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Alastair McColl, Paul Roderick, John Gabbay
Corticosteroids in preterm delivery in Oxford

Geographical Area: Oxford
Focus: Case studies focusing on effectiveness

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Editorial comments on how case study is linked to improving health outcomes: (also published in Volume 1)
Hicks, Mant and Dobson suggest that population based outcome indicators and outcome measures are not necessarily a guide to the potential for improving the quality of health services. The perinatal mortality rate for Oxfordshire was below the national average but they found that not all women delivering at gestations less than 34 weeks were receiving antenatal corticosteroids. They consider that where there is good evidence from randomised controlled trials that a particular intervention is associated with a desirable outcome then it can be both more efficient and more effective to attempt to monitor and improve the quality of health services by monitoring and improving the relevant process measures. By the end of their project the proportion of women receiving corticosteroids had increased. They conclude that the main determinant of individual clinical decisions are clinicians’ beliefs about what is best for their individual patients. They classify the causes of the gap between research and practice into one of two categories: a) clinical uncertainty and b) operational inefficiency. All their qualitative evidence pointed to the building of collaborative relationships between purchasers and providers based on trust and mutual respect as the most productive way of changing clinical practice.

Abstract (also published in Volume 1)

Background: Systematic reviews of randomised controlled trials in perinatal medicine have identified effective interventions that reduce mortality and morbidity among pregnant women and their children including the use of antenatal corticosteroids in the management of preterm labour.

Objectives: To estimate scope for improving health by increasing the use of corticosteroids in the management of preterm delivery in Oxfordshire, to identify barriers to change, to stimulate appropriate changes in the use of corticosteroids in the management of pre-term labour, to design appropriate interventions and to monitor changes in practice.

Setting: Oxfordshire Health Authority and the John Radcliffe Maternity Hospital.

Design: Interviews of purchasers and providers of obstetric services, review of the evidence relating to the gestational age specific effectiveness of corticosteroids in the management of preterm delivery and retrospective case-note review of the management of pregnancies delivered before 34 weeks gestation before, during and after the project.

Results: At the start of the project, women delivering at gestations less than 32 weeks were more likely (81%) to receive antenatal corticosteroids than women delivering between 32 and 34 weeks gestation (48%). The main barrier to the administration of antenatal corticosteroids to women delivering between 32 and 34 weeks was clinicians uncertainty about the effectiveness of corticosteroids in women delivering after 32 weeks gestation. We estimated that there was the potential to prevent about six cases of respiratory distress syndrome and two deaths by increasing the use of corticosteroids in women delivering before 34 weeks gestation. At the end of the project, there was no difference in the use of corticosteroids among women delivering before 32 weeks gestation or women delivering between 32 and 34 weeks gestation.
Conclusions: The main determinant of individual clinical decisions are clinicians’ beliefs about what is best for their individual patients. The causes of the gap between research and practice can be classified into one of two categories a) clinical uncertainty and b) operational inefficiency.

Practical lessons:
1) The nature of evidence about the effectiveness of health care is such that conclusions are rarely black and white but usually come in shades of grey.

2) When seeking to influence practice it may be helpful to identify the main reason(s) for any “shortfall” in practice. There are two very different sets of resource implications to consider a) the resource implications of changing clinical practice and b) the resource implications of identifying where change in clinical practice would be of benefit and of attempting to bring that desirable change about.

3) Population outcome indicators and outcome measures are not necessarily a guide to the potential for improving the quality of health services.

4) As in many other fields of medicine, where there is good evidence from randomised controlled trials that a particular intervention is associated with a desirable outcome then it can be both more efficient and more effective to attempt to monitor and improve the quality of health services by monitoring and improving the relevant process measures.

Introduction:

Why this clinical area was chosen:

Perinatal mortality rates are long established, widely used indicators of populations’ health. Multiple factors influence perinatal mortality rates, many of which have nothing to do with the quality of health care. So, although it is sometimes tempting to assume that a low perinatal mortality rate means that a particular population is served by excellent and effective maternity services, it may not always be wise to make such an assumption.

Oxford is home to the National Perinatal Epidemiology Unit (NPEU). In the 1980s, led by Dr. Iain Chalmers, it demonstrated that a systematic and rigorous search for all the randomised controlled trials in a particular field, combined with careful, explicit appraisal of the identified trials and integration of their results could lead to the generation of important new knowledge about the effectiveness of particular treatments. The new knowledge that the NPEU generated about the effectiveness of many interventions used in perinatal medicine was widely recognised as being of great importance. It was soon realised that the methods that they had developed could be applied to any other field of medical care. This led to the establishment of the Cochrane Collaboration which has begun to replicate and extend the work pioneered by the NPEU in perinatal medicine to many other branches of medicine.

Oxfordshire enjoys a relatively low perinatal mortality rate. For example in 1993/4 the perinatal mortality rate in Oxfordshire was 6.6/1000 births compared to 8.0/1000 births for England and Wales as a whole. Nevertheless, we wanted to see whether there was potential to use the work of the NPEU to increase the effectiveness of maternity services in Oxfordshire. We visited the NPEU and asked the researchers there what they considered to be the single most important perinatal intervention that a health authority should ensure was well delivered by their local maternity services. We explained that, for these purposes, we considered an “important” intervention to be one that was used for a common condition, where there was high quality evidence about its effectiveness and where one could be confident that, appropriately used, the intervention would have a large beneficial effect on important outcomes (such as death). In addition, we were interested in identifying topics where there was at least a suggestion that current practice may not accurately reflect the best available evidence and where the costs of intervention in relation to the consequential benefits were likely to be low. Staff of the NPEU identified corticosteroids for the prevention of the respiratory distress syndrome in infants delivered prematurely as the intervention in perinatal medicine that they thought best met all these criteria.

Preterm delivery is common. About 160 (approximately 2.5% of all births) babies are born at the Oxford Radcliffe hospital each year. These babies are at risk of developing respiratory distress syndrome (RDS) and of dying. Systematic search for and review of the randomised controlled trials provides strong evidence to support the view that if a mother who delivers a baby prematurely is given corticosteroids before her baby is born then the chances of her baby dying, developing RDS or a number of other life threatening illnesses are reduced by about 40% (Crowley et al. 1990).

At the time we began this project (1993), there was evidence that many mothers delivering prematurely were not being offered corticosteroids: firstly, OSIRIS (OSIRIS Collaborative Group 1992) an international multi-centre study of the effectiveness of surfactant collected data about corticosteroids use in 1990/91 in

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**Radcliffe hospital**

At the time we began this project, many mothers delivering prematurely were not being offered corticosteroids. OSIRIS (OSIRIS Collaborative Group 1992) an international multi-centre study of the effectiveness of surfactant collected data about corticosteroids use in 1990/91 in
more than 6000 premature deliveries and found that only 15% of mothers delivering an infant prematurely had received antenatal corticosteroids; secondly a report of corticosteroid use in 1991 in the maternity hospitals of the NHS's Northern Region (Donaldson 1992) documented corticosteroid use between 0% and 30%; and thirdly unpublished data produced by Dr. William Tarnow-Mordi for the National Neonatal Network in Dundee revealed widespread international variations in corticosteroid use during 1991/2 (range 22% to 88%).

There was also a suggestion that increased use of corticosteroids might save the NHS money. Estimates by an NPEU health economist, Miranda Mugford (personal communication) suggested that if the proportion of women delivering prematurely who received corticosteroids were to increase by 25% then, as well as preventing the deaths of 400 premature infants there would be financial savings to the NHS of about 1.5 million pounds in surfactant and 2.6 million pounds in neonatal care (Bandolier 1994).

**Further information that was required:**

**What we wanted to know**
It was not enough simply to know that the administration of corticosteroids to mothers reduced the chances of premature infants developing serious illness or dying. Before making a major investment of time and energy into efforts to change clinical practice, we also needed answers to the following questions about the local maternity services:

- What was the potential to improve health through changing the way in which corticosteroids were being used?
- This could be estimated if we knew the numbers of women delivering prematurely who did not have valid contraindications to corticosteroids and yet did not receive them.

If there was significant potential to improve health then we would want to know:

- Why were some women delivering prematurely not receiving corticosteroids?,
- What could be done to overcome the barriers to using corticosteroids?, and
- Were the gains in health likely to be worth the effort involved in trying to change practice (bearing in mind the other things people could do with their time)?

We recognised that simply asking these questions might, through a Hawthorne effect, prompt some change in practice. We felt that this, in itself, would probably be desirable, although it would complicate any formal evaluation of the impact of any subsequent attempts to change practice.

**Getting the information**
We met the consultant who was responsible for delivery suite and the clinical director of obstetric services. They confirmed that corticosteroids were recognised as an effective treatment and that they were routinely used in the management of preterm delivery. They also thought that it would be unusual for a woman delivering prematurely not to be offered corticosteroids so they thought there was little to be gained by paying great attention to this particular topic.

They confirmed that there was a written policy describing the use of corticosteroids in preterm labour but pointed out that it was in need of updating and no longer a true reflection of existing practice (figure 1). In particular the policy listed a wide range of “contraindications” that were no longer felt to apply such as premature rupture of membranes. No audit of corticosteroid use had been undertaken so they could not quantify the proportion of women delivering prematurely who had received corticosteroids. As the existing written policy was out-of-date, they decided to re-draft it (figure 2). This involved the consultant in charge of delivery suite consulting with all the senior obstetricians in the hospital. It became clear that there was general agreement that there were substantial benefits to premature infants from maternal corticosteroid use if gestation was less than 32 weeks. However, there was considerable uncertainty among obstetric staff as to whether there were significant benefits to infants born at gestations greater than 32 weeks. The obstetricians decided that the newly re-written policy should maintain the recommendation that the maximum gestational age for using corticosteroids in preterm delivery should be 32 weeks. They were aware that in some other hospitals corticosteroid use was being recommended up until 34 weeks and that this was also the recommendation of the Scientific Committee of the Royal College of Obstetricians and Gynaecology (Royal College of Obstetricians and Gynaecology 1992).

**Figure 1: Policy for use of corticosteroids in preterm labour before start of project**

Dexamethasone should be given 12mg stat and after 12 hours if labour can be suppressed for at least 24 hours. Dexamethasone may also be used where early induction is required. Give only between 26 and 32 weeks.
Do not give if:
1. Pyrexia
2. Ruptured membranes (unless requested by consultant)
3. Diabetic
4. Hypertensive

Note: lower limit 26 weeks
upper limit 32 weeks
wide ranging contraindications
expectation that "labour can be suppressed for at least 24 hours"

It was agreed, however, that in light of the variable use of corticosteroids in preterm delivery that had been documented in other parts of the country and in other countries it would be helpful to document how well corticosteroids were being used locally. An audit was designed by obstetricians and public health physicians working together. Women who delivered babies before 34 weeks gestation in the preceding two years were identified from the computerised hospital medical records system, their notes were retrieved and data abstracted by a research/audit midwife. Data collected included details of corticosteroid use, possible contraindications to corticosteroid administration, gestational age, time and date of admission to hospital and time and date of delivery. Premature deliveries following intrauterine death prior to admission to the maternity unit were excluded from the analysis. This allowed us to document changes in corticosteroid use over the preceding two years (figure 3). Further information about this audit is being prepared for publication elsewhere (Mant et al. in preparation).

Figure 3: Use of antenatal corticosteroids over time in deliveries less than 34 weeks gestation
In addition to information from a) discussions between obstetricians and public health physicians and b) clinical audit, we arranged for a researcher to conduct structured interviews with purchasers and providers to identify barriers to change and the perceived potential of using the purchaser-provider separation as a means of improving clinical practice. The results of these interviews have been summarised elsewhere (Dopson et al. 1994) and we have incorporated the lessons learned from them in the conclusions of this case-study.

The incidence of contra-indications (see figure two) was low. 1% of mothers delivering prematurely were diabetic. 2% of mothers had significant cardiac disease, but after consultation with a cardiologist, half of these were given steroids anyway. 5% of mothers had a pyrexia, but this did not prevent steroids being given (it is likely that the rise in temperature occurred after steroids had been used).

Corticosteroid use had increased substantially over the preceding two years from 42% of women delivering before 34 weeks gestation in the period April to September 1991 to 71% in the period April to September 1993. Practice therefore now compared favourably to other published accounts of corticosteroid use in preterm delivery.

The main groups of women delivering before 34 weeks gestation who did not receive corticosteroids were a) those delivering within 24 hours of admission to hospital and b) those delivering at gestations greater than 32 weeks. The effect of gestational age on the rate of use of corticosteroids is shown in figure 4. Among women delivering before 32 weeks practice changed markedly during 1992 when the rate of use of corticosteroids increased from 56% to more than 80%. By contrast, for infants born between 32 and 34 weeks gestation corticosteroid increased only gradually with time and was still less than 50% in the period April to September 1993. Throughout the entire two years, corticosteroids were more likely to be used in women delivering before 32 weeks gestation than in women delivering between 32 and 34 weeks gestation. Practice was thus consistent with what the obstetricians told us about the strength of their beliefs about the effectiveness of corticosteroids in women delivering at different gestations.

**Figure 4: Use of antenatal steroid over time by gestational age**
If interpreted in the light of knowledge about both the gestation specific effectiveness of corticosteroids and the effectiveness of administering corticosteroids less than 24 hours before delivery, then the audit data would allow us to estimate the likely impact in Oxfordshire of specific changes in practice. We therefore went back to the original studies identified in the systematic review to try to estimate these data.

We found the data in the trials were not presented in a form that made it easy to extract gestational-age specific effectiveness data. Although it was not difficult to find data that related to deliveries before 32 weeks, the number of cases of RDS that were reported in experimental and control groups that one could be confident related to deliveries between 32 and 34 weeks gestation was small making it difficult to estimate precise numbers needed to treat (NNT) (see box) for this group. It was clear however that at all gestations up to 34 weeks there was no evidence that the risks of giving antenatal corticosteroids to the mother exceeded the observed benefits.

Numbers Needed to Treat (NNT)
The number needed to treat (NNT) is a measure of the effectiveness of a health care intervention. It describes the number of patients that have to be treated to prevent one event. In this case study an NNT of 6 implies that six women delivering a baby prematurely would have to be treated to prevent one case of respiratory distress syndrome. For comparison, the NNT for “clot-busting drugs” e.g. streptokinase in the treatment of heart attacks (acute myocardial infarction) is 30 i.e. one life is saved for every 30 patients treated.

Aware of the limitations of the data, we nevertheless estimated the approximate numbers of women that would need to be treated to prevent one case of RDS (NNT) at <32 weeks gestation was five, at 32 to 33 weeks gestation was 14 and at >= 34 weeks gestation was 86. This, combined with a knowledge of the expected annual numbers of deliveries in each gestational group allowed us to estimate the number of cases of RDS that would be prevented by increasing the use of corticosteroids in the 32 to 34 week gestation deliveries from their existing level (47%) to that achieved for the <32 week gestation deliveries (81%). We estimated that this change of practice would prevent about four cases of RDS each year in Oxfordshire and two deaths. Similarly we estimated that if practice were to change so that 81% of women delivering a premature baby within 24 hours of admission to hospital were given corticosteroids a further two cases of RDS would be prevented each year.

Data validity studies:

The questionnaire used in the audit described above was piloted before the main data collection exercise began. This pilot identified a number of ambiguities in the original questionnaire which were corrected. If the research midwife was uncertain about the interpretation or coding of particular items in the notes, medically qualified members of the research team (NH or JM) acted as arbiters. When there were apparent inconsistencies in the data (e.g. gestational age more than 34 weeks or date of delivery outside the relevant time period) data were re-checked against the case notes. Of women who received corticosteroids, 81% did so more than 24 hours before delivery and 86% received more than one dose.

Summary findings from initial work:
Many different interventions have been shown to change professional practice (Grecco and Eisenberg 1993). It is often suggested that, as the relative effectiveness of different interventions is unknown, one should use as many different approaches to changing professional practice as possible. We felt our data suggested that it may be possible to tailor the behavior change interventions to the specific circumstances. We interpreted our data in the following way:

I) where there was widespread acceptance of the effectiveness of antenatal maternal corticosteroids (i.e. in women delivering below 32 weeks), the intervention was used in more than 80% of cases. This compared very favourably to other published accounts of corticosteroid use in preterm delivery (OSIRIS Collaborative Group 1992). We felt it likely that the gap between the rate of use in women delivering before 32 weeks (81%) and the maximum possible rate (100% minus the prevalence of contraindications 8.5% = 91.5%) was due to a variety of “operational issues” some of which might be conscious decisions not to treat (e.g. reluctance of the woman to be given steroids) and others might reflect inefficiencies in the process of care (e.g. staff not knowing or forgetting the generally accepted current practice that had been described in the structured interviews with obstetricians).

II) where there was clinical uncertainty about the effectiveness of corticosteroid use (i.e. in women delivering between 32 and 34 weeks gestation) less than 50% of women receive corticosteroids. We therefore suggested that the difference in rate of use of corticosteroids between women delivering before 32 weeks gestation (81%) and women delivering between 32 and 34 weeks gestation (47%) was due to clinical uncertainty.

We believed that if our aim was to increase the use of corticosteroids in the 32 to 34 week gestation deliveries so that it was as good as that in the < 32 week gestation deliveries then interventions to change practice should be aimed at reducing obstetricians uncertainty about the effectiveness of corticosteroids in the 32 to 34 week group. Under these circumstances the interventions we could adopt might include education, drawing on the scientific data, supplemented by audit and feedback. We would assume that the main motivation for changing practice would be the professional motive of doing as well as possible for ones patients.

By contrast, if our aim was to increase the already high use (81%) in the < 32 week group towards the theoretical maximum (all deliveries except those with contraindications) then we would have paid attention to more “operational” issues that might reduce “avoidable” errors such as forgetting to prescribe corticosteroids. Such an approach would have involved looking in greater depth at the structure and management of systems of care.

We decided to try to reduce the obstetricians uncertainty about the evidence for the effectiveness of corticosteroids in the 32 to 34 week gestation deliveries. We did not examine the more operational issues. In retrospect, we believe we should have done both (see below).

Our “intervention” took place when we were invited to present the findings of the audit and our analysis and interpretation of the data in the literature to a meeting to which all obstetricians, neonatal paediatricians and midwives were invited. The meeting was well attended by all three groups. We presented audit findings, our estimates of the gestation specific NNTs, and our estimates of the likely consequences of changing practice locally. We were careful to indicate where the data were weak and to explain the assumptions that we had made in deriving our estimates. We did not specifically recommend any course of action. Instead we presented the data and answered questions. During the subsequent discussion, the obstetricians, midwives and paediatricians decided to change their practice and delivery suite policy so that all women delivering before 34 weeks completed weeks of gestation, except those with a very few specific contraindications, should be offered corticosteroids. Importantly, it was their decision and not ours. As a result obstetricians re-wrote the policy for the use of corticosteroids in preterm delivery again (figure 5).
It had originally been thought that incorporating targets in the contracts between purchaser and provider might help catalyse a change in practice. The independent structured interviews with providers, however, revealed a strong antipathy among clinicians to the use of targets. It was suggested that targets would be viewed as insulting (questioning clinicians' motives of doing well by their patients), and perhaps even counter-productive in that some clinicians might view it as a challenge to demonstrate why any target that was chosen was inappropriate. All our qualitative evidence pointed to the building of collaborative relationships between purchasers and providers based on trust and mutual respect as the most productive way of changing clinical practice.

**How changes will be monitored:**

Changes were monitored by re-auditing practice eighteen months later. We used the same method for data collection as we had in the original audit described above. In the first six months after the new policy was introduced corticosteroid use increased among deliveries of both < 32 weeks (to 98%) and among deliveries of between 32 and 34 week gestation (to 71%). This high rate among deliveries less than 32 weeks was also accompanied by a substantial increase in the treatment rates of women who delivered within 24 hours of admission to hospital. These high rates were not maintained. However, the increased treatment rates among women delivering at 32 to 34 week gestation was maintained, so by October 1994 to March 1995 there was no longer any difference in the rates of corticosteroid use among < 32 week gestation deliveries and among 32 to 34 week gestation deliveries.

These data would be consistent with but not conclusive evidence that both obstetricians' uncertainty about the benefits of corticosteroids among women delivering at 32 to 34 weeks gestation had reduced, and that there had been no improvement in operational efficiency within the obstetric unit. Indeed, we believe, from subsequent discussions, that obstetricians now believe that there is benefit in treating both those women delivering before 32 weeks gestation and between 32 and 34 weeks but that they remain unconvinced of the benefits of treating women if they are likely to deliver within 24 hours of admission. We also speculate that the corticosteroid usage rates might be further increased if attention were now to be paid to operational issues to ensure that practice accurately reflects the written treatment policy for the use of corticosteroids in preterm delivery. For example, we could have explored ways of prompting staff to remember to give steroids, and made sure that the policy was widely available and known about by the people who would actually make the decision i.e. the junior medical staff.

**Resource Implication:**

There are two very different sets of resource implications to consider a) the resource implications of

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**Figure 5: Policy for use of corticosteroids in preterm labour: updated policy after presentation of case note review and evidence to obstetricians, paediatricians and midwives**

<table>
<thead>
<tr>
<th>Initial therapy:</th>
<th>Dexamethasone regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between 23 and 34 weeks given: Dexamethasone in 2 doses (12mg IM) 12 hours apart</td>
<td></td>
</tr>
<tr>
<td>Except:</td>
<td>Where there is maternal diabetes requiring insulin</td>
</tr>
<tr>
<td></td>
<td>Cardiac patients (unless discussed with the senior team)</td>
</tr>
<tr>
<td></td>
<td>Frank maternal sepsis</td>
</tr>
<tr>
<td>Cautions:</td>
<td>Concomitant use of ritodrine for tocolysis</td>
</tr>
</tbody>
</table>

Pulmonary oedema is a risk when steroids and Ritodrine are given together. This is due in part to fluid overload, therefore great care should be taken when administering IV fluids and strict balance charts kept.

**Continuing therapy**

If labour has been delayed or there is not contractions but there is still considered to be a significant change of delivery steroids should be given on a weekly basis if the woman remains an inpatient. The dose is the same as the initial therapy. Weekly courses of steroids can also be given to a woman at high risk of premature delivery for fetal or maternal causes e.g. PTT, growth retardation.

| Note: | lower limit 23 weeks |
|       | upper limit 34 weeks |
|       | limited specific contraindications |
|       | no mention of suppression of labour for 24 hours |
changing clinical practice and b) the resource implications of identifying where change in clinical practice would be of benefit and of attempting to bring that desirable change about.

a) In the case study described above, although increasing use of corticosteroids would reduce the numbers of infants developing RDS and reduce the intensity of the care they required, the differences in outcome were sufficiently hard to detect that no cash could be released. A further complication was that the financial savings accrued in one cost centre (neonatal paediatrics) whilst the relevant changes in clinical practice took place in another (obstetrics). We suspected that the time and resources consumed in negotiating contract changes, agreeing prices etc. would exceed any savings that could be identified.

b) Resources were consumed by the audit, and in professional time discussing the use of corticosteroids, reviewing the literature and estimating the likely local consequences of particular changes in practice. It is perhaps worth noting that all the component processes of the work of the case study are already funded by the NHS: e.g. clinical audit, libraries, the Cochrane Collaboration, multi-disciplinary post-graduate meetings. However, the different influences on professional practice such as audit, education and guideline dissemination, are often not well co-ordinated in time and place. There are also important interventions that can influence professional practice that are not commonly used in the NHS e.g. computer prompting, academic detailing.

**Practical lessons learnt:**

The work described here was undertaken as part of a project labeled “Getting Research into Practice” (GRiP) which was designed to explore the potential for using the administrative separation between NHS purchasers providers to promote practice that was consistent with epidemiological evidence. The GRIP project began when each of the four county health authorities (Berkshire, Buckinghamshire, Northamptonshire and Oxfordshire) of the old Oxford Region were asked to select an area of clinical practice where there was “strong” evidence about the effectiveness (or ineffectiveness) of a particular aspect of practice and explore whether the purchaser-provider split could be used to promote practice that was more consistent with the evidence. For the reasons described above, Oxfordshire chose corticosteroids in preterm delivery as their GRIP topic. As part of the project, professional and managerial staff were interviewed by an independent researcher to assess their perceptions of the barriers to change and the potential for using the purchaser provider separation to improve quality of care. These findings (Dopson et al. 1994) contributed to the lessons we learnt from this piece of work which are as follows:

1) Population outcome indicators and outcome measures are not necessarily a guide to the potential for improving the quality of health services. Measuring outcome can be a poor guide to the quality of health services (Mant and Hicks 1996). Furthermore, broad indicators of population health do not provide many clues as to how health services might be changed to provide more effective care. If well conducted randomised controlled trials have demonstrated that a given process is linked to better outcome, then monitoring process rather than outcome is both a more efficient and more practical way of documenting the quality of a service and of identifying how improvements might be made (Mant and Hicks 1995). The main use of population outcome indicators should be to help purchasers, providers or the public to recognise when the health of the local population is in some way worse than might be anticipated. Such recognition should prompt local enquiry into the reasons for the apparent anomaly.

2) The causes of the gap between research and practice can be classified into one of two categories which have very different implications for the types of interventions that are most likely to change professional practice. These two categories are a) clinical uncertainty and b) operational inefficiency.

Where there is clinical uncertainty clinicians, either individually or collectively, are unsure of what they ought to be doing. Sometimes there is uncertainty because the information does not exist anywhere, but sometimes uncertainty may be due to lack of particular clinicians’ awareness of information that does exist. The main approaches for reducing avoidable uncertainty will include education, improving clinicians’ access to information, evidence-linked guidelines and improving clinicians information retrieval and appraisal skills.

By contrast, if people know what they are trying to do and there are still apparent lapses in practice then an examination of the way the service is organised may be indicated. Clinicians perceptions about how well the service is being delivered may not be accurate. It seems possible that there is systematic but understandable underestimation of the gap between intended practice and the care actually delivered. Successful interventions to reduce inefficiencies in the delivery of care are likely to include organisational changes and behavioural prompts such as the introduction of patient level reminders.

In the case study described above, we only addressed clinical uncertainty. We did not address the operational efficiency of our local obstetric service. We think that was a mistake, since we feel that we could have increased the uptake of steroids to the theoretical maximum of just over 92% if we had also addressed this issue.
3) The nature of evidence about the effectiveness of health care is such that conclusions are rarely black and white but usually come in shades of grey. Clinical practice requires clinicians to make judgments about whether particular treatments are likely to work in particular patients. As this case study illustrates, even for relatively well researched areas of medicine, the literature rarely provides specific or precise answers to the very specific questions clinicians may have about the care of individual patients. This complicates and probably reduces the effectiveness of target setting and prescriptive contracting as methods for improving the quality of care.

4) Interviews with clinicians illustrated that the main determinant of individual clinical decisions were clinicians’ beliefs about what is best for their individual patients. Doing well by individual patients remains the driving motivation of all the professional groups we met in the course of this case study. And their beliefs about what is best for their patients are influenced by a) their views about the strength, validity and relevance of the evidence for the risks and benefits of the relevant candidate interventions and b) by the opinions of individuals and institutions that they respect. In this case study obstetricians were influenced by the opinions of local neonatal paediatricians, who were angry at having to deal with babies who could have been helped if their mothers had been given steroids.

Importantly, and perhaps not surprisingly, clinicians’ views are not influenced by clauses in contracts between purchasers and trusts. The implication is that if purchasers want to influence the detail of clinical care they must be able to access and interpret relevant evidence, be able to use methods of working that influence clinicians e.g. audit and importantly earn the respect and trust of the clinical community.

5) Special data collection is usually required to determine how well practice reflects research findings. Routine data rarely allows inferences to be made about both the indications for intervention and the nature of the intervention. Valid, relevant monitoring of process thus usually requires special data collection exercises. It would be inefficient and expensive to collect continuously. Furthermore, as in this case study, it is often impossible to know from routine intervention whether the intervention has been used or not. We would recommend that selected samples of relevant processes are collected to determine quality of care. For example, it would be more efficient to review corticosteroid use by sampling practice of say, a three month period every two to three years, rather than continuously collecting data.

\[\text{Conclusion:}\]

\[\text{References:}\]


Mant J, Hicks NR, Dopson S, and Hurley P. (in preparation).


The overriding organisational context of this case study was the purchaser-provider separation introduced by the 1990 NHS reforms. This structure allows for “outsiders” (representatives of purchasers) to raise clinical issues directly with clinicians. We believe that if purchasers are to ask questions about clinical practice then they should have a good understanding of the topics they want to discuss and, preferably they should be able to bring perspectives or skills to the discussions that are not readily available within the clinical unit. Relevant contributions that purchasers might bring include a) a population perspective, b) comparative performance data, c) new evidence and interpretation about the effectiveness of possible interventions and d) advice about how desirable changes in clinical practice might successfully be introduced. These skills do exist in many health authorities, but it may be that they are not being used to best effect. This case study has provided an example of constructive and co-operative working between purchasers and clinicians in a clinical setting, in which high quality evidence about effectiveness has been used to improve the quality of health services. We believe that there is considerable potential for purchasers to work in this way with clinicians in many other areas of health care.