improved check of the four studied achieving target uptake by quarter 4. In the year before the introduction of this system, the age of the health visitor check was reduced from 24 to 18 months. There was still considerable resistance to comply at the start of 1991. The dramatic fall in late 18 month checks between quarters 1 and 2 was due to a marked improvement in the timeliness by a small number of health visitors. Optimal results were obtained by quarter 4 with a slight fall-off and oscillation thereafter (table 4).

The 3 year 3 month results also showed a fall in late checks between the quarters 1 and 2 with a concomitant rise of early checks. There was relative stability in subsequent quarters (table 5).

Table 4 18 Month check (health visitor domiciliary visit)

Quarter	Time period	% Age uptake (target 90%)	Too early (<74 weeks)	Too late (>92 weeks)
1	1.1.91–31.3.91	5.9 (47)	0	72.0 (34)
2	1.4.91–30.6.91	41.6 (356)	0	10.4 (37)
3	1.7.91–30.9.91	88.9 (680)	0.6 (4)	11.9 (81)
4	1.10.91–31.12.91	89.7 (677)	0.9 (6)	9.3 (63)
5	1.1.92–31.3.92	91.4 (715)	3.5 (25)	4.1 (29)
6	1.4.92–30.6.92	87.2 (737)	2.6 (19)	7.4 (52)
7	1.7.92–30.9.92	85.2 (748)	1.9 (14)	5.3 (37)
8	1.10.92–31.12.92	89.8 (724)	2.2 (16)	5.4 (36)
9	1.1.93–31.3.93	88.2 (686)	1.9 (13)	5.0 (37)

Table 5 3 Year 3 month check (GP/CMO clinic)

Quarter	Time period	% Age uptake (target 90%)	Too early (<169 weeks)	Too late (>189 weeks)
1	1.1.91–31.3.91	24.5 (214)	0.5 (11)	25.2 (54)
2	1.4.91–30.6.91	65.7 (522)	9.3 (49)	4.8 (25)
3	1.7.91–30.9.91	83.0 (638)	7.4 (47)	3.9 (25)
4	1.10.91–31.12.91	88.1 (672)	6.1 (41)	5.8 (39)
5	1.1.92–31.3.92	91.4 (715)	3.5 (25)	4.1 (29)
6	1.4.92–30.6.92	87.3 (729)	6.7 (49)	8.8 (64)
7	1.7.92–30.9.92	85.0 (635)	4.9 (31)	6.8 (43)
8	1.10.92–31.12.92	87.2 (700)	5.7 (40)	5.8 (41)
9	1.1.93–31.3.93	89.5 (758)	7.0 (53)	5.0 (38)

Table 6 Performance by examination centre: 3 year 3 month check

Quarter	Mean (SD) % uptake*	No (%) examination centres achieving target (n=30)
1	40.9 (25.0) (n=416)	2 (6.7)
3	84.2 (10.2) (n=656)	12 (40.0)
5	91.4 (9.3) (n=723)	19 (63.3)
7	85.8 (10.8) (n=654)	12 (40.0)
9	92.6 (8.9) (n=690)	21 (70.0)

*n=Eligible children in 30 examination centres.

To show variations in individual performance, percentage uptakes for the 30 examination centres with the highest number of eligible children at the 3 year 3 month GP/CMO check were analysed for each quarter. These comprised 80–86% of checked children per quarter. Results from the remaining 10 centres with a mean of less than eight eligible children per quarter were excluded from further analysis due to the marked effect on percentages by small variations in absolute numbers.

Table 6 gives data for alternate quarters with specific examples illustrated in the histograms of fig 3–5. Percentage uptakes of these examination centres for quarter 1 were placed in ascending order of magnitude (fig 3). This order was maintained to enable direct comparison with quarter 3 (fig 4) and quarter 9 (fig 5). There was wide variation in performance at the start of the study, with only two centres (6.7%) achieving the 90% uptake target (table 6). Results oscillated with a final maximum in quarter 9.

Specific problems identified included:

(1) Incorrect/incomplete/illegible data especially with self carboning forms. Illegible or incomplete forms were photocopied and returned for correction to those responsible wherever and whenever possible. Computer forms could spend months in circulation for relatively minor updates and completions, causing delay or eventual loss.

(2) Introduction of the parent held record in January 1992 meant that the self carboning form for the 6 week check was included in the parent held record. Problems were then encountered when parents forgot to bring it with them and caused delay in returns, especially from GPs in the first two quarters of 1992.

(3) Mobile populations especially service families caused considerable problems. Certain practices had a turnover of 25% of total patient numbers per year.

(4) Cross boundary problems occurred where children resident in one health area received preschool surveillance from another. The computer register allowed for this when informed of the situation, but all too often, this did not happen.

(5) Hard core non-attenders: as with immunisations, GPs and health visitors reported families where all attempts by professionals had been unsuccessful. Continued efforts to maintain contact and awareness with these families were important but policy decisions regarding cost and time effectiveness of such activities had to be made.

Figure 3 Performance by examination centre.

Figure 4 Uptake by examination centre: quarter 3.

Figure 5 Uptake by examination centre: quarter 9.

Discussion

Results suggest that providing health professionals with relevant and reliable updates of their achievement against target for specific performance indicators led to improved recorded performance.

The introduction of this study did not change standard forms and procedures for preschool surveillance in any way. The sharp increase in uptake over the first three quarterly periods of the study is probably related more to improvement in computer returns (recorded performance) rather than a marked rise in assessments performed (actual performance). The data do not allow differentiation between the two.

It is not entirely surprising that uptake was already highest at the 6 week check due to frequent contact with health professionals and high parental motivation. This would therefore

explain the relatively small improvement seen at this age compared with other checks.

What is more surprising is the marked and sustained improvement of uptake and timeliness at the 8 month check. This is an age where there is still a reasonable degree of contact between parents and professionals suggesting that professionals have had a positive effect on parental behaviour. More research is needed in order to investigate this.

The 18 month check was the only check where targets were achieved. By the age of 3 years, there is little routine contact between parents and professionals. Knowledge of the relevance of the preschool check is often less: motivation and compliance are therefore diminished. Informal contact during this study suggested that parents and possibly GPs did not fully appreciate the role of the 3 year check in early detection of children with special educational needs. This is an area of particular concern, requiring on-going education and reappraisal.

It is interesting to note that no check consistently achieved targets. Mean percentage uptake for the last five quarters showed better improvement for 18 months and 3 year 3 month checks than for 6 week and 8 month checks. Greatest improvements in late checks occurred between the first and second quarters where health professionals knew that their performance was under review but before figures were actually circulated.

This represents a phenomenon called the Hawthorne effect. Any intervention where people are asked about their work or where work practices are being scrutinised will result in an improvement in performance.¹² However, this effect is temporary, as complacency tends to set in unless steps are taken to sustain interest (that is, provide performance feedback or develop side studies).

In this study, strategies implemented to sustain current improvements by raising the level of awareness among health professionals include:

- The development of closer liaison with health visitor managers and the FHSA.
- Specific audit projects addressing the yield of abnormality detection at school entry.
- Software modifications to simplify the evaluation and comparison of performance standards between different groups of professionals.

The range of specific problems encountered covered a wide range of topics as outlined by Dixon.³ Documentation was a major factor underlying most of the problems, encompassing record keeping practices by health professionals and breakdowns/inefficiency of information systems. Surprisingly, resources were rarely cited as a problem, tending to be localised to specific examination centres for specific reasons, for example, absence due to sick leave without cover.

MOTIVATION OF PROFESSIONALS

It is suggested that improvements in performance may be attributed to increased

Figure 6 Model of professional motivation (after Porter and Lawler¹⁴).

motivation of the health professionals as resources and other inputs did not change. Motivation depends on a complex interaction of factors including the nature and training of the individual, the task involved, and the reward structure. Motivation of health professionals poses special problems as they must be allowed clinical autonomy yet conform to required standards.¹³ Preschool surveillance is particularly labour intensive with low equipment costs.⁵

Professional motivation can be shown as a circular model (fig 6).¹⁴ In the Basingstoke system the professionals' ability to deliver the service was enhanced by initial training and continued support from an interactive exchange of information. Improved performance indicators in turn enhanced motivation and effort (a virtuous circle).

The effectiveness of targets as motivators depends upon them being seen as achievable and appropriate. As targets were not being satisfactorily achieved, there was a danger that motivation would be lost (a vicious cycle). Such problems were most obvious where several GPs in one practice checked small numbers of their own children, rather than one specific GP or CMO covering the entire practice. The presence or absence of one child could determine whether targets were attained. New targets therefore should be set after research to establish cost effective levels of service.

Feedback of performance indicators provided rewards not previously available, such as the achievement of targets and peer approval. There was no financial motivation to achieve targets as accredited GPs were paid on a

capitation fee basis for preschool children under their care. However, it is not impossible to imagine future purchaser/provider contracts stipulating targets or offering item of service payments as inducement to achieve performance standards (for example, the immunisation programme).¹⁵

QUALITY OF SERVICE

In a commercial environment, the customer can be asked what he or she expects from a service. In a professional service, the client lacks the expertise to set realistic requirements.¹⁶ In the context of child health screening/surveillance the professional duty of care requires education and communication in order to 'empower parents to use child health, social and educational services to their advantage'.⁵

Important parental factors in the uptake of preschool surveillance include appropriate explanation of the timing and significance of preschool surveillance checks (written and verbal), the provision of clinics in convenient locations, and being seen at the appointed time in a comfortable environment by courteous and competent staff.

It is natural to assume that the most important indicators of performance will be measured. However, routine monitoring of a service often concentrates on easily quantifiable performance indicators, which may or may not be the most important. Indeed, overemphasis on such indicators may result in deterioration in total quality by diminishing the emphasis on less easily quantifiable but no less important indicators. In the present case, preschool surveillance checks performed on the right children at the right time are necessary. In order to provide a quality service, they must be done by well trained staff with adequate physical and time resources: indeed a complete quality system must monitor all these factors.

CONCLUSIONS/RECOMMENDATIONS

(1) This system provides a valuable contribution to the evaluation of preschool surveillance in the light of changing patterns of service provision.

(2) Rapid feedback of performance indicators to participating health professionals results in improved recorded uptake and timeliness of preschool surveillance checks.

(3) On-going monitoring and supervision is needed in order to maintain results as there is a plateau effect at 12 to 18 months.

(4) Resources should be concentrated at checks where there is less frequent contact with health professionals and at specifically targeted population groups.

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Tin mesoporphyrin and neonatal jaundice

I have referred before (Archivist 1992; 67: 1133) to the potential of haem oxygenase inhibitors for 'turning off the bilirubin tap'. Now a study done on babies in Athens (Timos Valaes and colleagues, *Pediatrics* 1994; 93: 1–11) has shown that tin mesoporphyrin reduces the postnatal rise in plasma bilirubin.

Normal babies of between 30 and 36 weeks' gestation were given an intramuscular injection of either tin mesoporphyrin (n=262) or saline (n=202) on the first day of life. Mean peak plasma bilirubin concentrations in controls was 198 $\mu\text{mol/l}$. In babies given tin mesoporphyrin mean peak plasma bilirubin fell with increasing dose from 178 $\mu\text{mol/l}$ for those given 2.0 $\mu\text{mol/kg}$ of body weight to 161 $\mu\text{mol/l}$ for those given 6.0 $\mu\text{mol/kg}$. (Both controls and treated babies were given phototherapy when plasma bilirubin reached 214 $\mu\text{mol/l}$.) Phototherapy was given to 62% of controls, 41% of those given 2.0 $\mu\text{mol/kg}$ of the drug, and 24% of those given 6.0 $\mu\text{mol/kg}$. The duration of phototherapy was less in the treated babies.

There was no serious toxicity from the drug. About 10% of those given the drug plus phototherapy developed a mild erythema on areas of skin exposed to the light. It should be noted that phototherapy was given using 'special blue' lamps and not conventional 'white light' lamps. The emission spectrum of these blue lamps avoids the region of maximum light absorption by tin mesoporphyrin. No other adverse effect of treatment was noted on follow up to the age of 18 months.

It seems, therefore, that tin mesoporphyrin reduces serum bilirubin concentrations in normal preterm newborns. Whether it is preferable to phototherapy or, indeed, whether most of these babies need any treatment at all, may be debated. The authors suggest that it may be useful in developing countries where other means of treating hyperbilirubinaemia may not be available. Whether it is prudent to give to babies a drug of incompletely assessed safety for an essentially benign condition I leave for you to decide.

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