

## Manchester triage system in paediatric emergency care

Moderate validity could be improved by incorporating physiological parameters



ROB/FOTOLIA

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The Manchester triage system is used in emergency departments to determine the clinical priority of patients on the basis of their presenting features.<sup>1</sup> It is not a diagnostic based system but ascribes a time by which ideally each patient should be seen by a clinician. It therefore functions as a risk management tool and can also be used to monitor overall activity in the emergency department. It is widely used in the United Kingdom and Europe. In the linked study, Van Veen and colleagues assess the validity of this system in 17 600 children visiting an emergency department in the Netherlands in 2006-7.<sup>2</sup>

Using this system, experienced clinicians, such as emergency department nurses, assess patients on the basis of the available history and, by means of focused questioning, choose one of 52 flow pathways. The sequential questions delineate the risk and hence the time in which the patient should be seen. The discriminating questions asked form an integral part of the framework of triage and make it a repeatable and consistent system. Inter-rater studies of clinicians conducting triage show good levels of agreement, outperforming ad hoc triage.<sup>3-5</sup>

Of the 52 pathways in the Manchester triage system, six are specifically for children, and the remaining pathways also consider children. The discriminating questions, which determine the acceptable risk of the patient's presenting condition, were derived by consensus of the Manchester Triage Group and have been revised 10 years after the initial launch of the system in 1996.<sup>1</sup> In this latest version, the placement of patients in the emergency department (for example, the resuscitation room or the minors area) is suggested for the triage categories of each pathway.

One of the key requirements of the system is that an experienced clinician undertakes triage—one who is experienced with the process, has good interpersonal skills, and can communicate well with patients. The clinician must also have an understanding of the patient's condition and be able to collate the presenting features with the clinical course of the patient's condition, which is particularly important if the presenting features do not fit into one of the pathways. This assessment of risk for each patient depends on the confidence of the person performing any triage.

Elderly people and young people make up much of the workload of the average emergency department—25% of those attending emergency departments in the UK are children.<sup>6</sup> Older and younger patients tend to be overtriaged; this may affect how all patients

pass through the department. The undertriaged patients may wait longer and their diagnosis and treatment may be delayed, particularly if the availability of clinicians and other resources is limited.<sup>4</sup>

It has not been possible to determine how effective triage is in terms of morbidity and mortality owing to the many confounding factors involved. Only a few studies have compared the validity of various emergency department triage systems in terms of use of resources, rates of admission to hospital, and length of stay in the emergency department.<sup>1 7</sup>

Van Veen and colleagues assessed the validity of the Manchester triage system by comparing the triage category ascribed to patients with a reference standard, comprising five levels of urgency. They found that it had moderate validity in children; the triage category agreed with the reference standard in 34% of children, whereas 54% were overtriaged and 12% undertriaged.

The authors suggested that additional information may improve the sensitivity and specificity of triage in terms of these validity outcomes—for example, by using a physiological based system such as the paediatric early warning score. Unsurprisingly, studies have shown that high scores (associated with children being ill) are linked to admission to hospital. However, this score was derived from inpatients and may not be representative of the general paediatric population; a low score does not exclude admission to hospital because children may present with conditions that need urgent attention but that do not alter their immediate physiological parameters.<sup>8 9</sup>

Is there a way to determine how good triage is? The validity outcomes used by researchers may not be meaningful because the purpose of the Manchester triage system is to prioritise patients on the basis of their presenting features to a rigid time frame, not the reference standards used. Two triage systems for emergency departments have shown high levels of agreement with each other in predicting use of resources and the immediate course of patients, but both were limited in how well they predicted these two outcomes.<sup>10</sup>

The derived consensus of the pathways and their discriminators need to be superseded by prospective collection of data so that levels of attributable risk to each of the presenting conditions can be derived.

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## Delays in accessing primary care

Need to be understood to prevent adverse health outcomes



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Many theories exist about the decision to consult a general medical practitioner.<sup>1,2</sup> Key influences include the characteristics of the patient, the medical practice itself, the nature of the disease or symptom, and the time of day. These factors are now of particular interest as we ponder the association between access to doctors and the effect on the prognosis of life limiting illness. Changes in policy on the availability of medical practitioners in the United Kingdom have potential clinical consequences; one of these, delay in seeking timely access to appropriate interventions, is explored in the linked study by Lasserer and colleagues.<sup>3</sup> The study found that the opening hours of general practices seem to influence patients' healthcare seeking behaviour after a transient ischaemic attack and minor stroke and can increase delay in assessment.

It has been shown repeatedly that people have the greatest confidence in their usual doctor and will procrastinate if faced with the prospect of consulting a different doctor after hours. A telephone survey assessed whether adults would see an alternative provider if they had an acute non-life threatening condition and their usual doctor was not available. Of the respondents, 48.6% indicated they would seek care from another professional the same day, 41.6% would wait one day or more, and 9.8% would not see another professional.<sup>4</sup> Therefore many people might wait if they thought that their life was not in any immediate danger.

Unfortunately, in many circumstances symptoms can be unreliable indicators of the need for urgent action in the absence of professional advice. Transient ischaemic attacks are just one example of many. Children also can deteriorate dramatically and beyond recovery within hours of consulting a doctor with a seemingly mundane infection. Doctors will be alarmed if a febrile infant remains irritable and has persistent vomiting or lethargy.<sup>5</sup> Wise clinicians provide a "safety net" by providing parents with clear action plans to be implemented according to the child's progress.

It has been argued that improving access to care is more likely to reduce rates of hospital admission for chronic conditions than changing patients' propensity to seek health care or making doctors' management of similar patients more consistent with evidence based practice.<sup>6</sup> The good news is that patients are willing to

consult a variety of professionals. The strongest evidence comes from studies of chronic conditions. In a study from the United States, researchers asked a random subgroup of 500 women about care preferences during acute illness and routine visits. Only a third of the women were "strongly" committed to seeing only their regular doctor. Most women were willing to consider consulting a different doctor or even a healthcare professional from another discipline. The authors suggested that more attention should be paid to educating patients about multidisciplinary roles, enhancing coordination of care, and customising care to match patients' preferences.<sup>7</sup>

Another way to consider this matter is to review the circumstances in which people won't wait to attend a familiar doctor. A Canadian study suggests that people with existing health concerns are more likely to present to an emergency department, especially if their usual doctor had advised them of when it would be wise to consult someone sooner rather than later.<sup>8</sup> It seems therefore that key influences on health seeking behaviour are instructions given to patients for when their usual doctor goes "off duty."

Most general medical practitioners will be grateful to a patient or relative who decides to seek professional help in response to deterioration in the clinical condition. In 2005, an Australian study concluded that intensified efforts were required to promote awareness of the need to present directly to the emergency department or call an ambulance at the onset of chest pain if more people are to survive a myocardial infarction.<sup>9</sup> Such instructions are now routinely issued to patients with a history of angina or previous infarction. However, the evidence that the mass media; community organisations; or professional, public, and patient education reduce the delay in patients seeking access to appropriate interventions is not convincing.<sup>10</sup> Delay in presentation is associated with advanced age and atypical symptoms. Any educational campaigns therefore need to be targeted at those at highest risk, especially older people, who are most likely to have an acute vascular event.<sup>11</sup>

A review from Australia identified six common models of providing after hours services.<sup>12</sup> None of the models reviewed extended clinic opening hours, even though this would reverse the international trend for individual practices to reduce the after hours services

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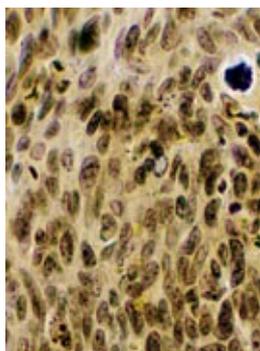
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they provide. Lasserson and colleagues confirm the impression that delay in access to health services has serious consequences and should be the target of our efforts at improvement. Although the authors' main suggestion that extending opening hours might reduce delay in assessing patients with transient ischaemic attacks is attractive, it is unlikely to be implementable or sustainable in the modern context. Their secondary suggestion of promoting self management in patients after hours by sending out public health messages about the need for emergency care seems more likely to benefit patients.

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## Adverse pregnancy outcomes after treatment for cervical intraepithelial neoplasia

Ablation is safer than excision, but unnecessary treatment should be avoided



BSWS/PL

RESEARCH, pp 798, 803

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Cervical cancer caused by infection with human papillomavirus remains a leading cause of death from cancer in women worldwide.<sup>1</sup> Premalignant lesions detected by screening are often treated by excision or ablation. Excisional techniques include cold knife conisation, laser conisation, and large loop excision of the transformation zone. Commonly used ablative techniques include laser ablation and cryotherapy, which destroy superficial tissue. All of these techniques are effective. Many women of childbearing age undergo these treatments, so their effect on subsequent pregnancies is important. Two linked studies assess the outcomes of pregnancy after treatment for premalignant lesions of the cervix (cervical intraepithelial neoplasia).<sup>2 3</sup>

In a registry cohort study from Norway, Albrechtsen and colleagues found that women who had undergone cervical conisation had a significantly higher risk of preterm delivery in subsequent pregnancies than those who had the treatment after delivery and those who were never treated.<sup>2</sup> They concluded that adverse pregnancy outcomes were related to the treatment itself rather than to the characteristics of the treated women. Some studies, however, have reported high rates of preterm birth in women diagnosed with cervical intraepithelial neoplasia who are not treated; this suggests that factors specific to the woman or the infection itself may place these women at increased risk.<sup>4 5</sup> The Norwegian study confirms previous studies indicating that all excisional treatments are associated with an increased risk for preterm birth.<sup>4 7</sup> During the study period the excess risk for preterm delivery decreased, possibly because less cervical tissue was removed as large loop excision of the transforma-

tion zone became more popular. Outcomes for ablative treatment were not reported and the different forms of excisional treatments were not clearly differentiated.

The meta-analysis by Arbyn and colleagues assesses whether treatment for cervical intraepithelial neoplasia is associated with severe adverse pregnancy outcomes.<sup>3</sup> It found that cold knife conisation significantly increased the risk of perinatal mortality, severe and extreme preterm delivery, and low birth weight. These more severe outcomes have high clinical importance, not only for the families affected but also for the healthcare system and for society. Large loop excision of the transformation zone was not associated with severe pregnancy outcomes, which is reassuring to clinicians and to women having this treatment.<sup>3</sup> However, the authors could not exclude the possibility that this treatment is associated with an increased risk for preterm birth. The meta-analysis confirmed previous findings that ablative treatments are associated with fewer adverse pregnancy outcomes than excisional treatments.<sup>4 6</sup> These findings indicate that the amount of tissue destroyed or excised may be important.

The Norwegian study reported that the risk of late miscarriage is significantly increased in women treated with conisation. Little is known about the effect of treatment for cervical intraepithelial neoplasia on fertility and early pregnancy loss.<sup>2</sup> A previous review indicated that fertility was not impaired after treatment for intraepithelial neoplasia, but the available data were weak.<sup>6</sup> A recent study found that treatment for intraepithelial neoplasia did not increase the proportion of babies born after in vitro fertilisation.<sup>8</sup> Large prospective studies are needed

to assess whether cervical treatments are associated with adverse pregnancy outcomes or impaired fertility.

Clinicians and patients should be aware of the risks for adverse pregnancy outcomes associated with excisional treatments. To minimise unnecessary treatment, a “see and treat” approach that combines diagnosis and treatment in one visit is not recommended, especially for women with low grade lesions. In many instances treatment of low grade lesions is not indicated.<sup>9</sup> In adolescents, the human papillomavirus infections that cause these lesions are common and transient, and the rate of spontaneous regression of low grade lesions is high.<sup>10</sup> Where treatment is needed lesions should not be treated aggressively, regardless of the type of treatment. To protect against serious adverse pregnancy outcomes, the minimum amount of tissue should be removed or destroyed. Women should be encouraged and supported to stop smoking—one of the few strategies known to reduce the risk of preterm birth, low birth weight, and cervical lesions associated with human papillomavirus.<sup>11 12</sup>

The discovery that persistent infection with oncogenic human papillomavirus genotypes is necessary for the development of high grade premalignant cervical lesions and cervical cancer has paved the way for exciting new molecular approaches to prevention. Future strategies to reduce the incidence of cervical cancer will probably include primary prevention using vaccines targeted against oncogenic human papillomavirus types, and secondary prevention based on human papillomavirus DNA testing and cytological screening. If these strategies

are optimally combined they could reduce the burden of cervical neoplasia worldwide and reduce the need for cervical surgery in young women.

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## Economic evaluation of health interventions

A broader perspective should include costs and benefits for all stakeholders

The choice of perspective is important in the economic evaluation of healthcare interventions. For example, in the National Institute for Health and Clinical Excellence’s (NICE) technology appraisal of drugs for Alzheimer’s disease, a major discussion point was whether the costs falling on care givers should be included as well as costs to the NHS.<sup>1</sup>

The main argument for adopting a restrictive perspective is that the budget for the NHS is meant to be for improving health. Therefore, the relevant consideration in evaluating interventions is the opportunity cost (in other treatments forgone) on the healthcare budget. But alternatively shouldn’t the full social benefits of healthcare interventions be considered? If healthcare interventions have benefits outside the healthcare sector—for example, in the criminal justice system, transport sector, or education—shouldn’t these be tracked and any budgetary adjustments sorted out separately? And shouldn’t health care aim to provide benefits to families and carers as well as the patient?

Textbooks say that all costs and benefits of interventions should be considered, no matter on whom

they fall.<sup>2</sup> However, most evaluations have a narrower perspective and focus on the relevant costs for the agency commissioning the study. Currently, NICE gives mixed messages on the subject of perspective. Technology appraisals normally consider only costs falling on the NHS and personal social services budgets in the primary analysis.<sup>3</sup> Public health appraisals, however—once the responsibility of the Health Development Agency, which operated under different statutes on public health—can also consider effects on other government budgets.<sup>4</sup> Therefore, an evaluation of a public health intervention to reduce substance abuse would consider the potential advantage gained from a reduction in criminal justice costs, but an evaluation of a drug to treat heroin addiction would not.

Intersectoral costs were one of the four methodological challenges we considered in a recent review of economic evaluations of public health interventions.<sup>5</sup> The review confirmed that the existing literature on economic evaluation generally adopts a restricted perspective, but it also showed that a broader consideration of costs and benefits was informative.

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For example, Byford and colleagues assessed the cost effectiveness of manual assisted cognitive behavioural therapy compared with treatment as usual.<sup>6</sup> The cost analysis included the cost to the NHS and that of spill over effects into other sectors of the economy, such as social services, voluntary services, accommodation and living expenses, criminal justice services, and lost productivity from time off work because of illness. They found that behavioural therapy would cost more per patient than treatment as usual if a community health service perspective was taken, but that it would be cost saving if a criminal justice perspective was taken. This shows how the perspective taken can influence the results. For the main analysis the authors took a broad economic perspective, which included the full cost of all service providing sectors, accommodation and living expenses, and productivity losses resulting from time off work as a result of illness. Manual assisted cognitive behavioural therapy was again found to be cost saving.

Broadening the perspective of economic evaluations is timely and consistent with recent policy developments in England. The *Commissioning Framework for Health and Well-being* signalled the need for primary care trusts and local authorities to undertake joint strategic needs assessments.<sup>7</sup> These will form the basis of a new duty for primary care trusts and local authorities to cooperate with one another.

For example, a primary care trust and local authority may decide that childhood obesity is a major priority area for joint strategic needs assessments. To facilitate this, NHS budgets to deal with overweight and clinically obese children would need to be identified, and once children are in the healthcare system optimum care pathways would need to be agreed on. However, the existence of such children is an indication that primary prevention has largely failed; a key component might also be to ensure that children do not need to enter the

healthcare system with problems related to obesity. This might be achieved by a range of cost effective public health measures across statutory and non-statutory sectors. Input might come from beyond the NHS; for example, from children, their parents, schools, communities, and local authorities. Many questions could be explored. Is advice on diet and nutrition effective and well understood? Are there safe play areas to encourage physical activity? Do nurseries and other childcare facilities provide regular opportunities for active play? Do local transport plans promote safe cycling and walking routes?

In the past, refusal to adopt a broader perspective has sometimes been justified because of data limitations, measurement difficulties, or limits in budgetary responsibilities. However, it is now time to overcome these practical difficulties and to think more broadly about the costs and benefits of healthcare and public health interventions.

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## Long term androgen deprivation therapy in prostate cancer

Benefits should be balanced against associated morbidities and costs

Oral oestrogens were the first line treatment for prostate cancer until they were found to be associated with cardiovascular toxicity in 30% of men.<sup>1</sup> Oestrogens were superseded by gonadotrophin releasing hormone agonists, which—on the basis of short term studies—were thought to have negligible cardiovascular toxicity.<sup>2,3</sup> Gonadotrophin releasing hormone agonists are currently used to delay the progression of advanced disease. Recently, their role has been extended to include adjuvant or neoadjuvant treatment for men having radical radiotherapy and for those with rising concentrations of prostate specific antigen after radical surgery with curative intent (presumed small volume residual disease), even though

survival benefits remain unproved.<sup>2</sup> Thus, patients are increasingly exposed to long term androgen deprivation therapy, and may take gonadotrophin releasing hormone agonists for more than 10 years. In these circumstances, the cardiovascular toxicity associated with this treatment is being re-evaluated.

A recent systematic review summarised the adverse effects of long term androgen deprivation therapy in men with prostate cancer; it found that this treatment was associated with an increased risk of atherosclerosis and cardiovascular disease.<sup>4</sup> The findings are not surprising because low concentrations of circulating testosterone have been associated with high body mass index, hyperlipidaemia with increased fat deposition,

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decreased insulin sensitivity, and type 2 diabetes—a constellation of effects known as the metabolic syndrome.<sup>4 5</sup> These effects may be heightened in patients who already have cardiovascular disease. All cause mortality in men treated with combined radiotherapy and androgen deprivation therapy is higher in those with pre-existing cardiovascular comorbidity.<sup>5</sup> Cardiovascular effects also seem to be time dependent. Men who receive androgen deprivation therapy for a short time (<12 months) are more likely to have a cardiovascular event, whereas the risk is lower in those who continue treatment for longer periods (>12 months).<sup>6</sup> Similar time and dose effects are seen for oestrogen therapy in women. The heart and estrogen/progestin replacement study and the nurses' health study show that oral oestrogen is associated with initial increases in cardiovascular toxicity over two years but a subsequent reduction in cardiovascular events with long term use, such that it has an overall cumulative cardioprotective effect.<sup>7 8</sup> This dual oestrogenic effect (and probably androgen suppression) is likely to be the result of an initial increase in arterial stiffness followed by improved arterial compliance over time.<sup>3</sup> Cardiovascular events may also be dependent on the route of administration. Parenteral oestrogen avoids first pass hepatic induction, reducing the impact of the metabolic syndrome and cardiovascular mortality to levels similar to those seen with gonadotrophin releasing hormone agonists.<sup>3</sup>

During the past 18 months, three other large studies have documented increased cardiovascular toxicity with long term use of gonadotrophin releasing hormone agonists. One study analysed outcomes from 73 196 patients on the surveillance, epidemiology and end results database who were treated for locoregional prostate cancer and observed for nine years.<sup>9</sup> The risk of a cardiovascular event was significantly higher in men treated with androgen deprivation therapy than in those treated by other means (adjusted hazard ratio: coronary heart disease 1.16 (P=0.001), myocardial infarction 1.11 (P=0.03), and cardiac death 1.16 (P=0.04)). The increased risk was not seen in men treated with orchidectomy. The second study also used surveillance, epidemiology, and end results data for 22 816 men followed for five years; cardiovascular events occurred in 24% of men who received androgen deprivation therapy versus 18% who did not (P=0.001).<sup>6</sup> On multivariate analysis, androgen deprivation was associated with a 1.2 relative increased risk of cardiovascular events. The third and most recent study followed 4892 men treated with radical surgery or radiotherapy included in the cancer of the prostate, strategic urologic research endeavor database.<sup>10</sup> The five year cumulative incidence of cardiovascular death for those receiving androgen deprivation therapy was 5.5% compared with 2% in those not receiving this treatment (P<0.001).

Long term use of gonadotrophin releasing hormone agonists is associated with other morbidities whose effects should also be considered. Testosterone suppression results in an andropausal (castration) state

in which patients are at risk of debilitating loss of cognitive function, fatigue, lethargy, depression, suppression of libido, erectile dysfunction, and hot flushes.<sup>3</sup> Accumulative bone losses of up to 2.6% each year are also of concern. Androgen deprivation therapy increases the risk of osteoporotic fracture 3.5 times, and the use of bisphosphonate drugs has increased dramatically in men on prolonged treatment.<sup>11</sup>

The expanded indications for androgen deprivation therapy in men with early prostate cancer, the increase in cardiovascular and osteoporotic morbidities, and the treatments used to try to ameliorate these effects have resulted in spiralling costs of medical treatment for prostate cancer.<sup>3</sup> The use of androgen deprivation therapy has increased 10-fold during the past decade. As a result, money spent on gonadotrophin releasing hormone agonists is now the sixth largest expenditure on drugs in the United States, and the treatment of associated morbidity runs into billions of dollars each year. These costs must be weighed against the benefits of slowing the progression of cancer and improving survival. Analysis of cost effectiveness and quality adjusted life years should be included in future studies of adjuvant and neoadjuvant androgen deprivation therapy. In addition, current National Institute for Health and Clinical Excellence guidelines could be revised to discuss the timing of androgen deprivation therapy in the context of all cause morbidity and mortality. Men need to be aware of these issues when asked to choose between the different treatment options. New ways of achieving androgen deprivation and managing advanced prostate cancer while minimising these morbidities are warranted.

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