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Developing and Introducing Evidence Based Clinical Practice Guidelines for Serious Illness in Kenya

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Abstract

The under-5 mortality rate in most developing countries remains high yet many deaths could be averted if available knowledge was put into practice. For seriously ill children in hospital investigations in low-income countries commonly demonstrate incorrect diagnosis and treatment and frequent prescribing errors. To help improve hospital management of the major causes of inpatient childhood mortality we developed simple clinical guidelines for use in Kenya, a low-income setting. The participatory process we used to adapt existing WHO materials and further develop and build support for such guidelines is discussed. To facilitate use of the guidelines we also developed job-aides and a 5.5 days training programme for their dissemination and implementation. We attempted to base our training on modern theories around adult learning and deliberately attempted to train a ‘critical mass’ of health workers within each institution at low cost. Our experience suggests that with sustained effort it is possible to develop locally owned, appropriate clinical practice guidelines for emergency and initial hospital care for seriously ill children with involvement of pertinent stake holders throughout. Early experience suggests that the training developed to support the guidelines, despite the fact that it challenges many established practices, is well received, appropriate to the needs of front line health workers in

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Role of the authors

Annah Wamae, Fred Were, Aggrey Wasunna and Norbert Peshu helped oversee the development of the CPGs, participated in their review and production and helped co-ordinate key activities at each stage of the process. In addition Annah Wamae acts as the link between the project and the Ministry of Health.

Stephen Ntoburi, Philip Ayieko and Newton Opiyo contributed to evidence reviews, production of the CPGs, development and refinement of ETAT+ training materials and (for SN) took part in ETAT+ course development and implementation.

Grace Irimu helped oversee the development of the CPGs, participated in their review and production, worked on the development and refinement of ETAT+ training materials, took part in ETAT+ course implementation and end of course evaluation and wrote the draft manuscript.

Mike English conceived the idea for the major study, obtained funding for this work, helped oversee evidence synthesis and the development of the CPGs, participated in the review and production of the CPGs, produced the draft ETAT+ course and worked on its development and refinement, took part in ETAT+ implementation and end of course evaluation and oversaw the development of the manuscript.

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Competing interests

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Kenya and feasible. To our knowledge the process described in Kenya is among a handful of attempts globally to implement inpatient or referral care components of WHO / UNICEF's Integrated Management of Childhood Illness approach. However, whether guideline dissemination and implementation result in improved quality of care in our environment remains to be seen.

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Introduction

Kenya, in common with many developing countries, has committed itself to Millennium Development Goal (MDG)-4, which calls for a reduction of mortality in under 5 year olds by two thirds from 1990 levels by 2015 [1]. Improving the management of common severe childhood illnesses is one of many strategies likely to be needed to achieve this goal as mortality rates in hospitals as high as 15% are reported [2,3]. Two further points also suggest the potential value of improved basic care to improve outcomes. First, the majority of deaths are attributable to a handful of illnesses and second, assessments demonstrate that the quality of care provided to children in low income countries is often poor with considerable scope for improvement [3,4].

Clinical practice guidelines (CPGs) are intended to assist the health provider in evidence-based decision making and promote the provision of optimal care. Previous studies have shown that adherence to such evidence-based guidelines is associated with improved health outcomes [5,6,7]. For some conditions such as pneumonia [8] and diarrhoea [9,10] the World Health Organisation has made CPGs available for many years. In 2000 evidence and expert opinion were used to provide comprehensive advice on the care of sick children in hospital with common conditions [11]. However, few hospitals or health workers in Kenya have any access to either the WHO recommendations or any local, modern practice guidelines [3] and it is known that a wide range of factors affect the actual ability to improve care and outcomes [12-15].

We therefore aimed to develop simple CPGs for conditions commonly associated with mortality in Kenyan hospitals and an in-service training package to facilitate their implementation. The effect on quality of hospital care of a multifaceted intervention project including these CPGs and training is the subject of ongoing research. Here we report the process of developing the CPGs and training and our initial experience with a model for implementation. We have previously reported the findings that established the need for improved paediatric care in Kenyan district hospitals [3].

Development of CPGs

Defining targets

Target illnesses responsible for more than 80% of paediatric hospital deaths locally [2,16] were identified and included: malaria / anaemia, pneumonia / asthma, diarrhoea / dehydration, severe malnutrition, meningitis, neonatal sepsis, birth asphyxia and prematurity / low birth weight. In addition to these, basic life-support, convulsions, hypoglycaemia and HIV were considered cross-cutting problems. For HIV the main focus was on recognition and diagnostic counselling and testing in line with available local guidelines [17].

Next consideration was given to the potential major users of the CPGs. In Kenya most initial clinical care for hospitalised children is provided by clinical officers (who undertake a 3 year diploma training) and nurses, the latter being the major providers of newborn life support and immediate care of the sick newborn in nurseries [2]. Junior physicians provide

some care but senior physicians or qualified paediatricians are rarely available early in an admission.

Finally the scope of the CPGs was considered. Most deaths of children in hospital in Kenya occur within 24-48 hours of admission [18-20]. The CPGs were therefore aimed specifically at trying to ensure that appropriate initial care could be provided by health workers with limited paediatric training by providing highly directive guidance on illness severity assessment and the use of 10 immediate and distinct, therapeutic, life-saving strategies: cardiopulmonary resuscitation (newborn, infant and child), anti-convulsants, parenteral glucose, parenteral antibiotics, rapid acting bronchodilators, antimalarials, intravenous fluid resuscitation, specific nutritional support, oxygen and blood transfusion. In addition, explicit guidance was also given on the use, where available, of simple laboratory tests: haemoglobin estimation, blood slide for malaria, HIV test, blood glucose, and CSF microscopy.

Promoting local ownership

The effective absence of local guidelines for common conditions indicated in part a lack of recognition of the value for conditions as common as pneumonia or diarrhoea. As the results of early work [3] suggested that any guidelines were likely to conflict with ‘everyday practice’ this problem was tackled, over two years, in a number of ways:

1. The first crucial step was a workshop, hosted by the Division of Child Health of the Ministry of Health (MoH), that included representatives from other MoH divisions, senior paediatricians from national referral hospitals, the private sector, university teaching hospitals, the Kenya Paediatric Association and the Kenya Medical Research Institute (KEMRI). Participants began the task of adapting to the Kenyan context the WHO recommendations for inpatient care [11]. At this meeting the algorithm format of basic CPGs were presented and approved as a mechanism to assist in the implementation of the recommendations.
2. As appropriate to guideline development, attempts were then made to base the CPGs on the best available evidence. Thus, literature searches and evidence summaries [21,22] were undertaken for all the identified conditions with the exception of infant and child resuscitation. These were undertaken according to the methods suggested by the International Child Health Review Collaboration (www.ichrc.org) and complemented this initiative resulting in the development of a local database of evidence summaries and 434 key references.
3. After collecting and summarising much of the evidence a dissemination forum entitled ‘Child Health Evidence Week’ was hosted where 8 local topic experts and two international experts presented and discussed the evidence with participants. The 36 participants were drawn from Kenya (26) and Tanzania (10) and consisted of senior academic / training staff from medical training schools (for nurses and clinical officers) and universities, the MoH and WHO.
4. Draft copies of the CPGs were produced under the auspices of the MoH Division of Child Health. These were reviewed by senior paediatricians from the University of Nairobi and the Kenya Paediatric Association and discussed in the post-graduate teaching seminars at Kenya’s largest university medical school.
5. The final version of the CPGs was then reviewed within the Ministry of Health, endorsed and approved for publication as a 31 page booklet of “Basic Paediatric Protocols”.

Development of a training approach to assist CPG implementation

How adults learn

The training was based on conceptual models[23-28] (Table 1) and teaching methods[29] that aim at improving knowledge translation and execution of the recommendations through sequenced and multifaceted activities. It was aimed at nurses, clinical officers and doctors to promote team working as studies have shown that nurses can often perform as well as clinicians in basic initial steps of management [30,31,32]. Both didactic and interactive sessions were delivered. Didactic interventions may change knowledge, skills or attitudes or may act as predisposing elements to change, particularly if delivered by a respected peer leader. Interactive sessions promote the use of acquired knowledge by participants and provide the opportunity to practice and hone skills [33,34]. As successful adult education is learner-centred, active rather than passive, relevant to the learner's needs, engaging and reinforcing [3,35-37] opportunities for questioning and reflection together with positive reinforcement and encouragement were a consistent feature of the course and defined the role to be played by facilitators.

Training course development

We initially adapted the existing WHO Emergency Triage Assessment and Treatment ETAT course (www.who.int/child-adolescent-health/publications/CHILD_HEALTH/ETAT) adding a considerable amount of new material on newborn resuscitation and care of the common causes or consequences of serious illness in the newborn or child to produce Emergency Triage Assessment and Treatment plus admission care (ETAT +). The didactic training materials were initially tested for content and ease of understanding with ten trainee paediatricians and two senior nurses. In the second step the identified instructors were trained by the principal course designer over 5 days and each lecture and practical session was discussed. The training materials were then revised and compiled into a draft instructor manual. Three full-scale pilot training courses were then held in a district hospital not earmarked for the project (28 participants), the national hospital (14 participants) and a medical training college (34 participants). During and after each pilot training course instructors discussed problems and required revisions were made to the course materials and instructor manual.

The result was an ETAT+ course comprising 17 lectures interspersed with practical sessions (see Table 3). Practical sessions were undertaken in small groups (approximately 8 people) and were designed to reinforce practice change messages and progressively build knowledge and skills using role play with manikins and simple equipment. Each practical session emphasised the assessment of airway, breathing, circulation and disability (ABC&D), the appropriate provision of life saving interventions, problem solving and team involvement. In addition, all training emphasised and encouraged the use of specific job aides including the "Basic Paediatric Protocols" booklet containing all the CPGs, drug and fluid dose charts and standardized paediatric and newborn admission record forms [2] that focused attention on the symptoms and signs included in the CPGs.

The role of facilitators / instructors

Instructors or facilitators need to be authoritative and as a group present a consistent approach. Their selection and training is therefore likely to be critical to the ability of a course to influence practice. Our initial instructor group consisted of 4 paediatricians, 2 medical officers (equivalent to the senior house officer level) and 1 clinical officer working as a tutor in a medical training college. During the training course development and pilot testing all went through the Paediatric Advanced Life Support Course (PALS) and the UK Resuscitation Council's Generic Instructors Course (GIC) in Kenya. The aim was to equip

them with skills and techniques relevant to adult learning and teaching and harmonise their approach as instructors. Consistency amongst the instructors was further promoted by jointly providing group teaching and a rotating allocation of instructors to groups, lectures and practical sessions. .

Promoting change

Although training tends to focus on changing knowledge reluctance to change practice and unsupportive working environments may be significant barriers to knowledge use [38]. Several strategies were therefore adopted at the individual and institutional level aimed at facilitating implementation of practices in line with the CPGs. This began with pre-course preparation as participants were sent authoritative WHO reading materials [39,40] approximately 1 month prior to the training and informed that they would sit multiple choice and practical exams at the end of the training. The course itself was delivered by credible and respected authorities, the role of evidence in developing the CPGs was emphasised and a majority of the training time was focused on active use of knowledge and problem solving. To promote institutional change we aimed to train a large number of personnel from different professions but a single institution together and incorporate active team working. We also incorporated self-assessment in the form of audit of patients' hospital records and a hospital site and practice survey conducted by participants with discussions aimed at reflection on the gap between actual and desired practice.

Our initial experience with training to implement the CPGs through ETAT+

To reduce the cost of training we planned for it to be conducted on-site or in the vicinity of a hospital. No payments (*per diems*) were given to the participants but refreshments and a midday meal were provided. Due to the nature of the training and the requirement for 32 staff to be available for 5.5 days a preliminary visit was made to the four initially identified sites to explain and plan for the training. Although the training was aimed at those with clinical responsibility for admitting sick children, pharmacists, nutritionists, and laboratory staff were also invited for specified topics. Each hospital's administrators actively co-operated to achieve this aim including re-scheduling staff leave and some clinical services and, in some cases, the provision of routine medical cover by consultant staff.

Details of who attended the training in the first four hospitals are provided in Table 3. After the first day, when training rules were agreed, punctuality and attendance were excellent. The absence of any *per diem* payment did not result in absenteeism. The typical cost of providing one 5.5 days training for 32 participants including all costs for the 5 facilitators was approximately US $5,000 per site (although this does not include costs for course development and instructor training). As our aim was to promote understanding, use of and belief in the CPGs participants were allowed access to these during the written, multiple-choice examination. Marks from this examination were affected by the extent to which participants took advantage of this and are thus not a very useful guide to individual performance. However, Table 3 shows a summary of the participants' practical assessment results. At the end of the training course we asked participants to evaluate the course components in terms of relevance and value, the feasibility of introducing the CPGs and their commitment to change using a self-administered questionnaire requiring responses on 5 point Likert scales. Responses are described in Table 4.

Discussion

We have described the development of CPGs for emergency and hospital care for children (0 - 4 years) as well as a means for their implementation that has been attempted in four district hospitals in Kenya as part of a longer term evaluation of their impact. District

hospitals are the primary targets for the CPGs as although staffed by health workers with little or no specialist paediatric training they are the major referral sites for sick newborns and children from peripheral health units and therefore represent the clinical service area with the greatest potential for reducing mortality[41].

Interestingly although aimed at the district hospital the CPG booklets that also contain drug, fluid and feeding guidelines are being introduced by the MoH and WHO-Kenya to major provincial and national hospital settings and training facilities at a cost of $0.85 per copy. This perhaps reflects the fact that the development of the CPG booklet was a long term, careful process including the government, academics, clinical teachers, paediatricians and others from the stage of priority setting [3,37] through drafting guidelines, evidence review, development of job aides [2], peer review of draft guidelines and dissemination so enhancing local ownership. The CPGs produced consist of clear and direct recommendations for 'best practice' in delivering emergency and early inpatient care for common problems and largely reflect international recommendations for provision of life-support and care presented in the "WHO Pocket Book of Hospital Care for Children". As such our CPGs reflect an attempt to implement referral level or inpatient IMCI.

However, the CPGs will be useless if they are not understood and if recommended practices are not delivered appropriately. We therefore designed a training approach around the CPGs adapting and considerably extending the scope of an existing WHO course (ETAT) to produce ETAT+. This course links our local CPG booklet and training to standardized admission forms that appear to be acceptable and effective [2], and should cost less than $30 per 1,000 patients admitted to sustain. We hypothesise that the approach of 'institutional learning' will promote change in the short term and minimize negative social influences [42]. Such an approach could go some way to mitigate the effect of the rapid staff turnover that is a feature in many Kenyan hospitals. Training health providers of different clinical backgrounds together may also empower cadres with less perceived authority to prompt and promote change. Although there are challenges to delivering training at an institutional level we have shown that district hospitals in Kenya are willing to work to make such an approach possible if given adequate time to prepare. Further, our decision not to offer a *per diem* payment (the former norm for most government or NGO run trainings) did not appear to threaten the training as 99% of the participants completed the course and punctuality was excellent. This, together with the decision to host the training in sites close to these relatively rural hospitals and the need for only 5 facilitators resulted in relatively low training costs.

From the commencement of the training our observations indicate that it became progressively apparent to the participants that there was a major 'gap' between what they had been practicing and the 'best practices' possible even in a situation with limited resources. We feel this created a positive motivation for learning in order to change practice. Thus, by the end of the course over 80% of participants performed well in their practical assessment, nearly 20% excellently. We had made no attempt to formally characterise those who performed poorly. However, our observations suggested that some of the older clinicians (although interestingly not nurses) with deeply engrained practices were the least likely to have completed their pre-reading, were the most likely to perceive change as disadvantageous in terms of the personal effort required and the least likely to perform well.

Decay of knowledge and loss of skills pose a real threat to the ongoing success of best practice care interventions [43]. We are currently attempting to evaluate the real-life effectiveness of CPGs allied to support supervision in selected district hospitals. Further challenges for implementing and maintaining best practice care at a national scale include the capacity to update CPGs and sustain provision of job aides, to provide peer leadership

and expert instructors, and, ideally, to integrate best practice into training institutions. Particularly if training institutions can promote the use of evidence and CPGs in Kenya then in time an increasing number of health workers, sensitised to the concept and aware that practice change is ongoing may accept and even demand updated best practice advice.

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Abbreviations

CPG	Clinical Practice Guideline
ETAT	Emergency Triage, Assessment and Treatment
MoH	Ministry of Health
WHO	World Health Organisation

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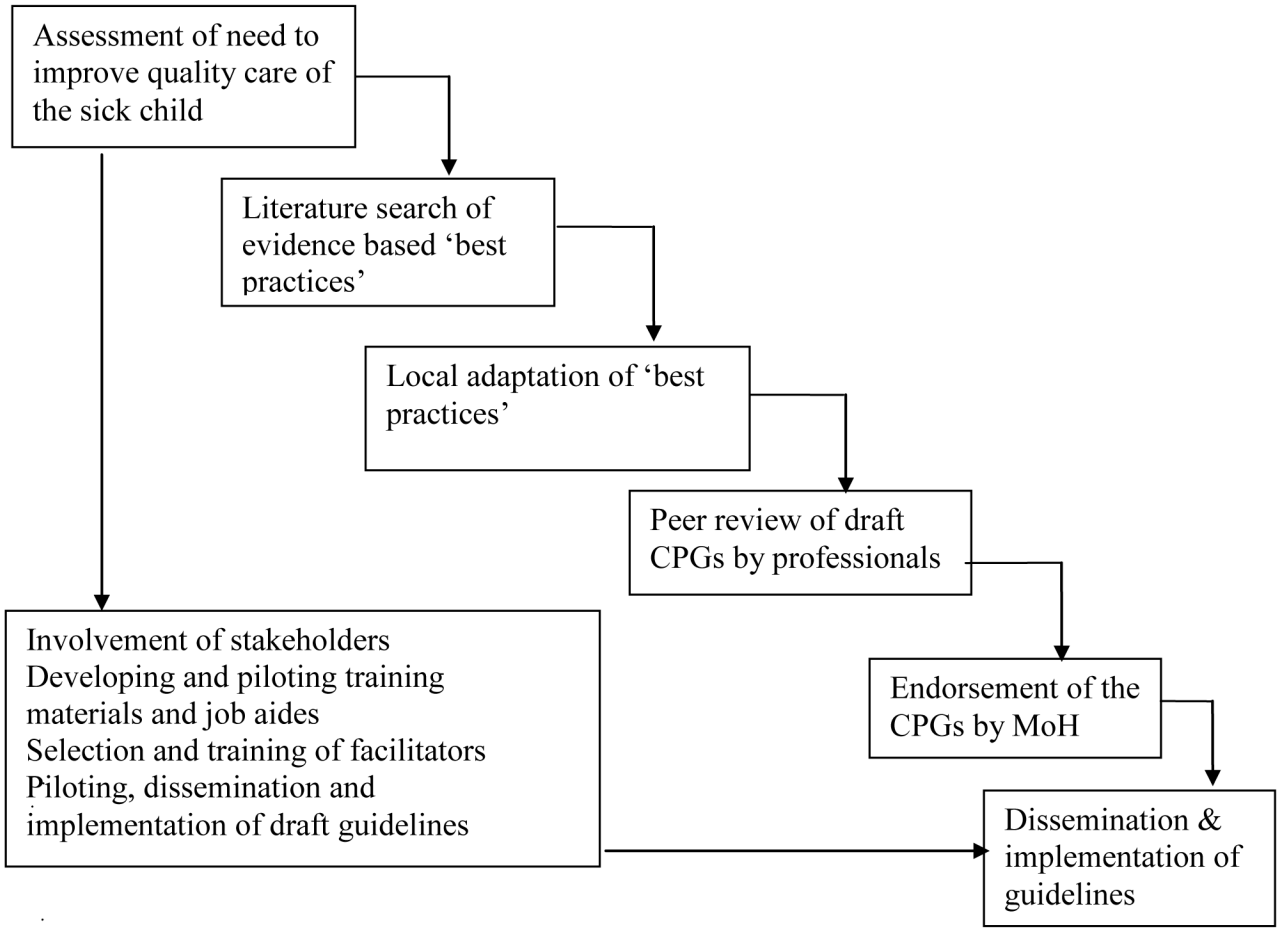

Figure 1.
Steps in development and dissemination of Kenyan Clinical Practice Guidelines

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Table 1

Behavioural theories applied in the development and dissemination of CPGs

Theory/concept	Assumption	Application in the development and dissemination of CPGs
Behavioural change model[28]	Moving through the stages of readiness to change requires changing knowledge and attitude, positive beliefs about ones ability to enact change and adapting the environment where changes take place	Knowledge transfer in didactic sessions, emphasis on optimising basic, achievable forms of care through repeated interactive learning sessions. Sharing results and process of hospital survey to allow reflection on current practice and indicate 'need for change'
Adult learning theories[29]	Adults change practice by learning rather than being taught.	Active participatory learning, small group interactive sessions, multi-method training
Social influence theory[27,44]	Individual's belief and behaviour are influenced by persons in their social network and society at large.	Involvement of local experts in development of theCPGs. Weight of evidence. Institutional / governmental endorsement and dissemination of guidelines. Use of facilitators with credible background.
Diffusion of innovation theory[23,45-47]	Individuals adopt change at different speeds. Innovators and early adopters will encourage others in changing practice. Some features of innovation modify its adoption: complexity, advantage over existing practices and procedures, compatibility with guidelines in use, 'trialability', and observability of results before adopting the innovation	Institutional dissemination of guidelines. 'Mass training' to create a corps of people supporting new practices. Simplified guidelines with clear and definite messages, repeated series of skill practice and case scenarios. New guidelines were adapted form existed guidelines - ETAT, PALS, IMCI, national HIV and malaria guidelines. Introduction of time-saving job aides
Health education model[25,33,48]	Behaviour change depends on predisposing, enabling and reinforcing factors. Predisposing factors are less likely to change physicians' behaviour compared to enabling and reinforcing elements but behaviour change cannot take place without addressing gaps in knowledge and skill.	Predisposing strategies: lectures, emphasis on 'best practice', credible lecturers and CPGs based on available resources Enabling strategies: job aides, practise of skills. Reinforcing strategies: Immediate feedback, on personal performance, Audit / reflection on current practice, End of course test and evaluation, hospital survey and feedback
Reflection[26]	Reflection is integral to knowledge translation. Enhances the capacity to visualize new realities and outcomes.	Problem based Audit, hospital survey and feedback, small group learning, role-play, case scenarios with team of hospital colleagues emphasising successful performance and post course evaluation.

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Table 2

Contents of ETAT + and duration of sessions

	Theory	Practical
Essential clinical signs, triage and life support (basic life support and intraosseus access)	1hr	1hr 45min
Infant and child resuscitation	45min	3hrs 30min
Resuscitation at birth and sick new born (0-7 days)	45min	3hrs 30min
Assessment, classification and treatment of diarrhoea disease, pneumonia, altered consciousness and meningitis, severe malnutrition and malaria. DC&T of HIV infection.	2hrs	3hr 15min
Rights of the Child and Standards of care, hospital survey and audit	30min	4hrs

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Table 3

Summary of ETAT + participants and assessments

		Doctors	Clinical officers	Nurses	Total
Total professional staff from all sites		29	71	599	699
% of hospital professionals trained		(11/29) 38%	(29/71) 41%	(90/599) 15%	(130/699) 19%
Results of practical assessment	Excellent	7 (64%)	5 (17%)	13 (14%)	25 (19%)
	Pass	3 (27%)	16 (55%)	61 (68%)	82 (62%)
	Fail	1 (9%)	8 (28%)	16 (17%)	25 (19%)

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Table 4

ETAT+ course evaluation participants responses over the feasibility of implementing CPGs and their commitment to changing practice

Topic for response	Summary of participants responses across all sites (n = 126)
Relevance and value of training topics and job aides	***Scale 1 = not at all useful, 5 = very useful / valuable*** Mean response > 4.5 for every question
Feasibility of implementation	***Scale 1 = very hard to implement, 3 = possible to implement, 5 = very easy to implement*** Mean scores in each hospital were >3.5 for all items other than in one site where mean scores for provision of emergency care in outpatient areas, provision of night-time feeds for malnutrition and performance of diagnostic counseling and testing for HIV by clinicians were accorded mean scores of between 3.3 and 3.5 These three items together with performance of lumbar puncture where indicated by the CPGs tended to have lower mean scores (though above 3.5) in the other sites as well.
Commitment to change	***Scale 1 = In this hospital practice change is not required at all, 3 = I do not feel strongly about practice change, 5 = I am strongly committed to change*** Mean scores for all items were > 4 indicative of at least a response of 'I have some commitment to change' in all sites with the lowest mean scores returned for provision of emergency care on paediatric wards, performance of lumbar puncture according to the CPG and provision of night-time feeds for malnutrition.