

The cost of local, multi-professional obstetric emergencies training

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Key words

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Conflicts of interest

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Abstract

Introduction. We aim to outline the annual cost of setting up and running a standard, local, multi-professional obstetric emergencies training course, PROMPT (PRactical Obstetric Multi-Professional Training), at Southmead Hospital, Bristol, UK – a unit caring for approximately 6500 births per year. **Material and methods.** A retrospective, micro-costing analysis was performed. Start-up costs included purchasing training mannequins and teaching props, printing of training materials and assembly of emergency boxes (real and training). The variable costs included administration time, room hire, additional printing and the cost of releasing all maternity staff in the unit, either as attendees or trainers. Potential, extra start-up costs for maternity units without established training were also included. **Results.** The start-up costs were €5574 and the variable costs for 1 year were €143 232. The total cost of establishing and running training at Southmead for 1 year was €148 806. Releasing staff as attendees or trainers accounted for 89% of the total first year costs, and 92% of the variable costs. The cost of running training in a maternity unit with around 6500 births per year was approximately €23 000 per 1000 births for the first year and around €22 000 per 1000 births in subsequent years. **Conclusions.** The cost of local, multi-professional obstetric emergencies training is not cheap, with staff costs potentially representing over 90% of the total expenditure. It is therefore vital that organizations consider the clinical effectiveness of local training packages before implementing them, to ensure the optimal allocation of finite healthcare budgets.

Abbreviation: PROMPT, PRactical Obstetric Multi-Professional Training.

Introduction

Improving maternal and perinatal care, and reducing preventable intrapartum harm in particular, is a global priority. More and better intrapartum training has frequently been recommended as a solution by national reports in the UK, including the recent Maternity Services Review in England (1–4) and also around the world (5,6). Up until recently, there has been little guidance or evidence for effective training and even less information on the

Key Message

Local, multi-professional obstetric emergencies training is not free. Maternity units should be confident of the clinical effectiveness of the training packages that they choose, and policy makers should be responsive to the cost implications of implementing training.

potential costs of implementing training. Two recent reviews of published outcomes after training for obstetric emergencies, one in 2009 (7) and another from 2015 (8), both concluded that regular, local, multi-professional training for all staff was the most effective model. Local training may also allow participants to evaluate their own workplace and identify areas for improvement (9). Practical Obstetric Multi-Professional Training (PROMPT) is an example of this model of training and would be a useful vehicle for investigating the cost of training. The PROMPT package was developed in the UK in 2000 and consists of a “Course in a Box”, containing Course and Trainers Manuals, and a DVD of training materials that can be adapted for local use in any maternity setting. Doctors, midwives & healthcare support workers all attend PROMPT training locally within the clinical areas of the maternity unit. The implementation of PROMPT at Southmead Hospital, Bristol, UK has been associated with improvements in perinatal outcomes (10,11) as well as improvements in safety attitudes and teamwork climate (12). These results have also been reproduced outside the UK (13,14). Finally, a recent paper suggests that the PROMPT program is sustainable, as demonstrated by the increasing improvements in some perinatal outcomes after more than a decade of continuous local training (15).

The latest National Maternity Review in England has recommended maternity units to adopt localized multi-professional training packages that have demonstrated improvements in clinical outcomes and acknowledges PROMPT as a leading example of such a training program (4). This is important as not all local obstetric emergencies training programs have been associated with clinical improvements (16): there are programs associated with no change (17) and, counter-intuitively, other programs have been associated with increased injury rates after training (18).

Although there has been useful research investigating the clinical impact of training programs for obstetric emergencies, very few studies have considered the financial implications of their implementation. One paper discussing the clinical effectiveness of PROMPT in a US hospital did attempt to capture the costs but did not use any recognized costing techniques (13). Furthermore, we are unaware of any publications, including the current NHS England Maternity Review (4), that have attempted to assess the cost of implementing local training. Such information would be crucial in guiding policy makers in the appropriate allocation of limited healthcare resources.

The aim of this paper is to outline the cost of setting up and running a standard course (PROMPT) for 1 year at its base hospital (Southmead Hospital, Bristol, UK).

Material and methods

A retrospective, micro-costing analysis was performed to assess the cost of establishing and running “Example PROMPT Course Programme No. 3” (see Supporting information, Figure S1) from the PROMPT Trainer’s Manual (second edition) (19) for 1 year at Southmead Hospital, Bristol. Potential, extra start-up costs for maternity units without established training were also included. The costs were calculated in 2016 UK pounds sterling and are presented in 2016 euros. As this was a costing analysis and no patients were involved, ethics approval was not required.

Southmead Hospital is a tertiary referral center, with around 6500 births per annum. There is also an alongside midwifery-led unit and a freestanding midwifery-led unit in the community (20). The costing was divided into the initial start-up costs and the variable costs. The start-up costs included the purchase of training mannequins and teaching props, “in-house” printing of training materials and assembly of emergency boxes (real and training). The variable costs consisted of costs related to releasing all maternity staff to attend the training and also other staff to facilitate the training. Administration time, room hire and additional printing were also included in the variable costs.

Costing information was obtained from a variety of sources, including: the local PROMPT faculty, the Trust Human Resources department and the Finance department. Enquiries were also made in other hospital departments, including practice development, learning and development, facilities, print room, clinical equipment services, hospital ordering system and pharmacy. Additional information was extracted from the British National Formulary, University of Bristol print services and other commercial equipment suppliers. Calculations were performed using MICROSOFT® EXCEL® spreadsheet software.

For maternity units without any established training, there may be additional start-up costs. For example, to run PROMPT in another maternity unit, a representative team must first attend a PROMPT “Train the Trainers (T3)” day, which is usually held in London. Therefore, units attending the T3 course would need to cover the costs of the team travelling to London as well as the costs of attending the day and receiving the PROMPT “Course in a Box” training materials. PROMPT was developed at Southmead Hospital and therefore, the local faculty did not need to attend the T3 training.

There were nominal printing and lamination charges at Southmead Hospital, with both being produced within the department, including pre-course reading booklets, which cost €0.51 each to print. These minimal fees may

not be equivalent in all hospitals therefore the potential costs of printing and laminating materials have been presented using the University of Bristol print service prices.

PROMPT should be conducted locally and drills should ideally be run in the same locations and using the same equipment as if in the real situation. At Southmead, the simulation sessions were run in a mixture of labour ward or birth center rooms and other ward areas, depending on their availability. As the rooms were part of the maternity unit infrastructure and already in use, there was no additional cost for using them. The hire of the seminar room was also discounted by 50% as the training was for hospital employees.

The introduction of emergency boxes into clinical practice, each carrying all the necessary equipment to manage a specific obstetric emergency (21), meant that there needed to be duplicate boxes for use during the training sessions. The only differences between the two emergency boxes were that the training boxes had all sharps removed and normal saline ampoules replaced any medication. As drill training was well established at Southmead before PROMPT was introduced, a lot of the equipment required to run the drills was already available and so there was no additional cost to the department. However, the potential cost of stocking real and training emergency boxes has been provided for maternity units without established training.

PROMPT encourages a multi-professional approach to training and at Southmead, annual attendance of PROMPT is mandatory for all maternity staff working in the obstetric unit, as well as both midwifery-led units, and also all maternity community staff. It is highly desirable for obstetric anesthetists to attend and as anesthetic attendance has consistently been above 80% each year, this cohort have been fully included in the costing exercise because this would be the “gold standard” for multi-professional training. Attendance for training was also mandated for two operating department practitioners at Southmead, so they too have been included in the calculations. In addition, all maternity care assistants attend the afternoon drill sessions at Southmead. The calculation of the annual cost of releasing staff to attend and/or teach PROMPT at Southmead was complicated by a number of other factors: some staff attended in their own personal time or supporting professional activity time, and some members of staff used their study leave allowance to attend. In addition, staff could be on different incremental pay scales despite being on the same grade or banding. Considering these issues, we decided to fully include staff costs for PROMPT at Southmead because this would give an indication of the potential maximum costs of training and therefore minimize underestimation. The costs were based on the average salaries per grade for the current cohort of maternity staff working at Southmead Hospital.

This calculation included the salaries of those working less-than-full-time. It was assumed that two less-than-full-time doctors or midwives had the equivalent cost per day as one full-time doctor/midwife. Obstetric and anesthetic consultants at Southmead often participated in the local training during their supporting professional activity time, and this was taken into account when calculating the consultant costs for PROMPT at Southmead. If locum staff at Southmead were not clearly staying for longer than 12 months they were excluded from the calculation. All maternity staff working in the community with an affiliation to the maternity unit were included in this exercise, as were all midwifery “bank” staff, who may be called to cover sickness or staff shortages in the unit at any time. This costing was based on training 100% of relevant maternity staff over 1 year. At Southmead, this required seven PROMPT courses per year on average and therefore the staff facilitating the training may need to be released more than once during the year.

Results

The start-up costs were €5574 and the variable costs for 1 year were €143 232 (Table 1 and Table 2). The total cost of establishing and running PROMPT at Southmead for 1 year was €148 806. Releasing staff to attend and facilitate training accounted for 89% of the total first year costs and 92% of the variable costs. The total cost of running PROMPT per year in subsequent years could be modeled on the variable costs of the first year. However, the cohort of staff each year will significantly influence this figure.

For maternity units without any established training, the additional start-up costs could be €6759 (Table 3). The potential costs of printing materials and stocking the emergency boxes are provided in the Supporting information (Tables S1–S4).

In 2015, there were 6517 live births at Southmead Hospital. Therefore, based on this birth rate, the cost of local, multi-professional obstetric emergencies training at Southmead is approximately €23 000 per 1000 births for the first year and around €22 000 per 1000 births in subsequent years.

Discussion

To our knowledge, this is the first paper that has calculated the cost of a local, obstetric emergencies training program to this level of detail. Our data comprehensively confirms that training is not free, and nor is it cheap. Therefore, it is vital that maternity units consider the evidence base and clinical effectiveness of training packages before they decide to implement them, and policy makers should be responsive to the cost implications of implementing training.

Table 1. Total start-up costs for PROMPT at Southmead.

	Units	Unitary cost	Total cost	Source of data
Train the Trainers Course (T3)				
Fee (per team of 4)				Not applicable
Travel/accommodation	4			Not applicable
Total for T3 course			€0.00	
Mannequins/models				
Resusci Anne First Aid	1	€925.62	€925.62	Commercial company
PROMPT Birthing Simulator	1	€3312.63	€3312.63	Commercial company
MamaNatalie	1	€655.57	€655.57	Commercial company
Baby Anne	1	€189.73	€189.73	Commercial company
Total for mannequins/models			€5083.55	
Teaching props				
Magic Trousers	1			PROMPT Faculty
Magic pants	1			PROMPT Faculty
Magic Cushion	1			PROMPT Faculty
Stained pads	4			PROMPT Faculty
Total for teaching props			€257.06	
Printed materials				
Total for printed materials			€0.00	
Equipment				
Basic life support				
Equipment			Already available	See supporting information, Figure S2
Obstetric hemorrhage				
Equipment			Already available	See supporting information, Figure S2
Emergency box (training)	1	€19.25	€19.25	Box only/Commercial company
Emergency box (real)	1	€19.25	€19.25	Box only/Commercial company
Large container	1	€19.26	€19.26	Commercial company
Eclampsia				
Equipment			Already available	See supporting information, Figure S2
Emergency box (training)	1	€19.25	€19.25	Box only/Commercial company
Emergency box (real)	1	€19.25	€19.25	Box only/Commercial company
Large container	1	€19.26	€19.26	Commercial company
Sepsis				
Equipment			Already available	See supporting information, Figure S2
Emergency box (training)	1	€19.25	€19.25	Box only/Commercial company
Emergency box (real)	1	€19.25	€19.25	Box only/Commercial company
Large container	1	€19.26	€19.26	Commercial company
Neonatal resuscitation				
Equipment			Already available	See supporting information, Figure S2
Breech				
Equipment			Already available	See supporting information, Figure S2
Large container	1	€19.26	€19.26	Commercial company
Total for equipment			€192.54	
Other equipment needed				
Blu-tak	2	€2.56	€5.12	Commercial company
Whiteboard markers (pack of 6)	6	€5.13	€30.78	Commercial company
Paper (200 sheets)	1	€5.13	€5.13	Commercial company
Total for other equipment			€41.03	
Total start-up costs			€5574.18	

Similarly, insurers who are best placed to underpin these costs, should consider the cost effectiveness of training (22). PROMPT is an established training program that has been successfully adapted and implemented in the USA, Australia and also in low-resource settings (13,14,23), which makes it a useful vehicle for investigation.

This analysis focused on only one UK maternity unit and we appreciate that these figures may not be easily generalizable, within or outside the NHS. The costing was performed with a series of assumptions and therefore, the final cost is subject to a degree of uncertainty. Only the average salaries per banding scale were used and

Table 2. Total variable costs for PROMPT at Southmead.

Rooms	Sessions	Cost per session	Total cost	Source of data
Seminar room (morning session)	7	€ 96.10	€ 672.70	PROMPT support manager/Learning and research department
Total room cost per year			€ 672.70	
Attending personnel				
Obstetricians				
	Total Number	Cost per day	Total Cost	Source of data
Consultants ^a	15	€ 732.08	€ 10 981.20	HR and Finance departments
Registrars ^b	17	€ 394.32	€ 6703.44	HR and Finance departments
Senior House Officers ^b	28	€ 289.28	€ 8099.84	HR and Finance departments
Total cost for doctors per year			€ 25 784.48	
Anesthetists				
	Total Number	Cost per day	Total Cost	Source of data
Consultants ^a	11	€ 732.08	€ 8052.88	PROMPT faculty/HR and Finance departments
Specialty Doctors ^b	5	€ 476.72	€ 2383.60	PROMPT faculty/HR and Finance departments
Registrars ^b	2	€ 394.32	€ 788.64	PROMPT faculty/HR and Finance departments
Senior House Officers ^b	3	€ 289.28	€ 867.84	PROMPT faculty/HR and Finance departments
Total cost for anaesthetists per year			€ 12 092.96	
Midwives^c				
	Total Number	Cost per day	Total Cost	Source of data
Band 8	8	€ 321.83	€ 2574.64	HR and Finance departments
Band 7	54	€ 287.48	€ 15 523.92	HR and Finance departments
Band 6	195	€ 215.78	€ 42 077.10	HR and Finance departments
Band 5	36	€ 168.98	€ 6083.28	HR and Finance departments
Band 4 (awaiting registration)	1	€ 150.30	€ 150.30	HR and Finance departments
Total cost for midwives per year			€ 66 258.94	
Operating department practitioners (ODPs)^c				
Band 6	2	€ 215.78	€ 431.56	HR and Finance departments
Total cost for ODPs per year			€ 431.56	
Maternity care assistants (MCAs)^c				
	Total Number	Cost per afternoon	Total Cost	Source of data
Band 3	74	€ 66.36	€ 4910.64	HR and Finance departments
Band 2	26	€ 59.33	€ 1542.58	HR and Finance departments
Total cost for MCAs per year			€ 6453.22	
Printing				
	Total number	Cost	Total Cost	Source of data
Certificate (Colour)	475	€ 0.00	€ 0.00	Hospital Print service
Evaluation sheets (2 × B&W)	475	€ 0.00	€ 0.00	Hospital Print service
Booklets	475	€ 0.51	€ 242.25	Hospital Print service
Total printing (variable) cost per year			€ 242.25	
Administration time (Band 8)				
	Total days	Cost/day	Total cost	Source of data
Fixed	18	€ 321.83	€ 5792.94	Practice development midwife
Variable (session dependent) (2 days per session × 7 sessions)	14	€ 321.83	€ 4505.62	Practice development midwife
Total admin cost per year			€ 10 298.56	
Faculty				
Morning 1 h (ice breaker)				
	Numbers	Cost for morning	Total cost	
Practice development midwife (Band 8) ^c	1	€ 42.91	€ 42.91	HR and Finance departments
Consultant ^a	1	€ 91.51	€ 91.51	HR and Finance departments
Remaining lectures 3 h				
Consultant ^a	1	€ 274.53	€ 274.53	HR and Finance departments
Registrar ^b	1	€ 147.87	€ 147.87	HR and Finance departments
Midwife Band 7 ^c	1	€ 114.99	€ 114.99	HR and Finance departments
Practice development midwife (Band 8) ^c	1	€ 128.73	€ 128.73	HR and Finance departments
Total cost for morning			€ 800.54	

Table 2. Continued

Afternoon 3.5 h	Numbers	Cost for afternoon	Total Cost	
Consultant ^a	3	€ 320.29	€ 960.87	HR and Finance departments
Registrars ^b	3	€ 172.52	€ 517.56	HR and Finance departments
Midwife Band 6 ^c	3	€ 100.70	€ 302.10	HR and Finance departments
Midwife band 7 ^c	2	€ 134.16	€ 268.32	HR and Finance departments
Pratice development midwife (Band 8) ^c	1	€ 150.19	€ 150.19	HR and Finance departments
Total cost for afternoon			€ 2199.04	
Total cost of faculty for one day			€ 2999.58	
Total cost of faculty for 1 year (7 days)			€ 20 997.06	
Total variable costs			€ 1 43 231.73	

The costs per hour and costs per day were calculated assuming:

^aConsultants worked 42 weeks a year and 40 h a week

^bOther doctors worked 44 weeks per year and 40 h a week

^cMidwifery managers, midwives, operating department practitioners (ODPs) and maternity care assistants (MCAs) worked 46 weeks a year and 37.5 h a week.

Working day for doctors is 8 h and working day for midwifery managers, midwives, ODPs and MCAs is 7.5 h.

therefore, the actual cost incurred may be different. The costs per day and hour were also calculated based on assumptions that each multi-professional group worked the same number of weeks and hours per year. In reality, there would be variation in the time worked within each multi-professional group, which would affect the final cost. Other variables to consider are the costs of part-time staff, where two less-than-full-time doctors or midwives may actually equate to more than one full time doctor/midwife due to training and study requirements, so this too may affect the final costings.

We anticipate that the cost of releasing staff to attend and teach PROMPT at Southmead may be slightly overestimated as some staff may have used their study leave allowance or spare time to attend and consultants tended to use their supporting professional activity time to participate. However, for this exercise, we felt it was important to ensure that the potential maximum cost of training was calculated and so have quoted fully for all staff costs, irrespective of potential funding savings from study leave, personal time or non-attendance.

Given that staff costs represent an overwhelming proportion of the total and variable costs, the final costs of training will be dependent on local workforce numbers.

A recent Care Quality Commission Report identified that Southmead maternity unit is operating at below the national recommended staffing levels for both obstetricians and midwives (24). The costs of training at Southmead may therefore appear to be less than the training costs in another maternity unit with a similar birth rate, particularly those operating nearer to the nationally recommended staffing levels.

The analysis has been performed assuming that the same course program is run for the duration of the year. In reality, units may wish to adapt and change their

programs from year to year to be locally responsive and to cover a variety of the different obstetric emergencies included in the PROMPT package (see Supporting Information, Figure S3), which may incur small additional expenses. For example, as PROMPT has been running at Southmead for over 10 years, the icebreaker activities have now been replaced by poster presentations of local research and audits. This requires more staff than a standard icebreaker session and would therefore affect the final cost. During this costing, it was assumed that the same team of faculty members would teach all the sessions throughout the year. In reality, there may be a different mix and grade of faculty for each training day, which would also affect the final costs.

With regard to equipment, the costing was based on the minimum required mannequins and teaching props that were needed to effectively implement the course. As this was a retrospective micro-costing analysis, the prices for a small number of items may have changed since first purchased, or they were unavailable at the time of this costing exercise.

We have tried to include the potential, additional start-up costs that maternity units without any established training might incur. Any extra staff costs would clearly represent the most significant additional costs. Extra staff would also impact on the number of training rooms required, number of sessions needed and the number of certificates, evaluation sheets and booklets to be printed. For maternity units without established local training, room hire at the full cost may be required. Some of the prices used for the components of the emergency boxes were based on Southmead Hospital sources and not commercial prices: therefore the actual cost to other maternity units may be different. However, many of these are likely to be standard across the NHS. Some maternity units

Table 3. Additional start-up costs for maternity units without established training.

	Units	Unitary cost	Total cost	Source of data
Train the Trainers Course (T3)				
Fee (per team of four)			€5124.19	RCOG
Travel/accommodation	4	€192.16	€768.64	Estimate
Total for T3 course			€5892.83	
Printed materials				
Total for printed materials			€138.38	See supporting information
Equipment				
Obstetric hemorrhage				
Emergency box contents (training)	1	€25.70	€25.70	See supporting information
Emergency box contents (real)	1	€294.73	€294.73	See supporting information
Eclampsia				
Emergency box contents (training)	1	€19.31	€19.31	See supporting information
Emergency box contents (real)	1	€284.74	€284.74	See supporting information
Sepsis				
Emergency box contents (training)	1	€20.19	€20.19	See supporting information
Emergency box contents (real)	1	€83.38	€83.38	See supporting information
Total for equipment			€728.05	
Total additional start-up costs			€6759.26	

without training may already have some of the necessary equipment required to stock their emergencies boxes, so they may not incur all of these additional costs.

Our calculations have been performed to provide an indication of how much it would cost to set up and run PROMPT in the UK. Although the final costs have also been presented in euros, we have not attempted to investigate how much PROMPT would cost to run outside the UK.

As far as we are aware, this is the first detailed investigation calculating the cost of local, multi-professional obstetric emergencies training in a UK maternity unit setting. There is an assumption that local, “in-house” courses are the most economical methods of delivering training, but clearly there is still a significant cost to the maternity departments undertaking them. In addition, the potential financial benefits of running such courses, including possible reductions in litigation claims, are most commonly felt outside the obstetric units themselves. The lack of an explicit link between training costs and potential cost savings may be a barrier to the implementation of training because department level managers cannot justify the significant, additional costs incurred locally. There may be many other barriers to implementation too, including institutional priorities and departmental motivation, which we have not explored in this paper. The Clinical Negligence Schemes for Trusts (CNST) was a program, introduced by the National Health Service Litigation Authority, that incentivized NHS Trusts in England to provide multi-professional, maternity skills and drills training through reduced insurance premiums (25). This CNST assessment has subsequently been halted, but examples of successful insurer engagement with maternity services

and incentivization can still be found around the world, such as in Victoria, Australia (14).

A US unit that implemented PROMPT training estimated that, over 7 years, the costs avoided by improved outcomes associated with PROMPT were \$7.5 million for the prevention of permanent brachial plexus injuries (15 cases prevented) and \$26.8 million for avoided hypoxic-ischemic encephalopathy cases (four cases prevented) (13). These figures included medical and liability costs but it is unclear how these sums were calculated. The work for this paper provides a foundation for a future, robust economic evaluation of obstetric emergencies training.

Finally, assuming a reasonably narrow range of staffing: birth ratios, it may be reasonable to estimate that training will cost at least €22 000 to €23 000 per annum, per 1000 births at unit level.

Conclusions

Local, multi-professional obstetric emergencies training is not cheap. The cost of training is significant and staff costs potentially represent over 90% of the total figure. It is therefore vital that organizations should consider the evidence base and clinical effectiveness of each training package before deciding which one to implement locally.

Although there is increasing evidence of the clinical impact of some local, multi-professional obstetric emergencies training, the potential costs of any training model also need to be considered when making recommendations for practice. These could be usefully combined in a formal economic evaluation that will help guide policy makers in the prudent and optimal allocation of finite healthcare resources.

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Supporting information

Additional Supporting Information may be found in the online version of this article:

Figure S1. “Example PROMPT Course Program No. 3” from the PROMPT Trainer’s Manual (second edition) .

Figure S2. Additional equipment required for “Example PROMPT Course Program No. 3”.

Figure S3. Obstetric emergencies included in the PROMPT package.

Table S1. Breakdown of the cost of the printed materials.

Table S2. Breakdown of cost of stocking the real and training obstetric hemorrhage emergency boxes.

Table S3. Breakdown of cost of stocking the real and training eclampsia emergency boxes.

Table S4. Breakdown of cost of stocking the real and training sepsis emergency boxes.