Emergency care for children—the next steps

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Recommended steps for improved medical services to children and those needing urgent medical attention

In a typical year, around 25% of calls to National Health Service (NHS) Direct will be about a child; a pre-school child will see his or her general practitioner about six times; a child of school age will see his or her general practitioner two or three times; approximately 10% of walk-in centre attendances will be children; up to half of infants aged <12 months and one quarter of children over one year old will attend an emergency department (accounting for about one quarter of emergency department attendances); 1 in 11 children will be referred to an outpatients clinic; and 1 in 15 children will be admitted to hospital. Emergency care has undergone massive change in the past few years. Recent emphasis has been on reducing delays for patients, particularly in emergency departments of acute hospitals. At present, the focus is changing to wider issues of quality.

In June 1999, an intercollegiate working party of the Royal College of Paediatrics and Child Health, British Association of Accident and Emergency Medicine, British Association of Paediatric Surgeons, Faculty of Accident and Emergency Medicine, Royal College of Nursing and Royal College of General Practitioners was established. The terms of reference were to review emergency services for children and to make recommendations for future provision of these services. The subsequent report—*Accident and emergency services for children*—made 32 recommendations (representing minimum levels of care), which were to be implemented by 2004.¹ A recent study has shown that these recommendations have been poorly implemented.² The Scottish Executive has also made recommendations on the quality of care. This government has recognised unacceptable variations nationwide in the quality of care for children and wishes to eliminate these differences (the National Service Framework).^{4,5} The NHS plan was published over the same period, in 2000. This plan stated categorically that by 2004 medical services should ensure that all patients are seen and discharged or admitted within 4 h. This was subsequently modified to 98% of patients. This was followed by the publication of *Reforming emergency care*, Department of Health,

London, UK, in 2001 and the formation of the Emergency Services Collaborative, NHS Modernisation Agency, London, UK, in 2002. All of this attention was inevitably of benefit to children as well as adults, with particular attention paid to the environment and speed of care.

An important lesson learnt from the subsequent improvements in emergency care was that it is a whole system problem. New clinically based standards covering all aspects of the patient's journey to hospital including all potential routes of entry now need to be established. The quality of care should be no different, whether the first point of care is the ambulance service, a walk-in centre or an emergency department. As secondary care for children is focused in fewer centres, it is more important that mechanisms be established for ensuring high-quality care in those centres without paediatric teams on site. It is unacceptable to sweep this under the carpet with blanket statements that these centres should not see children. Experience has shown that parents will often take their seriously ill child to the nearest NHS facility. The public must be offered clarity as to the services available, and any centre where children might present in an emergency state must be able to undertake the initial emergency management. All these centres should have a lead clinician for children's care, who can link with colleagues in a clinical network for children. We need to go beyond the simplistic approach of developing an integrated care pathway to developing a system that is integrated, avoiding duplication and gate keeping.

Unnecessary gate keeping should be abolished: why should an ambulance crew take a child directly to a paediatric centre after a 999 call but an isolated emergency department needs to ask permission (ie "refer" the patient) first? Referrals from one NHS organisation to another often introduce unnecessary delays. Retrieval teams have been shown to have many advantages but must exist in a system that ensures their rapid availability so that they do not prolong the therapeutic vacuum. Recent evidence has shown that they delay transfer of patients with head injuries.³

Systems also need a team who can optimise the patient's care while awaiting the arrival of a retrieval team. Why do we have different systems and different standards depending on whether a child is at home, referred to a general practitioner, at a walk-in centre, or at a peripheral emergency department? Systems should be designed for a whole health economy, not according to the location within that economy.

In the Department of Health, we have promulgated the message that all first-contact practitioners should have a basic training in assessing children and undertaking their initial management. There is a need for improved training, increased numbers of specialised staff and improved communication between professionals. There is considerable variation in practice between emergency departments.⁴ In the past, it has been suggested that all nursing staff dealing with children should be Registered Sick Children's Nurses and that all sick children need to be seen by paediatricians. The focus is now on ensuring that all staff have the adequate competencies to deal with cases that may present to them. Many emergency nurse practitioner schemes have focused solely on the care of adults and need to be expanded to include children. The advantages of see-and-treat systems should not exclude children because of unnecessary limitation of emergency nurse practitioners by strict protocols that include age as a criterion. The role of play specialists is now well recognised but variably adopted in emergency care. Widespread knowledge of the recognition and early care of seriously ill children is vital for all those involved in any aspect of urgent care. The management of pain in young children could be improved further.^{5,6} Major incident planning has often not dealt with the specific issues related to incidents with high numbers of children, which are not rare. Accepted standards for such incidents⁷ exist but need to be implemented widely. Child protection procedures need to be improved continuously and communication between all agencies in all sectors, without any barriers, is particularly important in this field. Although mental health emergencies in children are rare, systems must be in place to ensure that timely and appropriate care is available. There is a particular gap when it comes to adolescents with mental health problems, including the effects of drugs and alcohol. Local peer review of critical care services for children has successfully improved standards, and an expansion of this, both geographically and to include all emergency care, would be advantageous.

We know that there is room for further improvement in emergency care for

children. It will take time to implement these suggestions nationwide, but the direction of travel and the needs are clear—improved and measured quality of care, improved training and improved systems. Regarding the care of children, many emergency care facilities focus on the care of children under age 5 years. The needs of older children and young adults also need consideration but are often forgotten, as fewer sites focus on 24 h paediatric services, it is vital that appropriate networks of care for children and young people with emergencies are developed and that paediatric services are represented on all urgent care networks.

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Low-risk febrile neutropenia

Treating low-risk febrile neutropenia: Jenny's story

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Some paediatric patients with cancer can be treated with antibiotic regimens of reduced intensity and duration

Jenny is an imaginary 4-year-old girl on maintenance treatment for acute lymphoblastic leukaemia. She gets a cold and a temperature of 38.3°C, and her parents take her to the local hospital. Examination shows no apparent cause of infection, but her temperature remains increased and her neutrophil count is low at $0.7 \times 10^9/l$. Today, in the UK, the manner in which local hospitals treat such an episode varies considerably. After appropriate investigation, including blood and urine cultures, Jenny may be sent home with a recommendation to return if she becomes unwell, or if her temperature continues over the next few days, she may be started on oral antibiotics as an inpatient, with discharge after 48 h, or she may be started on intravenous antibiotics with a view to discharge on oral antibiotics at 48 h, or she may stay in hospital on intravenous antibiotics for a minimum of 5 days. Compare this with how Jenny is treated with chemotherapy for her acute lymphoblastic leukaemia, receiving the same national treatment regimen regardless of where she lives. For most patients, the difference between approaches to treatment of febrile neutropenia is never noticed as children are treated consistently at their individual hospitals, but imagine the potential for confusion or uncertainty if Jenny becomes unwell when she goes to visit her Aunt Minnie in a different part of the country.

The striking variation across the UK in the treatment of febrile neutropenia exemplifies the lack of consistency between paediatric oncology centres in their protocols for supportive care. Some centres are already using strategies to identify episodes of febrile neutropenia where the risk of life-threatening complications is low (acute medical deterioration, admission to the intensive care unit or death from sepsis), and are actively reducing the duration or intensity of antibiotics given during such episodes. Several studies have shown that this can be accomplished effectively and safely in selected low-risk episodes, in both specialist and non-specialist units.¹ Other centres continue to treat all episodes of febrile neutropenia with the standard approach of the past 30 years, using inpatient broad-spectrum intravenous antibiotics until the resolution of fever, without attempting risk stratification. It is interesting to contemplate the emergence of such variability. No large-scale, cooperative, randomised trials have been conducted for paediatric oncology supportive care, unlike the therapeutic studies on childhood cancer that are the envy of other specialities. In Europe, particularly in adult practice, the European Organisation for the Research and Treatment of Cancer has conducted studies on antibiotic treatment for febrile neutropenia that have influenced practice,²

but there are no cooperative trials focusing specifically on children. Local microbiological differences certainly exist and explain some of the local variation in antibiotic policy for febrile neutropenia, but do not account for other fundamental differences such as the degree of neutropenia (eg $<1.0 \times 10^9/l$ in some units, $<0.5 \times 10^9/l$ in others) chosen as the threshold for starting empirical treatment with antibiotics.

Intensive management approaches have reduced death rates to 1% and admission rates for paediatric intensive care units to $<5\%$ in paediatric febrile neutropenia.¹ About 50% of episodes of paediatric febrile neutropenia have no documented clinical or microbiological site of infection.³ Low-risk febrile neutropenia episodes are those in which it is very unlikely that there will be a life-threatening complication and are usually those without an identifiable, clinically relevant infection. For these episodes, it may be appropriate to reduce the duration or intensity of the antibiotics. Large-scale adult studies have produced detailed scoring systems to identify episodes of low-risk febrile neutropenia within the first 24 h of initial presentation.^{4–5} Even so, these scoring systems are not perfect, and serious complications or even death from infection are seen occasionally in low-risk episodes. Paediatric definitions are not as clear: the data that exist seek to define the risk of bacteraemia or invasive bacterial infection (as a surrogate for medical complications), and come from studies in single centres or a small group of centres. Only three sets of data have sought to validate a risk-prediction system.^{6–8} These define similar themes: episodes with a low risk of bacteraemia or invasive bacterial infection are those in which children are outpatients at the onset of the febrile neutropenia episode, are clinically well and show evidence of, or are predicted to have, impending bone marrow recovery.

Despite the lack of a single, validated risk-prediction system for paediatric

febrile neutropenia, many studies have compared differing approaches to treatment in febrile neutropenia episodes identified as low risk by local criteria. Useful approaches to reduced-intensity treatment include early discharge on ambulatory intravenous treatment, step-down treatment (starting with intravenous antibiotics and moving to oral treatment after a period of 8–48 h), or oral antibiotics from the outset of the episode, given in the hospital or as an outpatient. It is likely that many children with low-risk febrile neutropenia do not need any antibiotics at all, but at the moment we cannot adequately identify these patients early in the course of the episode. In the future, strategies such as the use of highly specific markers of inflammatory response might enable us to identify such episodes so that we can avoid antibiotics altogether in carefully selected low-risk episodes.⁹

Early discharge on ambulatory intravenous treatment has been shown in a small randomised trial to be as effective as continued inpatient treatment.¹⁰ However, other trials have shown that a step-down to early discharge on oral antibiotics can produce similar results,^{11–12} which is a more widely used approach in children. Step-down after 48 h of treatment as an inpatient was shown to be practical in the UK both in specialist paediatric oncology centres and local shared-care units,¹³ and such a strategy is potentially applicable to about one-quarter of febrile neutropenia episodes.¹⁴ Specialist centres with an interest in febrile neutropenia have been able to maximise the utility of the step-down approach by giving a single dose of intravenous antibiotics before discharge on oral antibiotics after a brief period of observation.^{8–15}

Treatment with oral antibiotics from the onset of febrile neutropenia has been viewed with great caution in children. Studies on an adult population with cancer have shown equivalence to intravenous treatment in selected low-risk patients with febrile neutropenia,¹⁶ but there are few data regarding its use in the paediatric population. Those that exist are encouraging^{17–19} but many clinicians still have considerable discomfort with this approach, and equivalence to other strategies has not been proved in a well-designed randomised controlled trial. The safety of oral treatment depends on good risk stratification and, until we can reliably identify patients without bacterial infection, on the use of well-absorbed oral broad-spectrum antibiotics, such as ciprofloxacin with coamoxiclav which will cover the full range of potential infections including Gram-negative organisms.

The Supportive Care Group of the United Kingdom Children's Cancer Study Group/Paediatric Oncology Nurses Forum is in the process of building a framework guideline

that seeks to unify the management of low-risk febrile neutropenia across the UK, with an emphasis on the step-down approach. The widespread implementation of this guideline will be an important step in advancing the supportive care of children with malignant disease, with an aim similar to that of many current therapeutic studies seeking a reduction in treatment-related morbidity (eg the International Childhood Liver Tumour Strategy Group SIOPEL 3 study comparing single-agent cisplatin with the established cisplatin/doxorubicin strategy for hepatoblastoma, or the United Kingdom Acute Lymphoblastic Leukaemia 2003 trial randomising patients with acute lymphoblastic leukaemia who have low levels of minimal residual disease to fewer blocks of intensive chemotherapy). The adoption of this treatment framework will hopefully generate new opportunities in the future to resolve issues, such as whether an oral antibiotic strategy is as safe as a step-down approach, with comparison of health-care costs and acceptability to families, and whether the lowest risk group can be treated successfully in the outpatient setting. These questions are currently the subject of trials in adult practice, but the difference between the age-defined populations is large enough to demand separate studies in children and young people.³

In summary, it is now possible to define a group of paediatric patients with cancer who can be treated with antibiotic doses of reduced intensity and duration. We have the chance to standardise the approach to the management of low-risk febrile neutropenia on the basis of current evidence (taking into account local microbiological environments). Further, by developing good clinical trials based on this approach, we can endeavour to advance the supportive care of children with cancer as conscientiously as we have with clinical trials on cytotoxic treatment. In time, if Jenny is unwell when she visits Aunt Minnie, she will be treated with the same consistency in supportive care as she already receives in chemotherapy.

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