Resuscitation 80 (2009) 449–452

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical paper

Structured training in the management of emergencies in mothers, babies and children in a poorly resourced health system: Logbooks to document skill use☆

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ARTICLE INFO

Article history:
Received 8 November 2007
Received in revised form
16 November 2008
Accepted 23 November 2008

Keywords:
Impact evaluation
Evaluation studies
Continuous medical education
Training
Emergency management
Resuscitation
Logbooks
ESS–EMCH

ABSTRACT

Objective: To evaluate the use of a structured training programme in emergency care in Pakistan through the completion of logbooks documenting actual resuscitation attempts.
Design: Cross-sectional survey.
Setting: All tiers of health care settings across all regions of Pakistan.
Participants: 120 health workers, trained in the skills for managing maternal, neonatal and childhood emergencies as part of a system development programme called "Essential Surgical Skills–Emergency Maternal and Child Healthcare (ESS–EMCH).
Methods: Following a series of 6 five-day training courses developed as part of the ESS–EMCH programme between January and December 2006, participants were provided with logbooks to document the actual use of their newly acquired skills during the resuscitation of mothers, infants and children.
Results: 1123 resuscitation attempts were documented and received from 63 of the 120 participants (response rate 53%; number of forms 4–22 per participant). Seventy-six percent (858/1123) of documented cases were received from doctors and 24% (265) from nurses. The patients receiving resuscitation were neonates 31% (n = 349), infants and children 38% (n = 426), pregnant mothers 21% (n = 233) and other adults 10% (n = 111). The commonest emergencies treated in neonates were resuscitation at birth, sepsis, shock and difficulty in breathing. Haemorrhage was the commonest obstetric emergency (52%, n = 52/101), followed by eclampsia and shoulder dystocia. Skills used to secure the airway; breathing (use of oxygen and bag valve mask ventilation) and circulation were used in 58%, 82% and 73% of resuscitated patients. Oxygen was used in 87% of neonates and in 62% of pregnant mothers. The overall survival rate in the cases reported was 89%.
Conclusions: Resuscitation logbooks can be used to assess which skills are used in emergency care. This analysis provides some evidence that the skills taught during the ESS–EMCH programme are used by the trained health workers. Individually held and completed logbooks should continue to act as a feedback and audit mechanism to measure outcomes, in conjunction with other methods of evaluating the impact of the training component of this programme.

Introduction

Universal access to high quality maternal and child health services is a crucial step in achieving reproductive health targets set in the Millennium Development Goals for 2015.[1] Lobbying for evidence-based interventions to facilitate improvement in health service provision is a critical aspect of the reproductive health agenda in developing countries. Training in emergency healthcare delivery by the capacity building of health workers is being promoted as an important intervention to improve maternal and child health. However, there is insufficient data on the impact of training programmes on the practice of health workers.

The Essential Surgical Skills with emphasis on Emergency Maternal and Child Healthcare (ESS–EMCH) programme contains within it a continuing medical education training programme for first responding health workers treating patients in the 'golden' hours of their presentation. The ESS–EMCH programme followed 5 years of humanitarian aid work with Afghan refugees in Pakistan. The experience revealed a health care system deficient in human resource, equipment, and the capabilities of treating life-threatening emergencies.[2–4] The ESS–EMCH programme targeted emergencies in pregnant mothers, infants and children prevalent in developing countries that required immediate resuscitation and skilled emergency management at primary or secondary care level.[5] Technical support for developing the training component of the programme was provided by Advanced Life Support Group, UK

☆ A Spanish translated version of the summary of this article appears as Appendix in the final online version at doi:10.1016/j.resuscitation.2008.11.026.

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doi:10.1016/j.resuscitation.2008.11.026

(ALSG) and the World Health Organization. Various courses offered in the programme were based on training methods adopted from other ALSG courses.[6,7] The programme was launched in Pakistan in 2004 and more than fifteen hundred health workers have been trained during the last 3 years. The programme has been endorsed as a first ALSG certified training course targeted specifically at developing countries.[8]

Evaluations of various ALSG and other certified training programmes for emergencies have been conducted in the United Kingdom and the United States.[7,9] This impact evaluation, of ESS–EMCH was conducted in the first quarter of 2007, which aimed to assess the effect of training on changes in knowledge, attitudes and the clinical practice of trainees.

Methods

Demographically Pakistan has four provinces, the federal capital territory and the state of Azad Jammu and Kashmir. This cross-sectional survey included health workers from these areas, who attended ESS–EMCH training courses during 2006. The participants were doctors and nurses working in a variety of facilities ranging from tertiary care to primary care as well as some private facilities. The participants for each ESS–EMCH course were nominated by the provincial government, based on predefined criteria provided by the programme. Only doctors or nurses regularly treating obstetrics, neonatology, paediatric, anaesthesia or trauma emergencies were included. Consent to participate in this evaluation was sought from the individuals who had been trained. The topics covered in training are listed in Table 1. In addition, participants were taught about use of emergency medicines and procedures applicable to specific emergency situations prevalent in Pakistan.

The local research ethics committee approved the study. A resuscitation logbook was developed to document skills and procedures used to treat actual emergencies (Fig. 1). The logbook was pilot tested and was also translated into the local language (Urdu).

The logbooks were given to 120 participants from six ESS–EMCH courses in early 2006. The participants were trained to record their use of skills and submit their observations on a monthly basis. All completed logbooks received by 31st January 2007 are included in the results. Forms with incomplete or missing information were excluded from the study.

Table 1
Skills and procedures taught in ESS–EMCH trainings.

Basic life support (BLS)
Resuscitation at birth
Maintenance of airway and breathing
Airway opening maneuvers
Bag valve and mask ventilation
Emergency surgical airway
Safe oxygen delivery during emergencies
Maintenance of the circulation
IV line placement including long saphenous vein cut down
Intra-osseous needle insertion
Umbilical vein catheterization
Other emergency procedures
Chest drain and thoracocentesis
Nasogastric tube placement
Heimlich maneuver
Spinal immobilization after major trauma
Management of obstetric emergencies
Vaginal breech delivery
Shoulder dystocia
Massive obstetric haemorrhage
Eclampsia
Cord prolapse
Uterine inversion

Results

Sixty-three of the 120 participants (53%) submitted logbooks documenting 1123 resuscitations. The number of responses per person ranged from 4 to 22. There were responses from all the provinces of Pakistan (Table 2). Of the total feedback forms received, 76.5% (858/1123) came from doctors and 23.2% (264/1123) from nurses. Response was highest (45.9%) from primary and secondary public health care facilities, followed by tertiary care (34%) and finally the private sector (19.4%).

The patients undergoing resuscitation were as follows: neonates 31% (n = 349/1123), infants and children 38% (n = 426/1123), pregnant mothers 21% (n = 233/1123) and other adults 10% (n = 111/1123). Out of the neonatal emergencies, two thirds required resuscitation at birth. Neonatal sepsis, shock and difficulty breathing comprised the remainder of the presentations in neonates. Shock (32%), breathing difficulty (24%), and fits (22%) were presenting complications in older infants and children. More than half of the obstetric emergencies were delivered without further complications (n = 119/233), or had non-pregnancy-related disorders (n = 13/233). Amongst the remainder, haemorrhage was the most common obstetric complication (52%, n = 52/101), followed by eclampsia in 19% (n = 19/101) and shoulder dystocia (8%).

Health workers used skills to secure the airway in 58% of cases, to support breathing in 82% and to maintain circulation in 73% of resuscitated patients. Oxygen was used in 79% of all patients (n = 886/1123). Eighty seven percent of neonates (n = 303/349) were given oxygen, whereas 62% (n = 144/233) of pregnant mothers were given oxygen while being resuscitated. Some specific skills, such as the Heimlich maneuver, were used in all four cases of airway obstruction with successful outcome, whereas spinal immobilization by using a cervical collar was recorded for 32% of trauma patients. Intra-osseous cannula insertion, long saphenous vein cut-down and umbilical vein catheterization were also used in 26 patients. About 20% of the emergencies were treated without the use of any medication. Intravenous glucose (126), oxytocin (144), and diazepam (152) were the most commonly used medicines. Diazepam was used in 100 of the 116 patients that presented with fits other than eclampsia. Magnesium sulphate was used as a specific medication in 74% (20) of patients presenting with eclampsia, whereas before the ESS–EMCH programme only one health worker had used magnesium sulphate in her facility with an incorrect dose. Fifty percent of patients with breathing difficulty received nebulized salbutamol during their emergency.

The overall recorded survival rate in this sample was 89% (primary care facility 97%, secondary care, 90%, tertiary care, 84%).

Discussion

This is the first time that logbooks documenting individual resuscitations have been used to evaluate which skills are used after training in the management of maternal, infant and child health emergencies in Pakistan. The evaluations previously reported from the management of obstetric emergency and trauma course (MOET) in the UK and advanced life support in obstetric course (ALSO) in the US have used surveys or questionnaires assessing the confidence level of trainees after attending the courses.[7] The MOET experience in the UK, Bangladesh and Armenia has been evaluated by either immediate post-course assessments or participant's feedback on the course content.[10–12] Other educational interventions in neonatal resuscitation have been evaluated by assessing outcome measures of morbidity and mortality.[13,14] In Pakistan, specifically there are difficulties in evaluating the outcome measures of morbidity and mortality because of poor record keeping and incomplete data. The logbooks were used to gather objective information about the applicability of the ESS–EMCH training in Pakistan's health system.

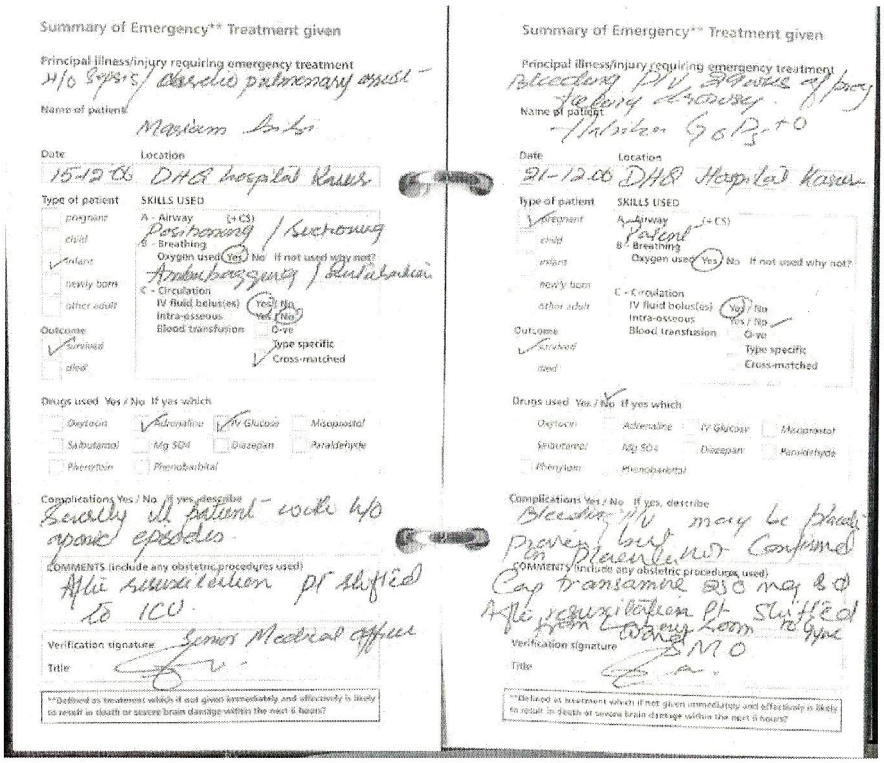

Figure 1. An image of two completed resuscitation forms of the logbook by one of the ESS–EMCH course participants.

A response rate of 53% by trainees on a voluntary basis was encouraging but poor and may have biased the results. A higher response rate from the Punjab province may reflect the increased number of courses conducted in this province. In addition, the health facilities in the Punjab were more functional than in other provinces. The response from tertiary care and private facilities was encouraging and suggests an acceptance of this kind of training. The observed difference in the response rate between doctors and nurses may have been because of the higher proportion of doctors trained in the courses.

The types of emergencies managed by the ESS–EMCH trainees across the country are comparable to national and international estimates of some of the pertinent causes of neonatal and maternal mortality prevalent in the developing world. The Bellagio child survival series has reported Pakistan amongst the countries having the highest levels of perinatal and neonatal mortality.[15] Causes include birth asphyxia, preterm delivery, tetanus and sepsis.[15,16] Statistics from previously available national data present a similar etiology.[17] The neonatal emergency situations encountered by our study group reflect an analogous picture, with more than 90% of presentations falling in the above category. Similarly almost 70% of the documented obstetrics cases comprised of haemorrhage or eclampsia, figures comparable to other developing countries of South Asia and Sub-Saharan Africa.[18]

This study has provided us with the evidence of the applicability of the skills needed to revive most commonly encountered emergency situations in mothers and children. Most of the emergency situations in mothers, neonates and children in developing countries are managed by generalist health workers, the major target population of the training component of the ESS–EMCH programme. The equivalent utilization of taught skills by all cadres of health workers reiterates the programme's philosophy in aiming to impart emergency resuscitation skills irrespective of the baseline knowledge. The finding that 10% of resuscitations involved non-pregnant adults shows the spill-over beneficial effect that such training courses can have in clinical practice.

The newly acquired skills were not previously practiced in Pakistan and were used for the first time. For instance, intra-osseous

Table 2
Logbook feedbacks received from respondents.

Province	Number of course participants included in the study		Number of course participants responding		Overall response rate	Total number of valid responses
	Doctors	Nurses	Doctors	Nurses		
Punjab	24	12	17	6	64%	480
Sindh	18	7	8	3	44%	74
Baluchistan	13	4	6	1	41%	177
NWFP[a]	17	8	11	3	56%	265
Federal Area and AJK[b]	10	7	6	2	47%	104
Total	82	38	48	15	53%	1123[c]

[a] North west frontier province.
[b] Kashmir region of Pakistan.
[c] Includes an additional 23 responses where area could not be ascertained.

access is a recommended procedure to establish timely and safe route for giving fluids, if two or three attempts to secure vascular access have failed.[19,20] None of the participants had ever used this technique before the course. Similarly long saphenous vein cut-down, chest tube insertion, skills to manage choking and the management of shoulder dystocia were not known to be applied by non-specialist health workers as a routine.

Still there are situations that need pertinent attention not only in terms of capacity building but also the provision of essential equipment and supplies in order to make use of the acquired knowledge and skills. For instance, the specific skill of spinal immobilization through cervical collar application was only observed in less than a third of trauma patients. This is not surprising for a health system deficient in ambulatory services and with limited availability of essential emergency equipment. Similarly magnesium sulfate is worldwide recommended treatment to control fits in eclampsia.[21] This medicine is not routinely used in Pakistan owing to its non-availability. It was neither available in any of the health facilities which entered the ESS–EMCH programme. Nevertheless, a 74% use of magnesium sulphate in eclamptic patients was observed after training; suggesting that health workers can mobilize resources to bring in evidence-based practices when they are equipped with knowledge and skills through appropriate training courses. Importantly, it shows that the ESS–EMCH training courses, which are practical and "hands-on", are successful in changing the practice of health workers at the bedside.

This was the first experience of using logbooks as a potential tool to document the effects of training in emergency care in real life settings in Pakistan. This effect has been addressed through other evaluation methods, in the overall impact evaluation of the ESS–EMCH programme that is currently in progress. Various other factors such as the non-availability of essential resuscitation equipment might have led to under-utilization of skills.

Limitations

The study carries a number of limitations which may have affected the results. A little more than half the participants responded, therefore we are not sure if the rest of them have been able to make use of acquired skills; although relatively inefficient postal service in certain areas would also have responsible. The self-reporting and voluntary nature of this study might also have led to a positive reporting bias, with the complicated or adverse outcome cases not being documented. However, the fact that deaths were reported somewhat mitigates against this particular bias. Ideally there should be logbooks recorded before and after training permitting a control element. The study also was not able to determine exposure of the respondents to any other training during or after the ESS–EMCH courses.

Conclusions

The results of this study provide evidence that logbooks documenting resuscitations can be helpful in assessing the use of emergency skills learned during training. However, the methodology now needs to be refined and efforts made to improve both the recording rate and efficiency of collating these data. However, each successful resuscitation indicates a positive benefit and can be encouraging and motivating for individual health workers. In view of the reported outcome we believe that the ESS–EMCH programme can make a difference to the practices and attitudes of health workers and that individually held and completed logbooks should continue to act as a feedback and audit mechanism to measure outcomes, in conjunction with other methods evaluating the impact of the training component of this programme.

Conflict of interests

This research was conducted as part of intermediary impact evaluation of ESS–EMCH course, designed and carried out by FQ as an academic assignment for partial fulfillment of the requirements for the award of the degree of Masters in International Child Health submitted to University of Warwick, Coventry UK in April 2007. FQ was paid by Child health Advocacy International UK for designing and conducting this and other research into the utilization of the ESS–EMCH programme.

Acknowledgements

Authorship: SZ and FQ contributed in conception, design, and analyses. SZ, AH, FQ & NA equally contributed in interpretation of data and drafting the article. AH and DS revised the draft critically for important intellectual content.

Contributors: Nick Spencer, Emeritus Prof. of Child Health at University of Warwick Coventry, UK contributed by refining critical details in conception and design of the study. Barbara Phillips of the Advanced Life Support Group reviewed the final version to be submitted. Ayyaz Bukhari contributed by entering the data into the SPSS.

References

1. United Nations Millennium Declaration. Resolution 55/2 adopted by the UN General Assembly. New York; 2000.
2. Hafeez A, Riaz R, Shah SU, Pervaiz J, Southall D. Integrating health care for mothers and children in refugee camps and at district level. BMJ 2004;328:834–6.
3. Cheetham C. Two months in Quetta. Arch Dis Child 2005;90:640–1.
4. Southall DP. Failures of emergency relief. J Roy Soc Med 2005;98(12):528–9.
5. Hafeez A, Zafar S, Rifaq F, Sultan MA, Southall DP, Muhammad KB. Achieving health millennium development goals through capacity building of health workers—ESS–EMCH strategy. Pak Paediatr J 2006;30(1):3–9.
6. Phillips BM, Jones KM, Jewkes F. The European Resuscitation Council's Paediatric Life Support Course 'Advanced Paediatric Life Support'. Resuscitation 2000;47:329–34.
7. Black RS, Brocklehurst P. A systematic review of training in acute obstetric emergencies. BJOG 2003;110(9):837–41.
8. Advanced Life Support Group [homepage on the Internet]. Manchester: Registered charity. [Updated 2007 June; cited 2007 August 12]. Available from: http://www.alsg.org/index.php?id=475.
9. Draycott T, Crofts J. Structured team training in obstetrics and its impact on outcome. Fetal Mater Med Rev 2006;17(3):229–37.
10. Jyothi NK, Cox C, Johanson R. Management of obstetric emergencies and trauma (MOET): regional questionnaire survey of obstetric practice among career obstetricians in the United Kingdom. J Obstet Gynaecol 2001;21(2):107–11.
11. Johanson RB, Menon V, Burns E, Kargramanya E, Osipov V, Israelyan M, Sargsyan K, Dobson S, Jones P. Managing obstetric emergencies and trauma (MOET) structured skills training in Armenia, utilising models and reality-based scenarios. BMC Med Educ 2002;2:5.
12. Johanson R, Akhtar S, Edwards C, Dewan F, Haque Y, Jones P. MOET: Bangladesh—an initial experience. J Obstet Gynaecol 2002;28(4):217–23.
13. O'Hare BA, Nakakeeto M, Southall DP. A pilot study to determine if nurses trained in basic neonatal resuscitation would impact the outcome of neonates delivered in Kampala, Uganda. J Trop Peds 2006;52(5):376–9.
14. Draycott T, Sibanda T, Owen L, Akande V, Winter C, Reading S, Whitelaw A. Does training in obstetric emergencies improve neonatal outcome? BJOG 2006;113:177–82.
15. Black RE, Morris SS, Bryce J. Where and why are 10 million children dying every year? Lancet 2003;361:2226–34.
16. Jones G, Steketee RW, Black RE, Bhutta ZA, Morris SS. The Bellagio Child Survival Study Group. How many child deaths can we prevent this year? Lancet 2003;362:65–71.
17. Jalil F. Perinatal health in Pakistan: a review of current situation. Acta Paediatr 2004;93:1273–9.
18. Ronsmans C, Graham WJ. The Maternal Survival Series Steering Group. Maternal mortality: who, when, where, and why. Lancet 2006;368:1189–200.
19. American College of Surgeons. Advanced trauma life support (ATLS) student manual. 6th ed. Chicago, IL: American College of Surgeons; 1997.
20. Atkins DL, Chameides L, Fallat ME. American Heart Association. International Liaison Committee on Resuscitation. Resuscitation science of pediatrics. Ann Emerg Med 2001;37(Suppl. 4):S41–8.
21. Duley L, Henderson-Smart D. Magnesium sulphate versus diazepam for eclampsia. Cochrane Database Syst Rev 2003;4:CD000127.