A quality improvement clinical pathway for enhanced recovery after elective Caesarean Section: results of a consensus exercise and survey

May 2016

Dr Elizabeth Coates[1*]
Dr Gordon Fuller[2]
Dr Ian Wrench[3]
Dr Matthew Wilson[2, 3]
Tim Stephens[4]
Dr Daniel Hind[1]

1. Clinical Trials Research Unit, School of Health and Related Research, University of Sheffield, Regent Court, 30 Regent Street, Sheffield, S1 4DA

2. School of Health and Related Research, University of Sheffield, Regent Court, 30 Regent Street, Sheffield, S1 4DA

3. Department of Anaesthetics, Royal Hallamshire Hospital, Sheffield Teaching Hospitals NHS Foundation Trust, S10 2JF

4. Critical Care and Perioperative Medicine Research Group, William Harvey Institute, Barts and The London, Queen Mary's School of Medicine and Dentistry, London, EC1M 6BQ

* Corresponding author – e.coates@sheffield.ac.uk; 0114 222 0886

Table of contents

Abstract

Background: Women have expressed a strong desire for earlier discharge after elective caesarean section (CS), provided their care needs are met. Nationally, the proportion of women leaving hospital the day after elective CS continues to rise in the UK, suggesting that 'enhanced recovery' (ER) principles are being practised, albeit inconsistently.

Methods: We conducted an online survey of UK maternity units to identify current practice. To reach consensus on an ER clinical pathway for elective CS, with inbuilt Quality Improvement components, we carried out an expert consensus workshop using the Nominal Group Technique and a round table discussion in March 2015.

Results: The survey suggests an increase in adoption of ER pathways in line with a national trend towards earlier discharge, as 50% had a formal ER protocol in place, and 30% reporting plans to introduce one. A multi-disciplinary panel of ten experts generated an ER pathway for elective CS with fifteen clinical components tackling: fluid balance (n=3); breastfeeding (n=2); neonatal temperature control (n=2); early mobilisation (n=3); operative management (n=3); and, other elements (n=2): pre-operative patient education and regular post-operative analgesia, as well as five organisational components. The expert panel also made recommendations on a preliminary QI strategy to support implementation.

Conclusions: The recommendations from the expert panel can be used to support delivery of early discharge following elective CS, and although this highlights the challenge of achieving organisational change, provides a blueprint for obstetric units to implement the pathway to the likely benefit of both patients and services.

Keywords: caesarean section; consensus development; clinical pathways; practice guideline; obstetrics

Introduction

Caesarean section (CS) is one of the commonest surgical procedures performed by the NHS. In 2013-14, over 73,000 (44%) were planned or 'elective' operations[1]. Compared with spontaneous birth, CS is associated with prolonged hospital stay, despite recommendations by the UK National Institute for Health and Care Excellence (NICE)[2].

The concept of 'enhanced recovery' (ER) after surgery has been used for more than a decade[3] and is supported by a 5-year improvement scheme, the NHS Enhanced Recovery Partnership Programme[4].Women have signalled a strong desire for swift and safe ER, and earlier discharge, provided their care needs are met[5]. In keeping with this, the proportion of women leaving hospital the day after elective CS rose from 7% in 2010-11, to 13.6% in 2013-14[1]. This suggests that some principles of ER are being applied to CS in UK units but practice is inconsistent[6–10].

Quality Improvement (QI) interventions are increasingly utilised to enhance health service delivery and can be used to reduce variations in care[11]. We therefore aimed to identify current practice through a survey of UK maternity units, and reach consensus on an enhanced recovery clinical pathway, with inbuilt QI components, for elective CS via an expert consensus workshop.

Methods

Study design

An online survey was used to identify current clinical practice in UK maternity units, as an efficient way of collecting basic information on elective CS[12]. Completion of the online questionnaire was taken as implied consent to participate. The Nominal Group Technique (NGT) was used with an expert panel of health professionals and mothers with experience of elective CS. NGT is an interactive multi-stage process designed to combine opinion into group consensus during a structured face-to-face meeting[13,14]. It sets out to generate a wide range of ideas, encourage equal participation, avoid conflict and the possibility that certain opinions dominate, and helps to achieve a

credible solution within a short timeframe. A round table discussion and 'carousel' exercise[15] were also completed during the workshop to generate ideas for the QI strategy. Ethical approval for the workshop was obtained from a University of Sheffield Research Ethics Committee. Written informed consent was taken from all participants at the workshop start.

Recruitment of participants

Survey

Non-probability sampling was used in the survey. Thirty-six maternity units were invited to take part in the online survey, and were considered eligible on the basis that they were already acting as recruiting centres to two national randomised controlled trials (ISRCTN29654603 or ISRCTN66118656). IW or MW e-mailed lead obstetric anaesthetists at each unit, inviting them to participate, providing a link to the survey and information on its purpose. A secure web based survey application was used to collect data (Survey Monkey, Palo Alto, California, USA, www.surveymonkey.com).

Consensus exercise

A purposive sample for the workshop was identified through personal and professional contacts of the study team, eminent positions in professional organisations and authorship of relevant scientific manuscripts. Patient and Public Involvement (PPI) was facilitated by the Jessop Wing PPI Group at Sheffield Teaching Hospitals NHS Foundation Trust. Experts were invited to participate by email and were provided with a participant information sheet detailing the study. Experts were asked to confirm their interest by email. After indicating their initial agreement to participate, panel members were emailed logistical details of the meeting.

Conduct of the study

Online survey

The survey included six questions about usual clinical practice in elective CS, use of an ER pathway and their interest in research on the topic. This was a simple questionnaire (see supplementary material), developed by IW and MW and piloted within the research team, which included open and closed response categories.

Consensus workshop

All data for the consensus exercise were collected in March 2015, during a one-day workshop held at the Royal College of Anaesthetists, London. The panel were provided in advance with a briefing document which summarised the findings of a rapid systematic review evaluating the composition of pathways for elective CS, and an umbrella review evaluating the individual ER components[16]. The briefing document also provided details on QI and an existing strategy used in a surgical pathway[17],[18], and described the workshop methodology.

Brainstorming round

Panel members introduced themselves, an explanation of the exercise was provided, and relevant evidence on peri-operative management of CS was outlined in detail by GF (a facilitator). A 'brainstorming' round was performed where individual panel members recorded all their preferred components for the ER pathway in private, without conferring.

Panel members were then asked to share their ideas in a 'round robin', each presenting a single component in turn, until all potential items had been identified. All items were recorded publicly and grouped by the facilitator according to the stage of surgery. A first structured group discussion round was facilitated, to clarify each item and agree the grouping of similar items. This discussion also addressed the optimal number of components to be included in the pathway, and any synergism or antagonism between components.

Rating round 1

A preliminary rating round was performed where each panel member rated each of the potential components of an ER pathway using 1 (strong preference to exclude) to 5 (strong preference to include) Likert scale. Rating was performed on paper forms in secret, anonymously, and without conferring. There was also an option to abstain from rating components outside of a panel member's experience or knowledge.

The results of the rating round were collated, summarised and presented to the group by the facilitator. A second structured group discussion round was then facilitated in light of the preliminary results. The panel was asked whether there were any strong feelings that certain items should be included or excluded, and why.

Rating round 2

A final rating round was performed where each panel member rated each of the potential items using the same 5 point Likert scale and procedure. The results of the final rating round were collated, summarised and presented to the group using descriptive statistics (median, mode, range) and frequency histograms.

Round Table

An explanation of the exercise was given to the panel, and relevant evidence on QI strategies was presented by TS (a facilitator and quality improvement specialist). A 'round table' discussion was then led by EC (a facilitator), where the panel discussed the barriers and enablers to introducing an ER pathway for elective CS. A participatory exercise was conducted whereby the panel were asked to generate ideas for the QI strategy across four domains: staff engagement; motivation and focus; community of practice and measurement. The domains came from the EPOCH trial[18], which in turn were distilled from key works on QI in healthcare[19,20]. Using a 'carousel' method, panel members were divided into four groups and asked to spend five minutes discussing each of the four topics in turn. Each group was asked to record their ideas on colour coded post-it notes, before moving on to the next domain. They were then asked to review the material provided by the previous group(s) and add to this. The exercise was repeated until all four domains were

complete. The final group was asked to summarise the ideas for each domain and share this with the wider group.

Statistics

Online survey

Descriptive statistics were produced using Microsoft Excel 2010 (Microsoft, Redmond, USA).

Consensus workshop

The final ER pathway was developed following two rating rounds and consensus was defined as the proportion of scores within a range (unrestricted) at the end of two rating rounds (identified a priori). This acted as the stopping criteria on the basis of the following criteria:

- Strong positive consensus to include component: 75% of responses are 4 or 5.
- Strong negative consensus to exclude: 75% of responses are 1 or 2.
- Divergent group view: >40% 4 or5 and >40% 1 or2
- Medium/mixed support for inclusion: All other results

All items with a strong positive consensus would be included and all items with a strong negative component would be excluded from the final pathway. Items with divergent or mixed responses, which could not be resolved by the moderated group discussion at the end of round 2, were to be adjudicated by clinical members of the research team. The results of the consensus rating round were analysed using Microsoft Excel 2010. The structured discussion sessions were transcribed verbatim.

Round table

The round table discussion was recorded and transcribed verbatim. Cross-sectional indexing was used to identify the key themes in the data[21]. The ideas for each domain were reviewed in order to generate a list of QI strategies.

Results

Survey

Table 1 summarises the main results from the survey. Of the 36 obstetric units contacted, 30(83%) responded. The median number of deliveries per year was 6000 (range 2500-9700); the median number of elective caesareans was 800 (180-2000). The median proportion of elective caesareans was 13% (7% - 28%). Fifteen units (50%) had a formal enhanced recovery protocol in use and a further nine (30%) reported plans to introduce one. Ten units (33%) reported that between 20-50% of their patients go home the next day after elective CS. Three units reported that more than 50% of patients are discharged the next day; eleven (37%) discharged fewer than 10% of their patients the next day.

Table 1: Descriptive statistics for survey of obstetric units' practice in enhanced recovery

Category	**n (%)**
Enhanced recovery protocol in use	30 (100%)
Yes	15 (50%)
No	6 (20%)
Plans to introduce one	9 (30%)
Proportion of patients discharged next day	27 (90%)
< 10%	11 (41%)
10 - 20%	3 (11%)
20 - 50%	10 (37%)
> 50%	1 (4%)

Consensus workshop

Ten expert delegates attended the consensus workshop (out of 16 invited). Table 2 details the characteristics of the panel. Other than gender, no demographic information was collected. Representatives of clinical specialties were all employed at Consultant level in UK hospitals.

Table 2: Characteristics of the expert panel

Characteristic	Number
Clinical specialty	
Anaesthesia	3
Obstetrics	2
Neonatology	1
Midwifery	1
Patient representatives	3
Gender	
Female	6
Male	4

Brainstorming round

Thirty-two components were identified during the brainstorming round (after grouping of numerous interchangeable components). The definition of each individual intervention was confirmed through group discussion and was largely non-specific and operational (table 3). Variations in local practice and lack of supporting evidence were reasons given for this lack of prescription.

The suggested components could be broadly categorised as organisational level changes (9 components) or primarily clinical interventions (23 components). Several themes were evident across the different components; for example many suggested interventions were relevant to peri-operative fluid balance (e.g. timing of fluid restriction, pre-operative carbohydrate drinks, food and drink available in the recovery area etc.). The individual components were grouped by the delegates into the pre-, intra- and post-operative phases according to timing of application.

Table 3: Interventions identified during the brainstorming round

Operative Phase	Component	Definition	Category*
Pre-operative			
	Patient education	Provision of comprehensive patient information on elective caesarean sections and enhanced recovery pathway at pre-operative clinic visit and on arrival at hospital, including possibility of day 1 discharge and breast feeding advice	C
	Theatre scheduling	Elective caesarean sections scheduled for morning operation lists	O
	Dedicated C-section list	Dedicated operation list reserved for pre-booked elective caesarean sections	O
	Haemoglobin optimisation	Pre-operative checking of haemoglobin levels and corrective interventions given if required	C
	Carbohydrate drinks	Energy drinks provided pre-operatively	C
	Fluid restriction timing	Reduced nil by mouth time for clear fluids period pre-operatively	C
	Food restriction timing	Reduced nil by mouth period for food pre-operatively	C
	Patient selection	Selection of low-risk mothers for ER elective caesarean section pathway	C
	Consultant delivered care	Consultants to perform anaesthetic and obstetric procedures	O
Intra-operative			
	Immediate skin to skin contact	Baby to receive skin-to-skin contact from mother immediately after delivery	C
	Avoidance of hypothermia	Normothermia target for mother in theatre with active warming performed if necessary e.g. with warming mattress	C
	Breast feeding in theatre	Attempts to initiate breast feeding commence in theatre	C
	Subcuticular wound closure	Closure of surgical wound using subcuticular sutures	C
	Joel Cohen incision	Joel Cohen surgical incision used for caesarean section	C
	WHO checklist	Elective caesarean section specific pre-operative checklist used	O
	Deferred umbilical cord clamping	Clamping of umbilical cord delayed following delivery of baby	C
	Uterotonics	Routine administration of uterotonics following delivery of baby	C
Post-operative			
	Type of analgesia	Regularly prescribed non-opioid analgesia with breakthrough pain relief prescribed for as required	C
	Regular analgesia	Regular analgesia (parametamol, NSAIDs, Codeine-based) prescribed routinely	C
	Bladder care plan	Formal bladder care protocol including early removal of catheter	C
	Self-medication	Opportunity for patients to self-administer analgesia as required	O
	Early discharge package	Hospital systems organised to facilitate leaving hospital expeditiously once discharge decision taken – including pharmacy preparation of discharge medications, expeditious baby checks etc.	O
	IVI discontinuation in recovery	Intravenous infusion discontinued in recovery areas	C

	Early mobilisation	Formal mobilisation targets and pathway commencing on day of operation	C
	Post-operative surgical team review	Routine post-operative review of patients by obstetric team	C
	Dedicated ward for recovery	Dedicated ward reserved for mothers recovering from elective caesarean section	O
	Post-discharge support	Specific follow up post-discharge by midwife	O
	Fluids and food given in recovery	Oral fluids and food offered to mothers in recovery area post caesarean section	C
	Telephone follow up	Mothers contacted by telephone after discharge to review progress and offer advice	O
	Access to food overnight	Hot food/meals/substantial snacks available to mothers overnight	O
	Infant temperature monitoring	Infant temperature routinely measured and appropriately managed	C
	Breastfeeding education	Formal breastfeeding advice provided to mothers, verbally or in leaflet form	C

* Key: O: Organisational Intervention; C: Clinical Intervention

Rating rounds

The results of each rating round are detailed in Table 4, with the final results summarised in Table 5. The number of respondents rating individual components in each round varied from 6 to 10, reflecting the clinical expertise of delegates and variety of potential interventions.

During Round 1 there was a strong consensus to include 13 clinical and 3 organisational components. Conversely, there was only one intervention where delegates initially demonstrated a strong agreement for exclusion (Joel Cohen surgical incision). There was a mixed opinion on the remaining 15 components, and no instances of divergent opinion.

Despite a lengthy discussion on each component, individual views were relatively stable, with limited change in-group opinion evident during Round 2. Of note, the group consensus changed on 11 (6 organisational, 5 clinical) of the components following group deliberation. This tended to result in a change of group opinion towards inclusion of individual components (7 instances).

At the end of this round, there was a strong consensus to include 15 clinical and 5 organisational components in the enhanced recovery pathway for elective c-section

(table 5). Twelve components were excluded by the end of round 2 on the basis of mixed scores (table 6). The final list of components was distributed to the expert panel and there was no challenge to this.

Table 4: Items included/excluded after each round

Operative Phase	Component	Round 1			Round 2		
Pre-operative		Responses	Scores*	Consensus	Responses	Scores*	Consensus
	Patient education	10	5, 5 (5-5)	Include	10	5, 5 (5-5)	**Include**
	Theatre scheduling	9	4, 5 (2-5)	Mixed	10	4.5, 5 (1-5)	Mixed
	Dedicated C-section list	10	4, 4 (3-5)	Include	10	4, 5 (2-5)	Mixed
	Haemoglobin optimisation	9	4, 3 (3-5)	Mixed	9	4, 4 (2-5)	Mixed
	Carbohydrate drinks	8	4, 3 (3-5)	Mixed	8	4, 4 (3-5)	Mixed
	Fluid restriction timing	9	5, 5 (2-5)	Include	9	5, 5 (3-5)	**Include**
	Food restriction timing	9	5, 5 (3-5)	Include	9	5, 5 (4-5)	**Include**
	Patient selection	10	4, 4 (1-5)	Mixed	9	4, 3 (1-5)	Mixed
	Consultant delivered care	10	3.5, 3 (1-5)	Mixed	10	4, 4 (1-5)	**Include**
Intra-operative							
	Immediate skin to skin contact	10	4.5, 5 (2-5)	Include	10	5, 5 (4-5)	**Include**
	Avoidance of hypothermia	9	5, 5 (2-5)	Include	9	5, 5 (1-5)	**Include**
	Breast feeding in theatre	10	5, 5 (4-5)	Include	10	5, 5 (5-5)	**Include**
	Subcuticular wound closure	6	3.5, 3 (3-5)	Mixed	8	5, 4 (4-5)	**Include**
	Joel Cohen incision	5	1, 1 (1-4)	Exclude	7	2, 1 (1-5)	Mixed
	WHO checklist	9	4, 4 (1-5)	Mixed	7	5, 5 (4-5)	**Include**
	Deferred umbilical cord clamping	8	3.5, 3 (2-5)	Mixed	8	2.5, 1 (1-5)	Mixed
	Uterotonics	6	2.5, 3 (1-4)	Mixed	6	2.5, 3 (1-5)	Mixed
Post-operative							
	Type of analgesia	9	5, 5 (3-5)	Include	8	4, 5 (1-5)	Mixed
	Regular analgesia	9	5, 5 (4-5)	Include	10	5, 5 (5-5)	**Include**
	Bladder care plan	10	5, 5 (4-5)	Include	10	5, 5 (5-5)	**Include**
	Self-medication	9	3, 3 (1-5)	Mixed	10	4.5, 5 (1-5)	Mixed
	Early discharge package	9	4, 4 (4-5)	Include	10	5, 4 (4-5)	**Include**
	IVI discontinuation in recovery	9	4, 4 (2-5)	Mixed	9	5, 5 (1-5)	**Include**
	Early mobilisation	9	4, 5 (3-5)	Include	10	5, 5 (4-5)	**Include**
	Post-operative surgical team review	9	4, 4 (2-5)	Include	10	4.5, 5 (4-5)	**Include**
	Dedicated ward for recovery	9	3, 3 (2-5)	Include	10	3, 3 (2-5)	Mixed
	Post-discharge support	9	5, 5 (3-5)	Mixed	9	5, 5 (4-5)	**Include**
	Fluids and food given in recovery	9	5, 5 (4-5)	Include	9	5, 5 (4-5)	**Include**
	Telephone follow up	10	3, 3 (1-4)	Mixed	10	1.5, 1 (1-4)	Mixed
	Access to food overnight	10	4, 4 (3-5)	Mixed	10	4, 4 (3-5)	**Include**
	Infant temperature monitoring	9	4, 5 (2-5)	Mixed	10	5, 5 (3-5)	**Include**
	Breastfeeding education	9	5, 5 (3-5)	Include	10	5, 5 (3-5)	**Include**

* Median, mode and range of scores presented, respectively

Table 5: Summary of clinical and organisational components included in the enhanced recovery pathway

Clinical components
1. Patient education
2. Fluid restriction timing
3. Food restriction timing
4. Immediate skin to skin contact
5. Avoidance of maternal hypothermia
6. Breast feeding in theatre
7. Sub-cuticular wound closure
8. Regular analgesia
9. Bladder care plan
10. IVI discontinuation in recovery
11. Early mobilisation
12. Post-operative surgical team review
13. Fluids and food given in recovery
14. Infant temperature monitoring
15. Breastfeeding education
Organisational components
1. Consultant delivered care
2. Early discharge package
3. Post-discharge support
4. Access to food overnight
5. WHO checklist

Table 6: Summary of clinical and organisational components excluded from the enhanced recovery pathway

Clinical components
1. Haemoglobin optimisation
2. Carbohydrate drinks
3. Patient selection
4. Joel Cohen incision
5. Deferred umbilical cord clamping
6. Uterotonics
7. Type of analgesia
Organisational components
1. Theatre scheduling
2. Dedicated C-section list
3. Self-medication
4. Dedicated ward for recovery
5. Telephone follow up

Round table and participatory exercise

The panel identified several components of a quality improvement strategy for the ER pathway in elective CS.

'The campaign'

The panel recognised the importance of a strong campaign, which presented a clear rationale for change, and that could help to challenge barriers to acceptance and implementation of the pathway (see table 7). This was required given the potential for inertia and indifference, ethical and safety questions about early discharge and the possibility of readmission, as well as related negative perceptions of the intervention.

Table 7: Rationale for the ER pathway

Category	Description
Patient motivation	Use evidence from patient surveys in Sheffield to demonstrate patient desire for reduced lengths of stay after planned CS
Improved patient experience	To normalize reduced length of stay and get mothers home quicker
	To empower women and help make them active in their own care
	Better patient knowledge of the pathway leading to less anxiety and improved satisfaction
	In the long term, the results of the study can be generalised*
Safety	Evidence of 'healthy' mothers and babies – safe to discharge earlier (reduced DVT/infection)
	NICE 2012 Guidelines – nationally recognised as best quality care
	To allow a shift in focus to the women and babies who are actually unwell
Efficiency and productivity	Better use of resources – staff and beds
	Improved productivity
	Provides a cohesive framework to work with

*One of the aims of this consensus exercise was to develop an ER pathway for elective CS, in a bid to inform future research bids to evaluate its effectiveness

Community of practice and staff engagement

The group also recognised the large number of stakeholder groups involved in, or impacted by ER, which in turn, would need to be convinced of the rationale for changing practice and behaviour. The multi-disciplinary list of key stakeholders and suggested leadership for the community of practice is outlined in table 8. This highlights the scale of the issue to be addressed – engaging numerous stakeholder groups will take an intelligent and well-developed strategy for QI.

The panel identified a number of suggestions for how a community of practice could be created to engage and support staff in delivering the pathway (see table 9). The suggestions can be grouped into categories: media and social media; site contact; continuing professional development; champions and early adopters; and whilst this list is fairly exhaustive, it provides an indication of the panel's perspective on how to support implementation.

Table 8: Membership and leadership of the community of practice

Patient and family	Interpreting Services
Midwives* (Community; Ward; Clinic)	Pharmacy
Anaesthetists*	Parent Education Staff
Neonatologists*	Management
Obstetricians*	GPs
Theatre Staff	Breastfeeding Community Clinic
In-hospital breastfeeding nurses	Patient Organisations - NCT; Mumsnet
Health Care Support Workers	Maternity Service Liaison Committees
Frontline Staff (band 5/6)	Clinical Commissioning Groups

*Suggested local leadership

Table 9: Mechanisms to support community of practice

Category	**Description**
Media and social media	Media campaign
	Trust newsletters – feedback on progress and successes
	Website; Twitter; Facebook
Site contact	Site visits from the research team
	Face-to-face
	Telephone follow up
	6 monthly multi-site collaboratives
Continuing professional development	Training
	E-Learning (Trust mandatory)
	Colleges and association (endorsement)
	Incorporated into induction (for midwives and doctors)
Champions and early adopters	Focus on champions and bringing early adopters on board
	Involve critical mass of staff

In addition to this, patient education, and staff training and support were the key suggested mechanisms for changing behaviour, through ensuring clear understanding of the motivation for the pathway, developing knowledge of this, as well as directly challenging negative perceptions.

Measurement

Correspondingly, the need to measure ongoing progress with the ER pathway was agreed, as was the importance of giving feedback through auditing outcomes and processes. The panel identified a number of potential outcome measures and data sources (table 10). Although the group also cautioned on the variety of data collection systems in place and the likely issues with coding and matching data, they listed BadgerNet; and NOAD (National Obstetric Anaesthetic Database) and NNRD (National Neonatal Research Database) as potentially relevant, existing sources to draw upon.

Table 10: Suggested outcome measures

Category	Description
Patient Reported Outcome Measures	Patient Enablement Instrument[22]
	Friends and Family Test[23]
	Edinburgh Postnatal Depression Scale[24]
Other patient outcomes	Patient satisfaction (via text/email)
	Patient expectations
	Personal cost to patient (resource use)
	Serious Adverse Events
	Longer term post-natal results (depression; satisfaction; breastfeeding rates)
Clinical process measures	Length of stay (day of discharge time, as compared to NICE guidance)
	Re-admission rates
	Breastfeeding initiation rates (hospital / home)
	Time to mobilisation
	Starvation time
	Maternal temperature
	Requirement for re-catherisation and prevalence of over-distention injury
	Surgical problems (wound infections/dehiscence and bleeding)
	Service utilisation (GP and midwife attendance rates)

The round table discussion also reinforced the importance of the organisational components that had been identified via the NGT. That is, aligning the ER pathway with existing routines, providing clear and simple documentation to support structured handovers, encouraging collaboration between different departments to enable an early discharge package and breastfeeding education. The panel also acknowledged the challenges posed by shifting the burden of care from acute to community and the need to co-design the pathway with community based stakeholders.

Discussion

A survey suggests an increase in adoption of ER pathways concurrent with a national trend towards earlier discharge. An expert panel recommended an ER pathway for elective CS with fifteen clinical components tackling: fluid balance (n=3); breastfeeding (n=2); neonatal temperature control (n=2); early mobilisation (n=3); operative management (n=3); and, other elements (n=2). This preliminary pathway has many similarities with existing, published ER pathways for elective CS (Table 11), although several novel interventions were identified (sub-cuticular wound closure, commencing breastfeeding in theatre, post-operative surgical team review and neonatal temperature monitoring).

This consensus exercise builds upon existing work on ER pathways within individual hospital Trusts by pooling expertise in the panel, and expanding the remit to address implementation. The expert panel also made recommendations on the content of a QI strategy that could support the delivery of the ER pathway for elective caesarean.

Table 11: Comparison of clinical components with other published ER pathways

Peri-operative phase	Enhanced Recovery components	Current pathway	Lucas[7]	Wrench[5]	Halder[8]	Damluji[9]	Long[10]
Pre	Patient selection	-	-	✓	-	✓	-
	Patient advice and information	✓	✓	✓	✓	-	✓
	VTE risk assessment	-	-	-	✓	-	-
	Reduced fasting times	✓	-	✓	✓	-	✓
	Carbohydrate drink	-	-	✓	✓	✓	-
	Fluid balance	✓	-	✓	-	-	-
	Haemoglobin optimisation	-	✓	-	✓	-	-
	Initiate breast feeding teaching	✓	✓	-	-	-	-
Intra	Fluid balance	✓	-	✓	-	-	-
	Prophylactic antibiotics	-	✓	-	✓	-	-
	Venous thromboprophylaxis	-	✓	-	✓	-	-
	Minimally invasive surgical technique	-	-	✓	✓	-	-
	Patient warming	✓	-	✓	-	-	-
	Delayed cord clamping	-	-	✓	-	-	-
	Analgesia	✓	✓	✓	✓	-	-
	Sub-cuticular wound closure	✓	-	-	-	-	-
Post	Early oral intake	✓	✓	✓	✓	✓	✓
	Early mobilisation	✓	✓	✓	✓	✓	✓
	Early removal of catheter	✓	✓	✓	✓	✓	✓
	Regular analgesia	✓	✓	✓	✓	-	✓
	Prevention of post-operative nausea and vomiting	-	-	✓	-	-	-
	Debriefing of patient	-	-	-	✓	✓	-
	Early skin to skin contact	✓	✓	✓	✓	-	-
	Commence breast feeding in theatre	✓	-	-	-	-	-
	Support to establish breastfeeding	✓	✓	✓	✓	-	-
	Community support	-	✓	-	✓	-	✓
	Post-operative surgical team review	✓	-	-	-	-	-
	Neonatal temperature monitoring	✓	-	-	-	-	-

Despite this, the study has a number of limitations relating to the survey methodology. The survey was conducted with a 'convenience sample' of obstetric units already participating in two national clinical trials. The survey was rapid, no formal pilot was conducted, and reminders were not issued. This may have introduced selection bias and render the results non-representative of practice outside this group, by potentially overstating the extent of ER implementation at the current time. However, the overall response rate (83%) was well above the threshold for meaningful interpretation

A key weakness of this study results from the difficulty of establishing the strength of evidence for individual components and pathways[16], and as the panel identified, this is likely to create a barrier to acceptance. Further work could be completed to differentiate the component parts of the pathway, i.e., pick a limited number of mandatory evidence-based 'high-impact' interventions, or recommend the (non-compulsory) use of the wider range of clinical components as in the EPOCH study[18]. Moreover, an additional iteration of the consensus exercise could facilitate this because seven additional clinical components had mixed support, and may have a useful place in the pathway.

Some additional work could help to further define the clinical pathway. This could be achieved by grouping interventions, as suggested by the panel during the group discussion. For example, pre-operative starvation and fluid times could conceivably be designated into a single operational component. Alternatively, certain interventions likely to improve peri-operative management, e.g., anti-emetics or long acting intra-thecal opioids, were already thought to be universal. These components were not included in the consensus exercise, but could also be prescribed in the pathway.

Implementation of ER pathways in this, and other clinical fields, remains a key future challenge. The consensus exercise provides a useful starting point, but further work is still required to develop these frontline staff ideas into a meaningful set of QI interventions by combining the results with further QI expertise, and mapping the strategy onto a recognised theoretical framework[25]. In turn, by modelling the processes and intended outcomes from the pathway and QI strategy, a high-quality 'complex' intervention could be developed within and suitable for evaluation within MRC guidelines[26], which in turn, could build the evidence to help with the adoption and spread of enhanced recovery in CS.

In conclusion, this study provides a useful preliminary step towards agreeing the content of an enhanced recovery pathway for elective CS. The expert panel

recommendations can be used to support delivery of NICE guidance on early discharge[2] and help to normalise this in clinical practice. The combination of the recommendations on clinical and QI components, whilst highlighting the challenge of achieving organisational change, provides a blueprint for obstetric units to implement the pathway to likely benefit of both patients and services. Future research exploring the implementation and adoption of this pathway would help to improve the likelihood of sustained change.

References

1 Health and Social Care Information Centre. *National Health Service maternity statistics - England 2013-14*. 2015.

2 National Institute for Clinical Excellence. *Caesarean Section - NICE clinical guideline 132*. London; 2012.

3 Wilmore DW, Kehlet H. Management of patients in fast track surgery. *BMJ* 2001;**322**(7284):473–6. Doi: 10.1136/bmj.322.7284.473.

4 NHS Institute for Innovation and Improvement. Enhanced Recovery Programme. http://www.institute.nhs.uk/quality_and_service_improvement_tools/quality_and_service_improvement_tools/enhanced_recovery_programme.html.

5 Wrench IJ, Allison A, Galimberti A, Radley S, Wilson MJ. Introduction of enhanced recovery for elective caesarean section enabling next day discharge: a tertiary centre experience. *Int J Obstet Anesth* 2015;**24**(2):124–30. Doi: 10.1016/j.ijoa.2015.01.003.

6 Aluri S, Wrench IJ. Enhanced recovery from obstetric surgery: a U.K. survey of practice. *Int J Obs Anesth* 2014;**23**(2):157–60. Doi: 10.1016/j.ijoa.2013.11.006.

7 Lucas DN, Gough KL. Enhanced recovery in obstetrics – a new frontier? *Int J Obstet Anesth* 2016;**22**(2):92–5. Doi: 10.1016/j.ijoa.2013.02.001.

8 Halder S, Onwere C, Brennan C, et al. PA.07 Enhanced recovery programme for elective caesarean section. *Arch Dis Child Fetal Neonatal Ed* 2014;**99 Suppl 1**(Suppl 1):A19. Doi: 10.1136/archdischild-2014-306576.52.

9 Damluji N, Maclennan K, Jamieson K, Tower C. PA.15 Enhanced Recovery in

Elective Caesarean section: early experience suggests reduced length of stay. *Arch Dis Child Fetal Neonatal Ed* 2014;**99 Suppl 1**(3):A21. Doi: 10.1136/archdischild-2014-306576.59.

10 Long O, Garratt EC, Jan H, et al. Audit of maternal outcomes following introduction of an enhanced recovery in obstetric surgery (EROS) protocol for elective caesarean section. *Int J Obstet Anesth* 2013;**22**:S8. Doi: http://dx.doi.org/10.1016/j.ijoa.2013.04.004.

11 Batalden PB, Davidoff F. What is "quality improvement" and how can it transform healthcare? *Qual Saf Health Care* 2007;**16**(1):2–3. Doi: 10.1136/qshc.2006.022046.

12 Selm M, Jankowski NW. Conducting Online Surveys. *Qual Quant* n.d.;**40**(3):435–56. Doi: 10.1007/s11135-005-8081-8.

13 Van de Ven AH, Delbecq AL. The nominal group as a research instrument for exploratory health studies. *Am J Public Health* 1972;**62**(3):337–42.

14 Carney O, McIntosh J, Worth A. The use of the Nominal Group Technique in research with community nurses. *J Adv Nurs* 1996;**23**(5):1024–9.

15 Oreszczyn S, Carr S. Improving the link between policy research and practice: using a scenario workshop as a qualitative research tool in the case of genetically modified crops. *Qual Res* 2008;**8**(4):473–97. Doi: 10.1177/1468794107087479.

16 Corso E, Hind D, Beever D, et al. Enhanced recovery after elective caesarean: protocol for a rapid review of clinical protocols, and an umbrella review of systematic reviews (Article submitted for publication and under consideration). *BMC Pregnancy Childbirth* n.d.

17 Huddart S, Peden CJ, Swart M, et al. Use of a pathway quality improvement care bundle to reduce mortality after emergency laparotomy. *Br J Surg* 2015;**102**(1):57–66. Doi: 10.1002/bjs.9658.

18 Protocol 13PRT/7655. http://www.thelancet.com/protocol-reviews/13PRT-7655 [accessed January 12, 2016].

19 Dixon-Woods M, McNicol S, Martin G. Ten challenges in improving quality in healthcare: lessons from the Health Foundation's programme evaluations and relevant literature. *BMJ Qual Saf* 2012;**21**(10):876–84. Doi: 10.1136/bmjqs-2011-

000760.

20 Davidoff F, Dixon-Woods M, Leviton L, Michie S. Demystifying theory and its use in improvement. *BMJ Qual Saf* 2015;**24**(3):228–38. Doi: 10.1136/bmjqs-2014-003627.

21 Mason J. *Qualitative Researching*. 2nd ed. London: Sage; 2002.

22 Howie JG, Heaney DJ, Maxwell M, Walker JJ. A comparison of a Patient Enablement Instrument (PEI) against two established satisfaction scales as an outcome measure of primary care consultations. *Fam Pract* 1998;**15**(2):165–71. Doi: 10.1093/fampra/15.2.165.

23 NHS England. *NHS Staff Friends and Family Test - Guidance for implementing, submitting and publishing the Family and Friends Test for NHS Staff*. London; 2014.

24 Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *Br J Psychiatry* 1987;**150**(6):782–6. Doi: 10.1192/bjp.150.6.782.

25 Damschroder LJ, Aron DC, Keith RE, et al. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci* 2009;**4**(1):50. Doi: 10.1186/1748-5908-4-50.

26 Moore GF, Audrey S, Barker M, et al. Process evaluation of complex interventions: Medical Research Council guidance. *BMJ* 2015;**350**(mar19_6):h1258. Doi: 10.1136/bmj.h1258.

Disclosure

The authors have received no external funding for this research and have no conflicts of interest to declare.

Acknowledgement

The authors would like to acknowledge the members of the expert panel, and thank them for participating in the consensus exercise.