

## QUALITY IMPROVEMENT REPORT

# Clinical risk management in obstetrics: eclampsia drills\*

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**Problem:** Infrequent presentation of patients with eclampsia, leading to staff inexperienced in the condition and untested emergency systems.

**Design:** "Fire drill" programme using on-site simulation of patients with eclampsia.

**Setting:** Tertiary referral obstetric unit.

**Key measures for improvement:** Successful implementation of measures to optimise management of eclampsia.

**Strategies for change:** Rapid activation of emergency team after one call, development and dissemination of evidence based protocol for eclampsia, strategically placed "eclampsia boxes," individual staff feedback and education.

**Effects of change:** Efficient and appropriate management of subsequent simulated patients.

**Lessons learnt:** On-site simulation can identify and correct potential deficiencies in the care of patients with eclampsia.

Clinical risk management is recognised as an important component of obstetric clinical governance. In a report by the Department of Health, maternity care has been identified as an area for improvement.<sup>1</sup> By 2005 the department would like the number of cases of negligent harm in obstetrics and gynaecology that result in litigation to be reduced by a quarter. The use of "fire drills" was advocated in the 1999 *Confidential Enquiry into Maternal Deaths and Towards Safer Childbirth* in anticipation of obstetric emergencies.<sup>2-3</sup> Implementation of these drills is necessary for level 2 accreditation by the Clinical Negligence Scheme for Trusts, which conveys a 20% discount in liability premiums for UK trusts.<sup>4</sup>

Simulation is useful for training both doctors and midwives to manage obstetric crises.<sup>5-6</sup> Training with high fidelity simulation has been shown to improve the speed with which anaesthetists respond to emergencies and the quality of their care.<sup>7</sup> Simulation can also be used to rate technical skills and behavioural performance during the management of emergencies, suggesting a role for this tool in a risk management strategy.<sup>8</sup> Multidisciplinary drills, or on-site simulations, using both manikins and actors, have been described for major obstetric haemorrhage, shoulder dystocia, and cord prolapse.<sup>9-10</sup>

Eclampsia is an uncommon but serious condition that affects 1 in 2000 pregnancies in the United Kingdom, with a mortality of 1.8%.<sup>11</sup> It may occur from 20 weeks' gestation to 48 hours post partum. Immediate management of the condition includes airway control, oxygen, magnesium for cessation of seizures, control of hypertension, and delivery of the baby.<sup>12</sup> Obstetric units should provide clear protocols for managing eclampsia, and the provision of packs with equipment to establish magnesium therapy is recommended (see fig 1).<sup>2-13</sup>

The outcome of eclampsia is affected by prompt appropriate care by experienced staff.<sup>14</sup> Given that most units will manage only one or two cases a year, and staff turnover is high, how is this experience to be gained? We explored the use of on-site simulation of a patient with eclampsia to provide controlled experience in an obstetric unit.

### CONTEXT

This project was started in 2001 in a tertiary referral obstetric unit, which manages around 6000 births a year. Three

episodes of eclamptic seizures are expected each year. The unit comprises 103 permanent staff: 15 obstetricians and anaesthetists, 68 midwives, and up to 20 ancillary staff. As many as 70 trainee medical staff may rotate through the unit in a year.

### OUTLINE OF PROBLEM

The traditional cycle of risk reduction involves incident reporting, analysis of the incident, feedback to clinical staff, and the implementation of changes to prevent harm to patients in the future. In this system adverse incidents must occur before corrective measures can be taken. Given the infrequent yet serious nature of eclampsia, maternity services cannot afford to wait for a genuine case to test the quality of emergency care.

We aimed to identify deficiencies in the management of eclampsia, to implement change to prevent exposure of



Figure 1 Pack containing equipment for magnesium therapy

\*This is a reprint of a quality improvement report that appeared in the *BMJ*, 2004, volume 328, pages 269-71.

**Box 1: Information for staff participating in drill**

You are about to take part in a simulated obstetric emergency. The patient is an actor so please simulate any invasive procedures. Say aloud what you are doing—for example, "I am sitting a green venflon." Everything else that you might do in this situation should be carried out as normal. Any intravenous drugs or fluids should be prepared as normal but delivered into the receptacle beside the patient. All the members of the hospital team are taking part in this simulation.

**Box 2: Clinical scenario**

The patient is a 36 year old primiparous woman, at 32/40. She has pregnancy induced hypertension and intrauterine growth retardation. On admission her blood pressure was 148/96, and urine tested by dipstick showed a high concentration of protein. Oral labetalol was started and her blood pressure fell to 146/90. She has gone into spontaneous labour and has been transferred to the delivery suite. She now mentions headache and visual disturbance.

patients to suboptimal care, and to expose inexperienced staff to a simulated eclamptic emergency in a safe environment.

**KEY MEASURES FOR IMPROVEMENT**

The gold standard for assessing this intervention would be to show better outcomes with fewer adverse events for patients with eclampsia. As eclampsia is a relatively uncommon event, such measurements are difficult to make. We therefore used as a surrogate outcome measure the identification of problems and successful implementation of appropriate changes in subsequent drills.

**METHODS USED TO IDENTIFY PROBLEMS**

Potential deficiencies in the management of patients with eclampsia were identified by introducing drills, recording the actions of staff in both written and video format, and analysing the outcome with a view to risk reduction.

As the timing of eclampsia is unpredictable, drills took place on the labour ward, antenatal and post natal wards, and in the emergency department. Staff involved in the drill included midwives, obstetricians, anaesthetists, clinical support workers, staff in the operating department, laboratory staff, switchboard operators, and porters. Only the drill organisers and senior clinical staff (coordinating midwife, on-call consultant obstetricians, anaesthetists, and paediatricians) knew the timing and location of the drills. A combination of anaesthetist, obstetrician, and midwife running the drill enables staff to experience the different priorities and approaches of these specialties.

In preparation for the drill we devised some clinical notes and a clinical scenario (boxes 1 and 2). We ensured that the drill would not conflict with actual clinical work, and we made preparations for postponing or abandoning a drill in a real emergency.

The simulated patient (a member of staff briefed about the condition and potential responses to medical intervention) was taken to the ward. A midwife was asked to take over the patient's care. She was allowed to obtain information from the patient and her medical notes. The patient then simulated a convulsion. The drill scenario developed in response to the actions of the staff, who were guided by the patient (for

**Box 3 Key events and responses**

Seizure starts  
 Seizure ends  
 Call for help  
 Arrival of:  
   Obstetric specialist registrar or consultant  
   Anaesthetic specialist registrar or consultant  
   Senior midwife  
 Correct patient positioning (left lateral)  
 Airway assessment and management  
 Delivery of oxygen  
 Intravenous access  
 Pharmacological intervention:  
   Correct choice of drug  
   Correct dose and administration  
 Monitoring:  
   Oxygen saturation in arterial blood  
   Blood pressure (non-invasively)  
   Heart rate and rhythm (electrocardiography)  
   Blood glucose concentration  
   Fetal wellbeing (cardiotocography)  
   Renal function (urinary catheter)  
   Magnesium toxicity  
 Delivery plan

example, simulating a post-ictal state with airway obstruction) and by observations posted by the drill director, such as blood pressure readings. A separate observer charted the drill's progress. The chart included key events and the participant's responses. The drill ended when the patient had been adequately treated, as determined by the drill director.

**Box 4: Problems identified during drills, and solutions**

- Difficulty summoning senior staff urgently  
Rapid activation of team through one call from switchboard
- Multiple protocols for managing eclampsia in different clinical areas, many out of date  
Development and dissemination of an evidence based protocol for eclampsia
- Deficiencies in the skills and knowledge of individuals in the management of eclampsia: positioning of the fitting patient; choice of first line anticonvulsant; safe administration of magnesium  
Immediate individual feedback and education; didactic instruction on magnesium administration in eclampsia protocol
- Time wasted fetching individual items for management of seizures  
Creation of strategically placed "eclampsia boxes" containing all necessary equipment and protocol for eclampsia
- Variable presentation of magnesium in drug cupboards  
Liaison with pharmacy to ensure consistency of magnesium ampoules supplied
- Confusion about staff roles, resulting in inefficient activity
- Clear division of tasks in management protocol

### Key learning points

- Clinical governance in obstetrics requires the use of risk management strategies
- Traditional methods of risk reduction may not be applicable to infrequent yet serious conditions such as eclampsia
- On-site simulation of obstetric emergencies allows risks to be identified without exposure of real patients to inadequate care
- On-site simulation provides controlled experience for all staff and promotes teamwork practices within a clinical unit

A debriefing session was held after a short break. Staff were invited to discuss positive and negative points about their performance and that of the team during the drill. This was followed by a systematic discussion of the key events and responses that should have taken place (box 3). The reasons for untimely or inappropriate staff responses were explored immediately. Thus we identified errors that could have led to an adverse outcome, discussed solutions, and began the process of correcting these deficiencies.

To allow the lessons learnt in the first cycle to be rapidly applied and reinforced, another drill took place the same day. Ideally, this should be held in a different clinical location—for example, if the first drill took place on the labour ward then the second drill should take place on a maternity ward. In this way the medical staff would be repeating the drill and a new group of midwives would be gaining experience. We aim to have a drill every 3-4 months.

### STRATEGY FOR CHANGE

Analysis of the simulations identified several problems in the management of patients with eclampsia (box 4), including both errors in the system and errors made by individuals. Significantly, during our first drill there was a failure to apply evidence based principles. Solutions were developed and implemented by senior medical and midwifery staff, and the labour ward risk management group was responsible for disseminating information about the new strategies.

### EFFECTS OF CHANGE

Repetition of drills in our unit has improved the care of simulated patients with eclampsia. In subsequent drills patient management has followed evidence based practice, with an enhanced level of efficiency. Staff are summoned faster, the resuscitation process is better organised, and drugs are prepared and administered more quickly. These improvements were unlikely to be due to experience gained in previous drills, as few staff participated in more than one

drill, but were more likely brought about by the simplification and reduction of tasks required when a patient has a convulsion and increased awareness of all staff about these tasks. Some staff found the drill a useful educational activity; however, it is probably not essential that everyone participates in a drill to improve the standard of care given by a unit as a whole.

### LESSONS LEARNT

On-site simulation can identify and correct potential deficiencies in the care of patients with eclampsia. This form of risk management may be applied to other emergencies that arise infrequently, in both obstetrics and elsewhere.

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