

Growth Monitoring of Infants and Young Children in the United Kingdom

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Introduction

Growth monitoring is an integral part of well-baby services in the United Kingdom (UK), and the weighing component was established many decades ago. Baby clinics, health visiting services with further referral to doctors, and weight checks were introduced in the early twentieth century as part of the Infant Welfare Movement and spread gradually, attaining universal coverage and finally being incorporated in the National Health Service. The growth monitoring aspects of this care are felt to be of importance in maintaining the infant health of the nation; however, practices have grown organically and have not always been submitted to systematic scrutiny and appraisal. Panpanich and Garner (1999) conducted a Cochrane Review of the evidence (worldwide) on the benefits and harms of routine growth monitoring (which they define solely in terms of weighing), and concluded that there was a surprising lack of investigation of either its benefits or its potential harms.

This review examines the current situation in the UK, relying on published evidence and the authors' understanding of current practice gleaned both through their researches in the area of infant nutrition and nurture and contact with colleagues in a variety of areas. It should be noted that there is limited publication of cases, audits or reflection on weight monitoring practice in the literature for UK practitioners. Thus, a feature of this review is to note many gaps. It has been commented that there is a high level of diversity in policy and practice across the UK (Hall, 2000a); this means that it is difficult to establish a comprehensive picture.

Scope of the review

Routine monitoring of the weight of infants and young children is intended to identify those whose growth pattern deviates from the norm. This group represents individuals who have an increased risk of poor growth due to either pathology or sub-optimal feeding (Wright, 2000). Weights falling absolutely below the 0.4 centile on the UK90 chart are deemed to "require immediate referral" while those between the 0.4th and 2nd centile merit "close observation" (Freeman et al 1995, p23) and a change of two standard deviations or centile spaces meriting referral (Wright, 2000). However, the majority of babies identified

by such measures are likely, upon investigation, to be growing normally (that is, attaining their genetic growth potential, perhaps slowly) with no underlying pathology. Thus identification of weight gain patterns of concern is not in itself diagnostic (Wright, 2000). Where the unusual pattern of growth is a symptom of an underlying condition, it is obviously desirable to identify and treat the condition, although the benefits of this for these individuals needs to be considered in balance with any harms, such as increases in parental anxiety for small but normally growing babies. Where a normal infant is not receiving the nutrition which is required to enable normal growth, this feeding issue needs to be identified and addressed: while it may appear to parents that the focus is on increasing weight, again it is weight as a symptom of sub-optimal feeding which is the target.

Importantly Panpanich and Garner (1999) define growth monitoring as a package of measures, which involves not just serial measuring and plotting but includes involving mothers/caregivers in discussions about suitable interventions where growth is of concern, and interventions agreed upon (rather than dictated) with further outcomes tracked.

Babies who are receiving interventions in order to address identified problems may have their weight more intensively monitored. The frequency and other aspects of this should be decided on an individual case basis as part of the care plan; there should be guidance on this to be found in the literature on the particular pathology in question, or from clinical experience. Consideration of this type of weight monitoring falls outside this review, in line with the Draft Scope from NICE, we do not consider cases involving “Women and children with clinical conditions that require specialist advice, secondary dietary management or clinical therapeutic advice” (NICE, 2006 p8/4.1.2).

Consensus view of good practice in growth monitoring

Growth monitoring in the UK is a fragmented practice, carried out by different professional groups with different approaches, and is not joined together through a nationally agreed policy from birth to five. Hospital midwives weigh at birth. Subsequent weights may be conducted before hospital discharge or at home by community midwives before mother and baby are discharged from midwifery care. Health visitors take over care at around 10 days and, usually in a handover from midwives, although midwives may continue to visit for up to 28 days. During an initial home visit, health visitors conduct a weight and plot this on the UK90 growth chart which is included in the ‘Red Book’ or Personal Child Health Record (PCHR) (CGF &RCPCH). (Clinics may keep a parallel record, but the PCHR is

the main record of the child's growth, and the three charts it contains cover the first year, years 2-5 and 6-20). Birth and midwife-conducted weights are not usually plotted on this chart. General Practitioners (GPs) see children at the 6-8 week check and when parents are concerned about the child; using the plotted PCHR chart to inform consultations. School nurses conduct a weight measurement and other checks when a child enters school.

Community Practice

Hall and Elliman (2003, p173) set out recommendations for weighing practice in the community which include:

- Using a digital scale (properly maintained and placed on a firm surface)
- Weighing babies naked, toddlers in vest and pants
- Weighing babies at the same time of day as previous weights
- Weighing babies in consistent relation to feeding (before or after)

These recommendations are based on clinical experience and are supported by a handful of research studies, investigating, for example, the effects of weighing babies at different times of day (Alsop-Shields and Alexander, 1997) and the accuracy of clinic scales (Steiger & Polnay 1996; Spencer et al, 1996) [the relevance of both of these studies is affected by the fact that at this time only some of the scales in use were digital, others being of older types]. Spencer et al (1996) urged that surveys "of practice in the 'everyday' clinical setting" (p7) be conducted to assess the level of error in conducting measurements in practice, but none have been found in the published literature. Hall and Elliman (2003) assert that the quality of measurement and charting should be reviewed; reports from colleagues suggest this is not done in many local areas. Many practicalities affect the conduct of weighing, for example Spencer et al (1996) surveyed all clinics in one area and found that some venues were not warm enough for naked weighing. No more recent study is available, although there is probably greater use of dedicated clinic premises rather than venues such as church halls or community centres used on a weekly basis.

Alsop-Shields and Alexander (1997), in a small study, investigated the effects of weights conducted by different child health nurses (in Australia) and found little difference. Such a study has not been conducted in clinical conditions in the UK. Routine weighing in clinics is sometimes done by health visitors, but is also sometimes carried out by nursery nurses,

volunteers, or clinic receptionists (the baby is weighed by this person and the mother then discusses any issues which arise with a health visitor). No published investigation of the reliability of measurements collected by these personnel has been found. It is not clear whether, where another person weighs the baby, who will plot the chart; this may also vary. The effect of such variations on accuracy of data collected (or on parental understanding) is unknown.

The importance of weighing babies at the same time of day and in the same relation to feeding is not mentioned in the notes in the PCHR, and it is unclear whether this is emphasised to parents: we are aware of many women seeking information from breastfeeding support volunteers who, on talking through how weights have been collected, reveal inconsistencies in timing, and further, a lack of understanding how this might affect the ability to interpret the changes in weight. In theory women attend a local clinic which is held on a particular time and day of the week, however, in one study, it was noted that women might attend the morning clinic session, or a GP session (held in the afternoon on a different day), or an afternoon breastfeeding support session, or baby massage sessions at a variety of times, choosing each week which was most convenient. The latter two sessions were held in premises with scales present and women were observed, and reported, using them opportunistically. Some of these weights might be recorded, others not (Sachs et al, 2005).

Weights may sometimes be conducted by the mothers themselves, particularly during group sessions held in clinic premises (Mahon-Daly & Andrews, 2001; Hall & Elliman, 2003; Sachs, 2005). Such weights might then be recorded by health visitors, or by the mothers. Even if not recorded, they might form part of the mother's reference for further decisions on feeding and care. Parents may also weigh their babies at home: this may be on scales sold for the purpose or on household personal scales (parent weighs self, then self holding baby). Both authors have been told about such use by parents during research interviews (Dykes, 1998; Sachs, 2005). No study has investigated the accuracy of weights conducted by parents.

Hall and Elliman (2003) note that the accuracy and reproducibility of growth monitoring measurements are affected by:

- Poor installation and maintenance of equipment
- Poor placement of portable instruments

Even where measurements are accurate, mistakes in recording the weights in numbers and / or errors in plotting may occur (Hall & Elliman, 2003; Wright, 2002). Weights in UK clinics may be read in kilos, and then calculated in pounds and ounces (which currently tend to be more meaningful to many parents): both or one may be written in the PCHR, and the measurement then plotted. Electronic scales automatically convert weight from pounds to kilos, however conversion tables are available, suggesting that some clinics may be using older equipment, and introducing an occasion for possible error in misreading tables. Plotting a weight from the written numbers is another occasion where error may occur. Wright (2002), a paediatrician, notes that “plotting growth charts is difficult and should not be done in a rush while talking to parents” (p279), probably reflecting her experience of measurements taken in clinical practice.

Importantly Hall and Elliman (2003) note that the families of children who might most benefit from growth monitoring are often those with the lowest attendance. Barriers from “multiple social and economic problems” mean they have “difficulty in making full use of preventative health care measures” (p170). Poor clinic attendance in certain geographical areas may lead to restriction of opening times and result in a downward spiral of contact. Health visitors may be stretched by attending to urgent problems and miss less acute issues. Areas of deprivation may have health visitor appointments which are hard to fill, or have frequent turnover of staff.

Practice during midwifery care

In contrast to the authoritative recommendations given by Hall and Elliman (2003) for routine community practice (see also below for recommendations on weighing frequency) there is no similar source giving practice recommendations for weighing accuracy or frequency during the period (usually 10-14 days, but this may continue up to 28 days: large initial weight losses or slow regain may be one reason for a baby not to be discharged from midwifery care) after the birth and during midwifery care.

Birth weight is universally measured. This can trigger further investigation in cases such as low birth weight. However it is not clear how soon after birth this is currently conducted. In recent years many hospitals encourage women to have skin-to-skin contact with their infants after birth, in line with the ‘Ten Steps’ of the UNICEF Baby Friendly Hospital Initiative; it may be that in many cases weighing is delayed to facilitate this. This may mean that some babies are now weighed after initial breastfeeding episodes, and that some babies may have eliminated during the period of skin-to-skin contact. No discussion

or assessment of possible effects of this on the initial birth weight measurement have been found in the literature. It is further unknown whether all hospitals now use electronic scales or how frequently these may be serviced and recalibrated. No study comparing different scales in a maternity hospital, or comparing scales in use in a hospital and those in the associated community clinics has been found. It should also be noted that no study or audit comparing the scales in a maternity unit and those in the paediatric ward of the same hospital (where a baby born might be readmitted if there is a problem) has been found. It is also unknown whether cross-calibration of such scales is common.

Midwives continue to use small spring scales in some areas, despite the assessment of Hall and Elliman (2003) that these are inaccurate and a European directive (cited in Freeman et al, 2006) which restricts further sale of such scales for clinical use. It is unknown how many babies in the UK are weighed on this equipment and how many on digital scales during midwifery care. No study assessing clinical weights in midwifery practice has been found. No literature on the frequency or method of checking the accuracy of such scales is available: the first author was told by one midwife that she had checked her scales using a bag of potatoes in a supermarket. Scales in common use by midwives, in hospital and during home visits, and those used by health visitors in the same geographical area do not necessarily appear to be cross-calibrated. In some areas midwives will not discharge a woman from their care until the baby has regained birth weight. However, local staffing levels may affect this. In areas where community midwives do not weigh or do not weigh routinely this is less likely to be the case.

Some hospitals may weigh babies routinely before they are discharged (and hospitals may have slightly different average discharge times). Once babies are at home, in some authorities community midwives may weigh, others may not. We are aware of some authorities where there are guidelines for midwives to weigh on specific days (e.g. day three, day five and day nine), and also of other areas where babies are not weighed between birth and the first health visitor visit. There is controversy surrounding this, and particularly the impact of different weighing regimes on the course of breastfeeding, which is discussed below. It can be seen that there is variation in practice from area to area. In fieldwork interviews, this has been remarked upon by women, who find it confusing. As women are likely to compare notes with friends and relatives, variations are often worrying as women do not understand the reason for variations in practice (Sachs, 2005; Sachs et al, 2006).

Initial birth weight loss and regain

After birth, babies lose weight, with breastfed babies losing more than babies receiving formula milk. This has been recognised for years, with a rule of thumb in use in some areas that a loss of ten percent or more would trigger a referral for a paediatric medical assessment. Cohn (2004) reported difficulties with the identification of 10% loss in practice, leading to late referrals. This suggests that a reliance on any such measure needs to be supported by appropriate tools and also careful documentation of weights taken. Shroff et al (2006) suggest the use of centile charts of weight loss for the first weeks. Wright and Parkinson (2004) had previously noted that current centile charts have “major limitations” (pF2560) in the first three weeks of life, as they do not account for initial weight loss and all babies appear to fall one half to one centile. Data used in compiling the UK90 chart relied on fortnightly weighing, so the downs and ups of weight in the first two weeks were not captured. (The new World Health Organisation chart centiles depict a slight fall in the first weeks, but weighings in this study were also conducted at fortnightly intervals in the first year.)

Recent research suggests that an average weight loss in the range of 6-7% in breastfed infants born in a western hospital setting is expected (this might reflect changes care practices, e.g. unrestricted breastfeeding encouraged rather than regulated feeding times). MacDonald et al (2003) studied the weight loss and regain of 971 infants in Glasgow, establishing median weight loss for breastfed (6.6%) and formula-fed babies (3.5%). Median time for maximum weight loss was the same for babies, however fed, at 2.7 days, with timing of birth weight regain documented. As it was collected in a UK hospital setting, this data may help to set expected birth weight loss and regain. Setting these would be a necessary part of establishing a coherent national policy on monitoring weight gain in the early weeks of life.

In recent years there have been a number of UK case reports of excessive weight loss leading to hypernatraemic dehydration and other complications in breastfed infants (Oddie et al, 2001; Laing & Wong, 2002; Shroff et al, 2006). Some of these authors have advocated more frequent weighing in order to assess breastfeeding, while others have countered with concern that frequent weighing in the early days after birth might have the effect of undermining breastfeeding through close scrutiny of this one measure (Williams, 2002). Sachs and Oddie (2002) reviewed the literature concluding that, as well as attention to weight loss, preventing such cases is reliant on the midwives developing skills in assessing breastfeeding effectiveness and teaching women the physical skills of breastfeeding. The MacDonald et al (2003) study noted above, in addition to measuring

the weight loss and regain of infants, followed a set protocol of weighing at birth, 48 hours, and on days five, seven, nine (and 14 if birth weight had not been regained); these weighings were discontinued once birth weight had been regained, ensuring that the period when weight was lost and regained through the establishment of successful feeding was documented, but further measurements 'just because the protocol says we weigh on day X' were not made. This appears to offer weighing tailored to need. Midwives conducted the weights and used digital scales which were calibrated every six months.

A further feature of this study was that the first action taken with breastfed babies who had not regained birth weight by day 14 or who lost more than 10% was to offer "additional intensive personal breastfeeding support by dedicated breastfeeding support midwives" (MacDonald et al, 2003, p F476; Mackie, et al, 2006), while all medical and midwifery staff in the unit received training in line with recommendations of the Baby Friendly Initiative. Breastfed babies who lost more than 12.5% weight or who had not regained birth weight by day 21 were sent for medical referral, as were formula-fed infants who lost 10%. This nuanced referral system is a promising model which might be studied for any national recommendations.

In further support of this policy, McKie et al (2006) audited rates of breastfeeding initiation and the incidence at six weeks for women experiencing this weighing protocol and compared them with two other local hospitals. The outcomes showed no detrimental effect of the weighing policy, in fact there was a slight increase in six-weekly breastfeeding rates for women experiencing the structured weighing and referral intervention. The authors comment that these data suggest that "monitoring newborn weight within an informed and supportive environment will not discourage breastfeeding" (McKie et al, 2006; p 4). The reportage of this intervention lacks any qualitative evaluation of women's views; such evidence would be welcome before a similar model were to be adopted more widely. This combination of targeted breastfeeding support, with staff suitably skilled and the use of a detailed weighing protocol with specific goals (to monitor birth weight loss and regain) is, however, a promising model for practice. Shroff et al (2006) note that 11% of the normal healthy babies in the MacDonald study has lost more than 10% and caution that weight loss must be interpreted against age, suggesting centile charts for this period and calling for further research.

Suggesting more structured weight monitoring in the early post-natal period, and assuming this will be conducted by midwives, while noting that more could be done to educate parents that fewer weights after the early weeks than are currently culturally felt to be

desirable suffice for the baby who has no other symptoms to worry parents, clearly challenges current practice. Parents may find these ideas surprising. Professionals, too, may feel challenged, as midwives would assume more responsibility for monitoring, while health visitors would have less. Currently, in the same way that midwives may be perceived in the community at large as the people who help women having babies, health visitors may be characterised as the people who weigh babies. Relinquishing part of this responsibility may be painful. Multi-disciplinary working and training has been called for in the area of infant feeding; it appears that weight monitoring could be similarly strengthened if the professional task divisions were more closely pinned to the needs of babies and their mothers.

A further important point in considering the birth weight loss and regain is that, while for decades the lesser weight loss of formula-fed infants has been seen as unproblematic, it may represent a side effect of these babies receiving unphysiological amounts of milk in the early days. Volumes of colostrum are usually low, and with the advent of bottle-feeding on demand in UK hospitals formula-fed babies may receive volumes above those taken by breastfed babies. Stettler et al (2005) recently examined the health of formula-fed (never breastfed) individuals from the USA who had been weighed regularly in infancy during research on formula types in the 1980's. This showed a strong correlation between weight gain in the first week of life and adult overweight. This study could not show a causal connection and further investigation is required, however it may point to life-long consequences of the style (frequency and amount) of formula feeding in the first week of life. No study or audit examining amount of feed given to formula fed infants in hospital or the early days in the UK has been found. It is also unknown what type of information is given to mothers on amounts to offer formula fed babies. Perhaps a protocol on avoiding over-feeding in the early weeks for formula-fed babies would be desirable? Indeed, little attention has been paid to the whole issue of what and how to teach formula/bottle-feeding to parents (Cairney & Alder, 2001; Renfrew, et al, 2003).

Weights in conjunction with other measurements

Growth monitoring involves measurements other than weight, usually head circumference and length/standing height. Measures such as taking arm circumference or calculating Body Mass Index (BMI) are not routine in the UK. The accuracy of these measurements at birth, taken by midwives, has been criticised (Wilshin et al, 1999; Jokinen, 2002). Wright (2000) asserts that prior to the age of 2 years there is no justification for routine length/measurements. This measurement is taken at birth and in clinics, and comparison

of the centile position between the two measures (and head circumference) may be discussed between parents and health visitors. Indeed, instructions for how to make length, height and head circumference measurements are included in the PCHR¹.

From the age of two, height is considered a more sensitive measure for diagnostic purposes, although weights may be taken if children present at clinic. A weight measurement is taken at school entry.

Frequency

A 1998 meeting of UK paediatricians produced the 'Coventry Consensus' recommendation that babies should be weighed at birth, and babies who are growing normally "should only be weighed at immunisation and surveillance contacts", giving 5 weights in the first year, once babies have left midwifery care, and "should not be weighed more than once every 2 weeks under the age of 6 months and once a month thereafter", so that there are fewer weighing episodes, but more attention is paid to measurements taken (Wright 2000, p7). Two senior paediatricians, Hall (2000b) and Wright (2000) reported the conclusions of the consensus, although Fry (2000a,b) has asserted that there was dissent on the recommended frequencies of measurement. The 'Coventry' frequency is incorporated in guidance (Hall & Elliman 2003) but it is unknown if it has impacted on practice. Certainly parents continue to bring babies to be weighed, and health visitors to weigh, more frequently than these recommended times.

Hall and Elliman (2003) note that facilities should be provided so that parents may have their baby weighed if they wish, and clearly many parents do wish. Surveys indicate that a high percentage of parents give baby weighing as their reason for attending clinic (Biswas & Sands, 1984; Sefi & MacFarlane, 1985; Sharpe & Lowenthal, 1992). The 2000 Infant Feeding Survey (Hamlyn et al, 2002) found that when babies were four to five months old, nine percent of women took their baby to a child health clinic weekly, a further 34% once a fortnight, with another 45% attending monthly. Attendance patterns were similar for breast and bottle fed babies (Hamlyn, unpublished personal communication, 2004). It is likely that visiting and weighing frequency is greater than this at earlier ages: however no data was collected on this in the first questionnaire for Infant Feeding 2000. Thomas & Avery (1997) found that mothers of Asian origin visited clinics less frequently than the white

¹ This is an example of the way in which the PCHR appears not to make the best use of space in giving parents useful information. Health professionals usually conduct the measurements documented in the PCHR.

mothers in the survey; no other information on ethnic differences in weighing frequency has been discovered. Women seeking asylum in the UK will have varied experiences and cultural expectations of baby care: it is likely that this, as well as the multiple challenges in their everyday lives, will affect their attendance for weighing.

In an audit of Newcastle clinic records, Wright et al (1997) found that the babies who were lightest were those most often brought for weighing: which they took to mean that services are most used by those who most need them, but could also reflect the level of anxiety babies on a low centile cause their parents. Where a baby has been investigated due to low attained weight or to poor weight gain, and any pathology or remediable feeding cause has been eliminated, the lack of reassurance at the end of the process and such continued dependence on intensive monitoring may be considered a negative outcome for the family (Thomlinson, 2002).

It appears that weighing the baby acts as a 'ticket of admission' to seeing a health visitor to discuss aspects of baby care (Sachs, 2005). Health visitors themselves acknowledge that the culture and the physical layout of clinics would need to be addressed if this were to change (Fulford 2001; Normandale 2001). However, parental expectation of frequent weighing is also conditioned by the UK's history of clinic provision – used now by four or five generations of mothers – and family expectations. It is notable that there is no information in the PCHR about the recommended frequency and possible disadvantages of weekly weighing. A short section in the PCHR could provide such information: this would need to be trialled to ensure it is in language that parents can understand and that it covers the questions they may have. Inclusion of such information could strengthen the position of those health visitors who currently do suggest that less frequent weighing is sufficient. (Although health visitors may be reluctant to do this, perhaps for fear of later charges of negligence or out of concern that parents will change feeding or care practices without any consultation and professional information). There appears to be reluctance to challenge the prevalent cultural expectation that frequent weighing is part of good parenting in the early months, even where there is no indication of problems. This may reflect a professional culture which places risk evaluation and risk avoidance centrally.

The current high frequency of weighing may have several consequences. The time taken may appear negligible, but if taken in aggregate may account for a great deal of health visitor time. If re-targeted on more in-depth discussions and evaluation of breastfeeding or bottle-feeding technique and complementary feeding practices (supplements of formula and complementary foods) it might produce better outcomes in infant feeding practices.

Health visitors could also help mothers recognise other ways of evaluating baby well-being. Currently some mothers and health visitors appear to treat weight as the only measure of health. While an important tool of evaluation, weight should be placed within a more holistic assessment of the baby and of feeding. Technically the shorter the interval between two weights, the more likely that fluctuations which are due to differences in feeding, elimination or diurnal variation in weight will be recorded, masking the true weight gain or loss trend. Also, any errors in weighing or recording will have more impact on the observed weight change (Freeman et al, 2006). Thus weekly weighings in clinic may mislead parents and encourage interventions such as complementing breastfeeding with formula, introducing complementary foods or using high-fat foods, or, alternatively, delay referral.

As health visitors are expected to weigh frequently, a large number of measurements are collected, many of which may not be of robust quality. The record in the PCHR is used by doctors who are generally do not make their own measurements and rely on clinic weights. Thus these records prompt referrals, or reassure that no referral is needed. More attention to fewer, more accurately conducted weights could improve identification of cases where referral is justified, and also allow better, deeper communication about feeding and care. This would be a suitable subject for action research.

Weight generally ceases to be such an important focus for assessing the health of children after the first year. The literature suggests no more than monthly weighing (Wright, 2000). Underdown and Birks (1999) recommend that between one and two years weights are taken no more often than every three months and at least six-monthly; then at 30 months and at school entry. The measurement taken around the time of school entry is common, perhaps universal (although children's age at starting school will vary by quite a few months).

Growth charts: use and interpretation

As noted, the PCHR includes the UK90 chart, now recommended for use in the UK by the Royal College of Paediatrics and Child Health [RCPCH] (Wright et al, 2002). It is not established that this chart is actually in use in all areas. The first year UK90 chart is based on data collected from UK babies during the 1980's, including many who were initially breastfed. A subset of this data was used to create a 'Breast from Birth' chart which is available for purchase and insertion in the PCHR. This is not recommended by the RCPCH and it is unknown how widely it is used: it may be that when individual breastfed

babies have growth patterns of concern, their measurements are plotted on the 'Breast from Birth' chart. It is possible that now that the World Health Organisation charts are available on the internet, individual health visitors or parents may use these in cases where there is tension over the interpretation of an individual baby's well-being on the basis of plotted growth.

A growth chart is a constructed tool. The chart is shaped by the way in which data was collected and by decisions made as to how to recruit the individuals measured. Once data is collected, further decisions on how to smooth and prepare the data are taken. Recommendations on how to read weights plotted on the chart, such as cut-off centiles for recommended referrals and the amount of centile crossing which should trigger concern, are individual to the particular chart. Each growth chart is uniquely constructed and is the result of many such decisions. Thus health professionals need training in the particular chart they are using.

Growth charts have been urged for clinic use since the late 1970's (Davies & Williams, 1983); and a Health Visitor's Association (1979) publication of the time gives an introduction to the use and interpretation of the Tanner Whitehouse charts. A current standard text used in training health visitors on the UK90 growth chart, and on other aspects of routine weighing was sought as part of the first author's research, and none found. This absence was confirmed by two lecturers on a university health visiting course. Any induction on the chart appears to take place during clinical training placements; this is likely to be highly variable.

Midwives currently rarely use charts; the PCHR is given out by health visitors. There are anecdotal reports that midwives may give it out in some areas; it is unknown how often this is the case. A notable feature of the UK90 is that it has no depiction of the early loss of weight after birth and subsequent regain – the curves rise smoothly from birth. Thus, plotting earliest weights on the chart might appear alarming to parents and professionals, particularly for breastfed babies, and be misleading.

Freeman et al (2006) remind practitioners that extra care should be taken where babies have been born prematurely and an obstetric wheel used to calculate corrected age for the first 12 months. Cooney et al (1994) noted the extent of such errors in one setting.

GP training appears not necessarily to include a dedicated session on understanding childhood charts, although discussion of the chart may be included in education on child

health: GPs are likely to rely on health visitor colleagues for the collection of weights, although in many practices one GP will undertake to support the baby clinic and this GP may inform her or himself about the charts. GPs are likely to view the chart of a baby brought for a consultation. A recent survey of doctors' breastfeeding support training needs found that only 50.9% felt able to detect abnormal growth, with 60.6% of paediatricians able to do this (Wallace & Kosmala-Anderson, 2006). This poor level of self-assessed competence is striking since "other practitioners may rely on them for advice or [...] they are likely to be regarded as a significant expert and gatekeeper for specialist referral" (p.229).

Training may be undertaken locally, usually for health visitors. This may come from a variety of sources, such as local paediatricians. Training is also available from the charity, The Child Growth Foundation (CGF), who provide sessions of varying length. The CGF provides support groups for families with children with a variety of growth disorders and also lobbies on routine growth monitoring issues. The first author attended a one hour session provided by CGF in 2000 (Primary Care 2000 conference): this focussed on accurate measurement and precise identification of the point when an infant's poor weight gain meant that individual should receive specialist referral. Wider questions of interventions in community care (e.g. changes in feeding practices) were not discussed, nor were potential disadvantages of intensive weight monitoring.

As noted above, the referral criteria include those who fall outside particular centiles and those whose growth deviates from a previous centile by two standard deviations (crosses two major centiles). 'Thrive Lines' for aiding identification of these latter babies have been developed (Cole, 1997). These are acetate overlays which can be placed over the plotted weight chart and, if weights are plotted at four-weekly intervals, pinpoint when centile-crossing of two major centiles has occurred. It is unknown how often health visitors or GPs use them. No published audit of their use is available, assessing the difference they make to referral times and accuracy, and a tool such as this risks focussing on weight alone as the referral criteria, without attention to the whole baby.

When a baby is referred, any further weight monitoring may transfer to the paediatric unit and be conducted by paediatric nurses or other staff. As noted above, equipment may not be cross-checked locally to ensure measurements are comparable, furthermore, staff are unlikely to have joint training.

Charts after infancy are expected to be less of a focus for parents; however this has not been investigated. With the provision of charts up to the age of 20 in the PCHR it is possible that the charts for ages 1-5 years are more carefully scrutinised by parents than weights at these ages have previously been.

The UK90 chart has been validated for use with primary school children, although one study found that, 15 years after the data had been collected for the chart, one school cohort already showed many children crossing BMI and weight centiles upward, confirming concerns about increased obesity (Rudolf et al, 2000).

Growth charts and breastfed babies

Internationally there has been a debate about the suitability of the international growth chart for breastfed infants. The international chart has never been in routine use in the UK, however there are often press reports assuming that it is, and the research critiquing the suitability of the international chart is sometimes quoted in UK discussions without noting that a different chart is in use in the UK. In fact, the UK chart appears to include a majority of babies who were initially breastfed, but there are difficulties in establishing the exact feeding patterns of these babies (Sachs, et al, 2005). The WHO charts have been released earlier this year (de Onis et al, 2006); so far no published comparison of these with the UK90 has appeared. The advent of the WHO growth charts has been a topic of discussion between many professionals involved in weight monitoring in the UK. However, clear information on how it differs from the UK90 chart has not been widely presented.

WHO, in the course of the last two decades of establishing the need for a new international reference and in devising and conducting the data collection in six countries, identified a need for better training of professionals in interpreting routine weight measurements. Materials relating to this are still forth-coming from WHO (due in November, 2006). As can be seen throughout this paper, practice in the UK, irrespective of which growth chart will be used, would also benefit from attention to training and updating in interpreting weight measurements and charts, and in conveying this to parents.

The difficulties in interpreting the plotted growth of a breastfed baby on charts which are based on data which include many formula-fed infants is due to the fact that the shape of the centile curves is different for a breastfed population and a formula-fed one. Breastfed infants (where there are no other restraints to growth, such as socioeconomic deprivation

or parental smoking) and where support for the physical establishment of breastfeeding is good, tend to grow more quickly in the early weeks (after birth weight regain) than formula-fed babies. From somewhere between two and four months (varying in different studies), breastfed infants grow more slowly, and if their weight is plotted on conventional curves, it may drop below the centile the individual was previously tracking, giving the appearance of growth faltering. By the age of two years, in studies conducted before the increase in childhood obesity, breastfed infants 'catch up' with formula fed counterparts. The concern which prompted revision of the international growth standards is that the apparent faltering was triggering misguided advice from health professionals to give complements of formula or complementary foods which were actually unnecessary, in order to bring the growth of breastfed infants into line with that charted on the basis of mixed fed or formula fed infants (Garza et al, 1994; de Onis et al, 1997; Garza & de Onis 1999, 2004; de Onis et al, 2006)

Although not formally researched or documented both authors have regularly heard concerns expressed over many years in the UK that similar misinterpretation of breastfed babies' growth has led to similar advice being given. Wallace and Kosmala-Anderson (2006) found poor levels of self-reported competence at detecting abnormal growth rates for breastfed babies among a sample of UK GPs and paediatricians. One ethnographic study documented the mothers of healthy breastfed babies expressed a preference for their babies to grow along a chart centile and that they perceived the fiftieth centile as ideal (Sachs, 2005). These mothers saw formula supplements and solid foods as important in sustaining growth which conformed to chart norms. Health visitors did not give women clear information about detrimental impacts of formula supplements on breastfeeding or question the idea that weight gain was more important than continued exclusive breastfeeding.

When women give formula in response to concerns about weight gain which deviates slightly from chart centiles this may be to the actual detriment of infant health by restricting breastfeeding, particularly exclusive breastfeeding, where the deficit in growth has been slight. Renfrew et al (2000) assert that "there is insufficient research to guide decisions about which [breastfed] babies may genuinely need additional feeds" and what level of weight loss should "result in supplementation" (p43). In the vacuum of evidence, practice may vary widely as to what individual practitioners suggest and what mothers do. Formula is culturally understood not merely to be a benign everyday baby food, but as an inevitable stage in infant feeding development. When women do not comply with health visitors' recommendations to give formula, tension between mothers and health care providers has

resulted with some mothers opting out of various aspects of routine health care (Brown, 2000; Saxby-Bridger, 2000; Hanss, 2004; Sachs, 2005).

Panpanich and Garner (1999) included in their definition of growth monitoring that where weights were of concern, interventions should be discussed and agreed between parents and health professionals. Different experiences, personal or professional, of individual practitioners who may have clinical experience of breastfeeding as liable to failure, or an understanding of breastfeeding as a robust system which can be rebuilt even when it has been poorly initiated or subject to disruption can colour the interventions they suggest. Such attitudes appear to depend more on the individual's experience than the particular profession he or she belongs to.

Mahon-Daly and Andrews (2002) made observations in a postnatal group and noted that "simply falling off the percentile trajectory was often a lone reason for breastfeeding to be discouraged or questioned" by health visitors and mothers accepted this (p68). Both authors have regularly heard reports of women they felt had been pushed to offering formula against their wishes. At the same time, a feature of these reports is often that timely assessment of physical breastfeeding has not been offered. Aspects to be assessed in a full examination include effective suckling on the part of the baby, optimal positioning of the baby at the breast, comfortable placement of the mother, the process of attachment of the baby to the breast throughout the feed, frequency of feeding episodes and use of one or both breasts during a feed. Many busy health practitioners do not feel they have the time to offer such assessments to the women in their care: few also receive in-depth training which could support them in doing this with women (Shaw-Flach, 1998; Ker, 2001; UNICEF UK Baby Friendly Initiative, 2002; Smale et al, 2006; Renfrew et al, 2006). There is evidence that women do not view clinics as places for accessing breastfeeding information or support, and may not turn to health visitors for breastfeeding support (Dyball, 1992; Ker, 2001; Mahon-Daly & Andrews, 2002). Thus if difficulties arise once women have left midwifery care they may not be sure where to access help. Attention may focus on how to increase the weight rather than how to improve breastfeeding effectiveness.

Interpretation of plotted growth and nutritional advice by health professionals

Plotted growth may cause concern due to falling below the 0.4th centile, or in the shaded band on the UK90 chart between the 2nd and 0.4th centile, or where an infant's weight has fallen through two major centiles. The corresponding 98th to 99.6th band and above the

latter represent equally unusual patterns of growth (statistically) but are appear less likely to cause concern. When an individual is shown to be an outlier of the greater population, professionals may offer advice and information on nutrition, with health visitors the first professional parents are likely to turn to for this. GPs who support child health clinics may also advise, although in general GPs have little training in nutrition.

Interpreting plotted weight curves can be difficult as various considerations such as babies catching-up to their genetic potential may look like faltering or too-rapid postnatal growth, and the statistical phenomenon of 'regression to the mean' may complicate understanding (Cole, 1995; Hall, 1995). Spencer et al. (1996) gave clinic-based health professionals four 'test' charts. Thirty-three percent misclassified a 'catch down' pattern of growth as 'poor weight gain', 15% thought the chart showing transient poor weight gain indicated 'failure to thrive', and two percent mistook the growth of a normal small baby for either 'poor weight gain' or 'failure to thrive'. If repeated in practice, such misinterpretations could lead to unnecessary referral and worry. Three percent (two individuals) also failed to identify correctly one chart which depicted 'gross failure to thrive', showing that a high rate of what would have been unnecessary referrals did not ensure that all babies who should have been of concern would be identified. Wallace and Kosmala-Anderson (2006) surveyed UK doctors and found many respondents did not feel they were competent at interpreting breastfed baby growth patterns. No more recent or larger published audit of this kind has been found.

Faltering growth

Faltering growth (which is the term now preferred to 'failure to thrive') has been historically more concerning than high weight gain. As noted above, breastfeeding mothers may turn to formula milk supplements to help with weight gain. A clinical review by a paediatrician includes a discussion of breastfeeding failure as a cause for failure to thrive (Marcovitch, 1994). This was critiqued by three senior midwives who suggested attention to the mother's breastfeeding 'style' and positioning technique would be the most effective intervention (Alexander et al., 1994). Formula feeding women may change the formula used. Because there are many other reasons for breastfeeding women to use formula and for formula feeding women to change brands, it is difficult to quantify the effects of faltering growth on changes in infant feeding. Reasons may be inter-related: for instance a baby who is not breastfeeding well and accessing high fat milk due to less than optimal positioning and attachment at the breast may also feed frequently and wake during the

night: these may be the reasons the mother gives for deciding to supplement (or change to formula feeding entirely).

As noted above, Renfrew et al (2000) note the lack of evidence to aid in identification of those breastfed individuals who genuinely need supplementary formula. Importantly there is also no published protocol for determining when and how it is appropriate to transition back to full breastfeeding once weight deficits have been made up through supplements. Indeed, professionals and mothers may assume that such a return is not possible.

At one time, once organic illness was eliminated as a cause of faltering growth, parental neglect or abuse was considered likely, but currently feeding is understood to be shaped by a complex balance of factors (Wright, 2000; Blisset et al, 2002). A variety of causes, such as illness or early development problem may lead to feeding difficulties and resulting under-nutrition, which then becomes an entrenched pattern; parental anxiety and tension around feeding times may exacerbate this (Blisset et al, 2002).

A recent analysis of data from the ALSPAC study (Emond et al, 2006; also Motion et al, 2001) found an association between growth faltering (conditional weight gain below the 5th centile [n.b. this is not the 5th centile on the UK90, but the 5th centile of the conditional reference charts (ref)] and sucking problems between birth to eight weeks. This held true for both breast and bottle-fed babies. In general, referral for specialist appraisal of sucking patterns, oral-motor anomalies, or tongue-tie is variable during the time a baby is breastfed, although cases have been reported to the authors. Referrals (or parental self-referrals) may be made to lactation consultants, chiropractors, surgeons (for frenotomy), etc. Very often, however, the response may be to move to bottle-feeding with formula (less often with expressed breast milk). However, in many cases which continue after the period of milk feeding it is the early problem with sucking that may have triggered a pattern of feeding difficulties with parental anxiety carrying over into other forms of feeding (Underdown, 2000). A health visiting model for intervention for failure to thrive does not include specialised breastfeeding assessment, or referral to breastfeeding specialists (Blissett et al., 2002), and breastfeeding specialists are not mentioned in a multi-disciplinary consensus statement (The Children's Society, 2002).

Interventions for growth faltering at the stage of infancy might involve suggesting specialist formulae, and supplementing breastfeeding. Blisset et al (2002) provides a model of intervention including a full history, including assessing if there are physiological triggers of eating difficulties, assessment of interactions between parents and child at feeding times,

increasing frequency of offering food, offering high calorie foods that the child will accept, and a reduction of anxiety and tensions through an individual assessment of the family patterns. As noted above, specialist breastfeeding assessment is not included in this model, although changes in how mother and baby are positioned can change the amount of fat the baby can access during feeds, and the recommendation to increase the feeding frequency echoes the suggestions during breastfeeding (Powers 1999, 2001).

In a systematic review of studies examining long-term outcomes for children identified as having failed to thrive and Rudolf and Logan (2005) found that although children identified in infancy with failure to thrive were shorter, lighter and scored less well on measures of psychomotor development, for most of them “there is little robust evidence from randomised controlled trials that intervention is associated with clear long term benefit” (p930). While there will be some children whose organic disease will be identified and can then be treated, these authors echo Panpanich and Garner (1999) by emphasising that investigation which might benefit these should not generate “damaging anxiety” for other slow-growing children (Rudolf & Logan, 2005, p 930).

Obesity

There is a general concern at growing levels of overweight and obesity in the UK, including in children. Importantly, no intervention has been accepted as suitable for offering to infants and children in their first years (Baird et al, 2005). Issues, such as the greater initial weight gain of formula-fed infants and the life-long impact of early overweight on life-long health are just beginning to be investigated.

Body mass index (BMI) is one measure proposed for use in measuring obesity. The new WHO growth standards will include BMI charts; hitherto this measure has not been used for young children in the UK. The House of Commons Select Committee on obesity has suggested that the BMI of every school child should be measured annually. Hall and Cole (2006) note that any programme needs to give attention to cut-off points (there is currently no standard international definition of either overweight or obesity), how to assess annual changes in BMI, and how to give information and advice to parents with causing unnecessary anxiety. Such strictures would apply to any extension of the use of BMI screening in younger children, and indeed echo the concerns of Panpanich and Garner (1999) with reference to the wider issue growth monitoring internationally.

In the school-aged population, Hall and Cole (2006) reiterate that whole population approaches with the aim of increasing physical activity and giving guidance on healthy eating are likely to be most successful. For pre-school children who are eating complementary foods as well as having milk, health visitors give similar messages where an individual child is identified as overweight. These messages are included in weaning information given, as good practice, which fits with the emphasis on prevention in the ethos of health visitors.

One of the core tasks of health visitors' work is advising on the transition from milk feeding to a full diet. International recommendations that six months of exclusive breastfeeding should be recommended for all babies have been adopted in the UK, with further recommendation that six months' milk feeding can also be recommended to formula-fed infants. In the UK the previous recommendation of 4-6 months' exclusive breastfeeding was widely interpreted as not starting 'solids' before 16 weeks, with many women starting before even this time (Anderson, et al, 2001). The cautions as to beginning early have not been well understood and are overcome by the twin pushes of excitement at having the baby exhibit a more grown-up behaviour, and the expectation that giving solid foods will ease mothers' time as feeding will be done by the baby and also ensure longer sleep (Murphy et al, 1998; Anderson et al, 2001; McDougall, 2003). With women returning to work, often nearer to four months than six months, a longer period of milk-only feeding may mean less health visitor input about the types of food to offer and other advice on the process of transition. A small-scale study found that a planned health visitor intervention spanning introduction of solids to 18 months could improve outcomes (Griffiths, 2002). Many women may not receive such sustained input.

Noble and Emmett (2006) noted differences in complementary feeding practices between breast and bottle fed babies in one area of the UK; in the same children energy intake as early as four months was associated with early childhood weight gain and subsequent weight and BMI up to the age of five (Ong et al, 2006). Another aspect of difference between breast and bottle fed babies is the proposal that breastfeeding women may have less restrictive behaviour, allowing babies to eat to their own appetite (Tavernas et al, 2004). Although this may be because of inherent differences between women who choose to breast and formula feed, there may also be an effect on the mother of experiencing breastfeeding, which may be more of a feeding partnership. There are clearly associations between parents' feeding decisions for their babies and the later course of lifelong health, but research findings are still being reported. It is also not clear how well research findings which are established are disseminated to practitioners and incorporated

in weaning information and advice. There is no mention of obesity or too much weight gain in the current Department of Health weaning leaflet for parents (DH, 2005). Rogers and Emmett (2002) studied the fat content of the diets of the same children, tracking the transition from the age of two to five years. Children whose diets were lower in fat were found to be higher in sugars, showing a balance of advantages in terms of vitamin adequacy. Recommendations from this study included setting an upper limit on the amount of milk in the diet of the under fives, limiting high-fat meat products and reducing the intake of crisps. This would accord with usual advice (DH, 2005). It is clear that “strategies for prevention of childhood and adult obesity may need to address factors during or before infancy that are related to infant growth” (Baird et al, 2005); and that this may lead to the need for more intensive training for professionals and targeted messages to parents.

With concern about increased incidence of obesity expressed widely in the media, it is important to manage parental expectation and ensure understanding that infants and young children have different growth requirements from adults. For instance, parents may express worries about breastfed babies who are on high chart centiles. As these individuals usually slim down when they become active toddlers teaching unconcern about these babies while encouraging parents of similarly large formula-fed infants will be a challenge. Formula feeding appears to accelerate weight gain above biological norms (Kramer et al., 2004). While the multi-factorial aetiology makes outcomes difficult to study, it appears that children who were not breastfed have higher incidences of overweight and obesity (Dewey 2003; Grummer-Strawn and Mei, 2004), with lifelong effects on their health (Singhal, 2005). The difference between formula and breast milk has usually been framed in terms of the ‘advantages of breastfeeding’ instead of considering the increased health risks to babies of formula feeding, and this may make explaining this difficult.

Professional perceptions of problems associated with growth monitoring

As noted throughout this paper, there are a number of issues which have been discussed in literature, and which may therefore have sparked concern among health professionals.

The issue of the conflict between recording regular weight gain and supporting breastfeeding are a particular concern for many, in all professions. Shaw-Flach (2003) conducted a small study of health visitors’ experiences of working with breastfeeding women, and graphically articulates the dilemma:

Some health visitors demonstrated how challenging they found this area of practice, with emotive language such as “unsafe”, “dangerous”, “panic” and “anxiety raising”. If the weight continued to be of concern there may then develop conflict between professional responsibility to ensure the baby grows, regardless how, versus a desire to maintain breastfeeding. (p25)

The strength of the feelings on the part of the professionals is likely to affect parents. This illustrates the need for clearer guidance and training in this area.

The debate as to whether weighing undermines breastfeeding has been mentioned above in relation to the early days. This debate continues in consideration of the later months and has often been related to the difference between breastfed babies’ growth curves and those of the chart based on mixed data (although, as discussed above, the critique of charts has often been borrowed from the international literature and not tethered to a consideration of the UK90 chart). An expectation has grown that the launching of the new WHO growth standards, with a hoped-for adoption in the UK, would somehow dissolve tensions around the competing desires to support breastfeeding and ensure good weight gain by rewriting existing weight gains as ‘all right’. The first author has lost count of the times such expectations have been expressed to her by practitioners. No chart could fulfil these. While there may often be babies whose growth is exhibiting the expected breastfeeding pattern of apparent ‘faltering’ against centiles after the first few months, the original expectation that the growth of every child must conform exactly to a chart centile curve is actually at fault. Most such cases are unlikely to show weight dropping through two major centile spaces, and a more holistic understanding of growth curves and their interpretation would eliminate many cases of concern for professionals, some of which lead to great tension for parents unwilling to give formula, others to early supplementation or cessation of breastfeeding.

The discussion of this issue also appears to throw together the early initial weight loss and regain and the effect of weighing on the initiation of breastfeeding and the later ‘faltering’, expecting both to be solved by the new charts. While the WHO chart does depict a dip in weight from birth, it is not clear exactly how this was arrived at, as babies were weighed at birth and at 14 days. As noted above, we would support the creation of a normative instrument to help identify babies who would benefit from early breastfeeding support or medical referral in the early postnatal period, however the WHO chart may not be suitable: this would require further investigation.

As noted above it is not clear if weight monitoring is always conducted with regard to best practice recommendations, e.g. nude weighing, consistency in timing in relation to a feed. In addition health visitors themselves have noted that the conditions in clinics are often not conducive to private unhurried discussion of any feeding or growth issues (Sharpe & Lowenthal, 1992).

Why do mothers want their babies weighed? What do parents understand about growth?

Although weighing is greater or lesser part of the experience of all mothers in the UK, there has been little investigation of these questions.

A number of questionnaire studies have sought the reasons women attend clinics, and reassurance is given as an important outcome women expect when attending clinic for weighing (Sefi & MacFarlane, 1985; Dyball, 1992; Sharpe & Loewenthal, 1992; Normandale, 2000; Hall & Elliman, 2003). Lucas et al (2006) conducted a systematic review of lay views about infant size and growth, including studies from other countries which might have similar conditions to the UK, finding that parents hope for babies' growth to conform to medical and community norms and if it does, this appears to provide the sought-for reassurance. An obvious corollary of the expectation for reassurance is that when weights do not conform to the norms of the chart, the outcome is not reassuring. Lucas et al (2006) note that when parents are able to account for differences in weights from the norms, such as by relating this to the growth patterns of other family members or as due to medical conditions, this was acceptable, but when no such causes were found, this could engender anxiety.

Sachs (2005), in a small-scale ethnographic study of breastfeeding mothers in one town in the UK, noted a variety of reasons babies were brought for weighing. These included: weighing in order to make sure a baby had regained after an illness episode, or in general compliance with weighing at medical contacts; using weighing as a means of accessing health visitor advice on a range of baby care topics; to report to family and friends on the baby's progress, or to prove breastfeeding was successful in the face of family concern; the desire to have a full record in the PCHR as a keepsake; and to know when the baby would need to move to a larger nappy or clothing size. Importantly three women in this study did not weigh regularly, two for positive reasons – the baby was visibly growing and one mother had a good social network outside the clinic; one for negative reasons – she wished to avoid the traumatic experiences of weighing she had had with her first baby

(Sachs, 2005). No study which explores the experiences of women who avoid routine weighing has been found, although this might be important to understanding of parental feelings and understandings. No study has been found which explores the reasons women who are not breastfeeding have for weighing their babies.

Weight gain appears to influence future feeding choices. Shaw et al (2003) studied young mothers in low income areas and found a “profound misconception” that babies won’t gain appropriately if exclusively breastfed, which led to some mothers not starting breastfeeding. Five percent of women who decided to bottlefeed in the Infant Feeding survey cited the fact that they can “see how much the baby has had” (Hamlyn et al., 2002, p93) which may relate to the need for security about infant growth.

Whelan and Lupton (1998) interviewed low income mothers and found that weight gain was “an important external verification” for breastfeeding, with poor weight leading to cessation of breastfeeding (p 98). As noted above, Mahon-Daly and Andrews (2002) found that “simply falling off the percentile trajectory was often a lone reason for breastfeeding to be discouraged or questioned” by health visitors, and mothers accepted this (p68). A cohort study in Newcastle collected data on babies’ weights and also asked women why they had stopped breastfeeding (Wright et al 2006). Babies in the cohort who had been breastfed for the shortest time were those who had the rapidest weight gain and were tallest at one year. These authors suggest that the “higher nutrient requirements of the genetically taller infants led them to make more demands on their mother and make her more likely to give up” (Wright et al, 2006, p 690). This study also notes that two-thirds of the women who stopped breastfeeding before six weeks did so in response to feelings that their babies fed too frequently or were hungry. The demands the larger, ultimately taller, babies made on their mothers may have been too culturally demanding (in terms of time spent and frequency of feeding) rather than too physiologically demanding. This highlights the complexity of studying this area and the value of combining quantitative investigation with qualitative enquiries.

Asian babies in the UK have been found to give their mothers great concern about their eating, and also about weight gain (Thomas & Avery 1997). At five months 29% of Bangladeshi mothers mentioned concern about eating or weight (these were one combined category in the report), compared to 15% of Pakistani mothers, 19% of Indian mothers and 13% of white mothers. At nine months, the figures for mothers concerned that their child was “not eating enough, not gaining enough weight” were 49% Bangladeshi, 33% Pakistani, 46% Indian and 27% white mothers (Thomas & Avery, 1997,

p66). This reveals a very high level of such concern in the areas in which most Asian women lived at the time of the 1991 census (the white sample was not a national sample, but was drawn from the same wards as the sample of women of Asian origin),

A case study of poor weight gain in the early weeks illuminates the emotional effects of concern about weight (Brown, 2000). Once her baby began gaining, this mother avoided the clinic, finding visits “extremely stressful”. The advisor herself (a midwife and lactation consultant) felt “fairly stressed about the well-being of the mother and baby” (Brown, 2000, p19). Some studies which document the feelings of parents whose babies have been diagnosed as failing to thrive detail negative emotional consequences when a baby is not growing well. Underdown (2000) noted mothers’ “loss of confidence and feelings of failure” when babies did not feed well from the beginning (p13). Thomlinson (2002) explored the lived experiences of some Canadian families where a child was failing to thrive (no similar study has been found conducted in the UK: Lucas et al (2006) included this study in their systematic review for the UK). Families spoke of “all-encompassing fear” (p540); of how “their abilities as parents were called into question when their children did not grow” (p541); and how the experience meant they had “lost faith in the medical profession” (p543). The parents in this position will be few, but the negativity of these outcomes is concerning.

Despite authoritative exhortations to ensure that weight monitoring to identify individuals of concern does not worry the many parents of well children, such evidence points to concern about infants and young children’s growth which is wide-spread.

Conclusion

In reviewing this area a patchwork of practice has been revealed. The issue of monitoring weight gain involves many health professions but has not necessarily involved effective multi-disciplinary working or the creation of clear tools for assessing individuals. Creation of national protocols for routine weight monitoring in the UK might help improve cost effectiveness of services and also equity of access to particular forms of support, such as with breastfeeding and specialist evaluation of infant oral-motor abilities. However, some traditional ways of working may be challenged. The WHO project to produce a new international growth standard was undertaken in recognition of the importance of growth monitoring for helping to ensure infant and young child health. Whatever chart the UK chooses to use in the future, attention to the practices of weight monitoring and seeking to

improve all aspects will be in line with the aspirations of WHO that weight monitoring can help to ensure that children's health and nutritional needs are met.

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