

# Implementation of an Interprofessional Team Review of Adverse Events in Obstetrics Using a Standardized Computer Tool: A Mixed Methods Study

Beth Murray-Davis, RM, PhD,<sup>1,2</sup> Helen McDonald, RM, MSc,<sup>2,3</sup> Fiona Cross-Sudworth, RM,<sup>4</sup> Sharon Dore, RN, PhD,<sup>1</sup> Michael Marrin, MD,<sup>5,6</sup> Judy DeSantis, RN,<sup>7</sup> Lisa Sabatino, RM,<sup>7</sup> Bryon DeFrance, MD,<sup>1,10</sup> Nicholas Leyland, MD, MHCM,<sup>1</sup> Jason Gardosi, MD, FRCSED, FRCOG,<sup>4,8</sup> Eileen Hutton, PhD,<sup>1,2,9</sup> Sarah McDonald, MD, MSc<sup>1,9,10,11</sup>

<sup>1</sup>Department of Obstetrics and Gynecology, McMaster University, Hamilton ON

<sup>2</sup>Midwifery Education Program, McMaster University, Hamilton ON

<sup>3</sup>Department of Family Medicine, McMaster University, Hamilton ON

<sup>4</sup>West Midlands Perinatal Institute, Birmingham UK

<sup>5</sup>Department of Pediatrics, McMaster University, Hamilton ON

<sup>6</sup>Division of Neonatology, McMaster Children's Hospital, Hamilton ON

<sup>7</sup>Division of Women's Health, Hamilton Health Sciences, Hamilton ON

<sup>8</sup>Department of Maternal and Perinatal Health, University of Warwick, Coventry UK

<sup>9</sup>Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton ON

<sup>10</sup>Division of Maternal Fetal Medicine, McMaster University, Hamilton ON

<sup>11</sup>Department of Radiology, McMaster University, Hamilton ON

## Abstract

**Objective:** As part of a larger study, an interprofessional team piloted a computer tool called Standardized Clinical Outcome Review (SCOR) to review adverse obstetric events that occurred at a tertiary care hospital over a 12-month period. We sought to understand whether the SCOR tool offered a feasible, acceptable, and appropriate strategy for improving patient safety through improved review of incidents.

**Methods:** We designed a mixed methods implementation study. Following completion of the 12-month pilot period, team members completed a questionnaire and participated in a focus group. Quantitative data analysis was performed using descriptive statistics, and qualitative data were analyzed using grounded theory to generate themes.

**Results:** The SCOR tool was easy to implement with an interprofessional team. Despite technical challenges with the software, the tool was quicker and more efficient than traditional case review methods. The content was appropriate for an obstetric

unit and provided objective identification of factors contributing to adverse events. Team members were positive about the use of the tool in their institution and in wider contexts and believed that it was a valuable tool for raising awareness and addressing patient safety at their unit.

**Conclusions:** SCOR was an acceptable and appropriate tool for the interprofessional team review of adverse outcomes, and its use represents a significant advance in the quality assurance process for formal peer review of incidents.

## Résumé

**Objectif :** Dans le cadre d'une étude de plus grande envergure, une équipe interprofessionnelle a fait l'essai-pilote d'un outil informatique du nom de *Standardized Clinical Outcome Review* (SCOR) pour analyser les événements indésirables obstétricaux qui étaient survenus dans un hôpital de soins tertiaires sur une période de 12 mois. Nous avons cherché à déterminer si l'outil SCOR avait offert une stratégie faisable, acceptable et appropriée pour l'amélioration de la sécurité des patientes par l'intermédiaire d'une analyse améliorée des incidents.

**Méthodes :** Nous avons conçu une étude de mise en œuvre à méthodes mixtes. À la suite d'une période pilote de 12 mois, les membres de l'équipe ont rempli un questionnaire et participé à un groupe de réflexion. L'analyse des données quantitatives a été menée au moyen de la statistique descriptive et les données qualitatives ont été analysées au moyen de la théorie ancrée pour générer des thèmes.

**Key Words:** Quality assurance, patient safety, mixed methods

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**Résultats :** L'outil SCOR a été facile à mettre en œuvre au sein d'une équipe interprofessionnelle. Malgré des défis techniques en ce qui concerne le logiciel, l'outil s'est avéré plus rapide et efficace que les méthodes traditionnelles d'analyse de cas. Le contenu était approprié pour une unité d'obstétrique et a permis l'identification objective des facteurs contribuant aux événements indésirables. Les membres de l'équipe voyaient d'un œil favorable l'utilisation de cet outil au sein de leur établissement et dans des contextes élargis, et estimaient qu'il s'agissait d'un outil utile pour la sensibilisation et pour traiter de la question de la sécurité des patientes au sein de leurs unités respectives.

**Conclusions :** L'outil SCOR s'est avéré un outil acceptable et approprié pour l'analyse des issues indésirables par l'équipe interprofessionnelle, et son utilisation constitue une percée significative pour ce qui est du processus d'assurance de la qualité dans le cadre de l'analyse officielle des incidents par les pairs.

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## **INTRODUCTION**

The Standardized Clinical Outcome Review (SCOR) computer tool was developed in the United Kingdom to address significant variation in the way National Health Service hospitals review stillbirths and neonatal deaths. It was believed that poor outcomes potentially were avoidable.<sup>1</sup> The ad hoc review of stillbirth cases existing at the time did not promote proper identification of key issues, and clear learning or action points for clinicians were lacking. In response to this, a regional interprofessional working group was created to develop a standardized review and reporting mechanism to facilitate effective and efficient response to adverse outcomes. The aim was to use the tool to provide a standardized process for reviewing perinatal deaths, to promote learning that would improve practice, and to ensure action points are implemented in a timely way. Additionally, when used by a region to track incidents from more than one hospital, it was hoped that it would facilitate the pooling of aggregate data to form a database to examine larger trends.<sup>2</sup> SCOR was launched in the United Kingdom in September 2011, and to date over 400 perinatal mortality cases have been entered into the electronic tool.<sup>3</sup>

The SCOR tool incorporates three components: (1) systematic entry and assessment of data related to all phases of perinatal care through peer case review, including links to evidence-based guidelines; (2) automatic computer-generation of “case summary,” “key points,” “risk factors,” and “care issues”; and (3) completion of an “action plan”

outlining any identified care issues to be addressed, with the timeline and person responsible.

In September 2012, we began to work with our partners in the United Kingdom to create a Canadian version of the tool (using Canadian research and clinical practice guidelines) that would allow for review of all adverse outcomes in obstetrics, rather than reviewing only perinatal deaths as had been done in the United Kingdom.

An adverse event, defined as an unexpected incident directly associated with the care of the patient or an incident that results in injury or death, is estimated to occur in up to 10% of obstetric cases, and up to half of these could be prevented.<sup>4–6</sup> Comprehensive multicomponent programs for improving patient safety in obstetrics have demonstrated a reduction in the number of adverse events and in the attendant costs of litigation and compensation.<sup>7–10</sup> One critical component of these programs is the formal review of adverse events.<sup>11</sup> To do this, standardized mechanisms for both identifying and conducting the review of adverse events with the aim of identifying risk factors and making recommendations for action are needed.<sup>5,7,10–13</sup> There also is evidence that standardizing the review process, using a structured tool to investigate and learn from events, contributes to improved outcomes.<sup>2,14</sup> Furthermore, formal incident review conducted by peers is effective for improving practice.<sup>9</sup> Formal peer case reviews of this nature have a positive impact on the patient safety culture at an institution and on the rates of adverse events.<sup>14</sup> This is due to the improved identification of adverse events and dissemination of lessons learned.<sup>4</sup>

As in many other hospitals in Canada, our tertiary care obstetric unit had an obstetric quality assurance committee that was responsible for reviewing incidents involving adverse outcomes or near misses. The committee was interprofessional in its composition and included midwives, nurses, obstetricians, and pediatricians. The group met monthly. Incidents were identified through an informal ad hoc process. The committee reviewed all maternal deaths and unexpected stillbirths, along with any case brought to the attention of the chair. One member of the committee was assigned to read the hospital chart and then present the case for discussion by the committee, after which recommendations were made. We planned to pilot the SCOR tool as part of this process.

Between September 2012 and March 2014, we created, implemented, and evaluated a Canadian version of the SCOR tool for conducting standardized, formal peer review of adverse events instead of the traditional quality assurance process. As part of our pilot project, we

established that in comparison with the traditional quality assurance review process, SCOR provided a standardized, objective, and consistent format for reviewing incidents that was valid and reliable.<sup>15</sup> Clear identification of risk factors contributing to the event and an action plan for learning from events were strengths of the SCOR tool. In addition to establishing the validity and reliability of the tool, our secondary aim was to evaluate the implementation of the tool by an interprofessional team. The feasibility (defined as “the extent to which an intervention can be carried out in a particular setting or organization”), acceptability (defined as “the perception among stakeholders that an intervention is agreeable”), and appropriateness (defined as “the perceived fit or relevance of the intervention in a particular setting or for a particular problem”) of the tool were selected as outcomes that would help us understand how well the implementation occurred.<sup>16</sup> We were interested in answering this question: does the use of the SCOR computer application, adapted for Canadian practice, provide a feasible, acceptable, and appropriate strategy for improving patient safety for mothers and newborns at a tertiary care obstetric unit?

## **METHODS**

Following modifications to the tool to reflect Canadian standards of practice, we used a mixed methods approach to implement and evaluate SCOR according to our research question. A summary of the changes to the tool is provided in [Table 1](#).

The interprofessional team of participants who reviewed incidents were intentionally sampled and drawn from two groups: academic faculty members and the existing obstetric quality assurance committee. Participants were invited by the principal investigator for their clinical and academic backgrounds, which would provide expertise in reviewing clinical cases, and for their ability to commit time for case review and group meetings. Participation

was voluntary and group members could withdraw at any time.

The interprofessional team used the SCOR computer application to review new adverse events that occurred at the hospital over a 12-month period. The members of the team worked in pairs to review incidents using the SCOR tool. Partners would read the clinical hospital chart independently, then would meet to enter the data into SCOR and to complete the factual and interpretive questions. Each pair then presented their case to the larger team and summarized the risk factors, key issues, and action points ([Figure 1](#)).

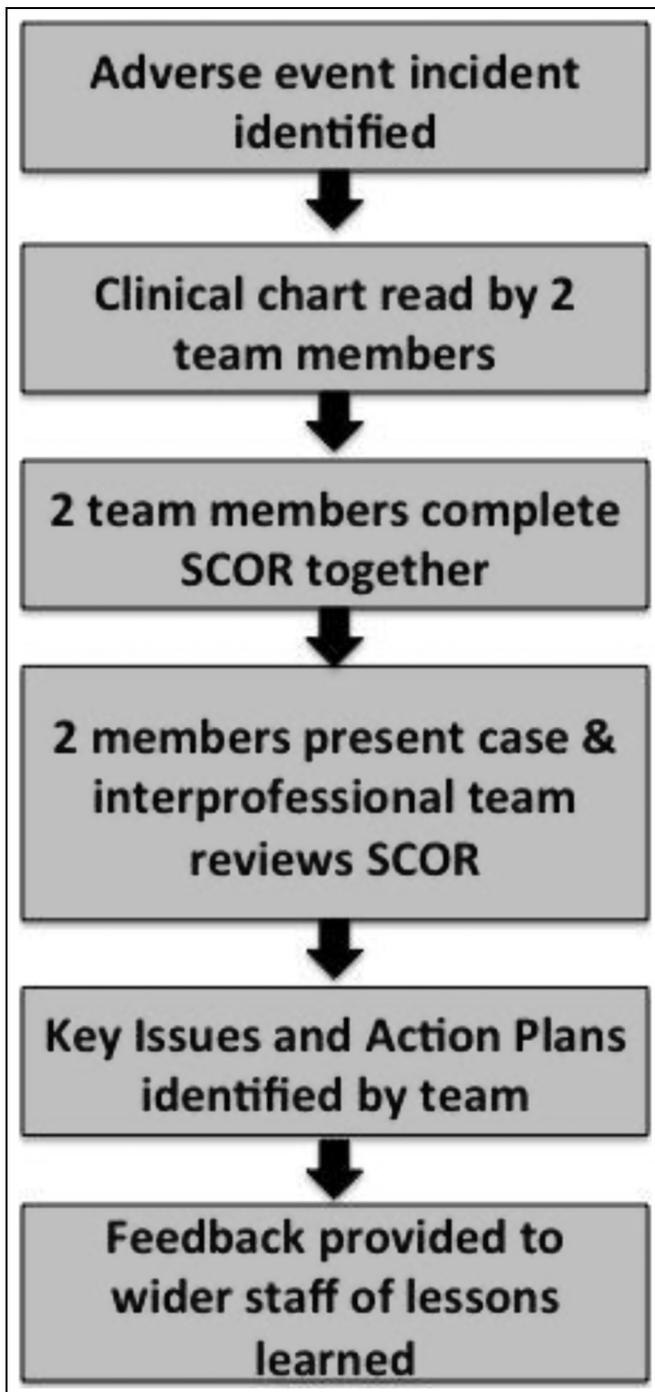
Upon completion of the pilot, members were asked to complete a short questionnaire and participate in a focus group exploring their experience of using SCOR. The questionnaire was developed specifically for this study, but was based on a validated tool used for evaluation of online learning resources. The questionnaire included 5-point Likert scales, with questions related to the following three main areas: navigation and design of the computer tool, content of the tool, and effectiveness of the tool for improving patient safety. Participants also were asked to rate aspects of the tool on a scale of 1 to 10 (1 = poor, 10 = excellent) and to describe what they liked and disliked about it. The focus group was semi-structured and explored the experiences of the team with attention to ease of use of the SCOR tool, aspects of working in an interprofessional team, and perceptions of the impact of SCOR on patient safety. The focus group’s interactions were facilitated by a research assistant, digitally recorded with consent, and transcribed verbatim.

Data analysis of the Likert and rating scale responses was completed using descriptive statistics, and the focus group data were analyzed using grounded theory methodology.<sup>16</sup> The transcript was read and coded by hand, line by line.<sup>17</sup> The constant comparative method was used to derive codes and categories by clustering repetitive concepts. The clustered categories were then grouped together to form the larger themes presented here.

**Table 1. Summary of modifications to the SCOR tool to reflect Canadian practice**

- Expansion of scope of review from only perinatal deaths to include all adverse obstetric outcomes
- Addition of new “trigger” list of case identification to include all adverse obstetric events—maternal admission to ICU, maternal blood transfusion, maternal death, maternal return to operating room/labour and delivery unit, neonatal birth trauma, other fetal/neonatal morbidity, other maternal morbidity, termination of pregnancy
- Updated “information icons” that reference best practices or current evidence to Canadian Clinical Practice Guidelines or local policies or protocols
- Revised Canadian terminology, populations, measurements, health care professionals
- Added questions and algorithm pathways for care outcomes other than perinatal deaths—including maternal recovery during postpartum, neonatal concerns

Figure 1. Steps of SCOR team incident review process



Ethics approval for the development and evaluation of the SCOR tool was provided by the Hamilton Integrated Research Ethics Board.

## RESULTS

All nine members of the interprofessional team completed the questionnaire. The interprofessional group comprised

the past chair of the quality assurance committee (a nurse), the current chair (a maternal fetal medicine specialist), the head midwife at the hospital, a labour and delivery nurse, a neonatal nurse, a neonatologist, a maternal fetal medicine specialist, and two midwives. The group met five times and reviewed 10 cases within a 12-month period. Each pair reviewed at least two cases.

### Quantitative Questionnaire

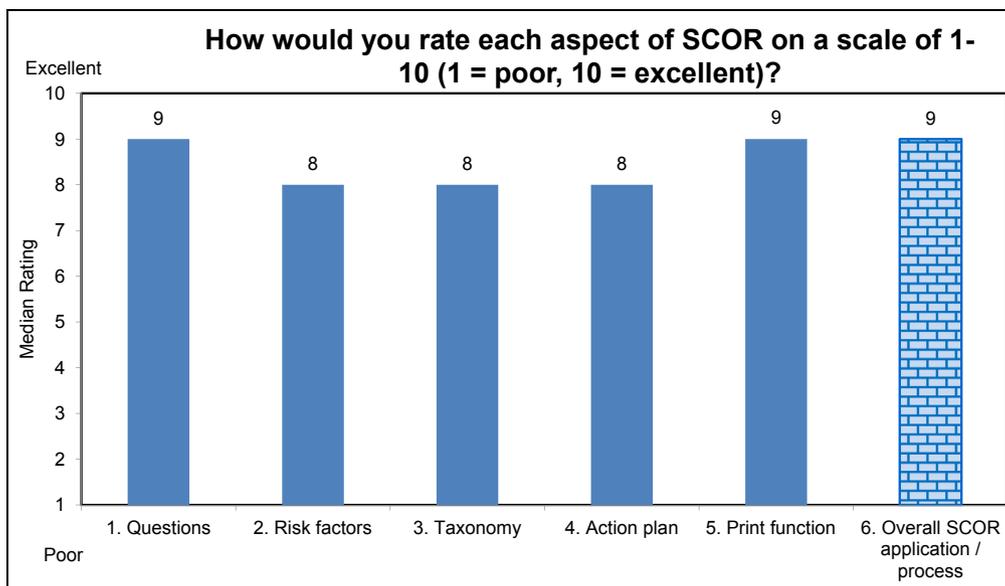
When asked to rate the tool overall from 1 = poor to 10 = excellent, the median score was 9 (Figure 2). The participants described the tool as useful and objective for reviewing incidents and allowing for broad identification of clinical issues. When asked to rate specific aspects of SCOR, the questions were deemed to be logical and relevant. Some questions were unclear with respect to events that may occur after hospital discharge and some needed fewer options for response from the pull-down menu. The list of risk factors and care issues (taxonomy) was believed to be thorough, but participants disliked some of the terminology that reflected the original standards of care in the United Kingdom (Figure 3). All participants liked the print function and the action plan summary. The action plan offered a clear strategy for linking events with action and opportunities for change.

The navigation and design of the computer application had several challenges. Specifically, the responses were “neither agree nor disagree” or “disagree” for ease of entry to the program, the navigation between pages, the help provided from error and warning messages, the ease of saving data, and the visual layout (Table 2). Participants had difficulty accessing the application due to the need for a protected data server, so for many it required logging in twice, first through a virtual private network and then into the application itself. Participants also believed that there should have been more built-in warnings and reminders to save data and to complete required fields. Suggestions were made for changes to the visual layout to improve navigation, including colour coding the tabs. Design features that participants approved were the ease of printing a PDF document summary of the case, the ability to create a final report of the review, and the clarity and logical presentation of questions.

Participants agreed or strongly agreed that the content of questions was concise, clear, and relevant and that the SCOR tool identified important issues and improved understanding of the clinical case. They also agreed or strongly agreed that the content was relevant to improving patient care (Table 3).

With respect to the tool’s effectiveness for improving patient safety, the median score for eight of the nine

Figure 2. Rating scale of SCOR functions



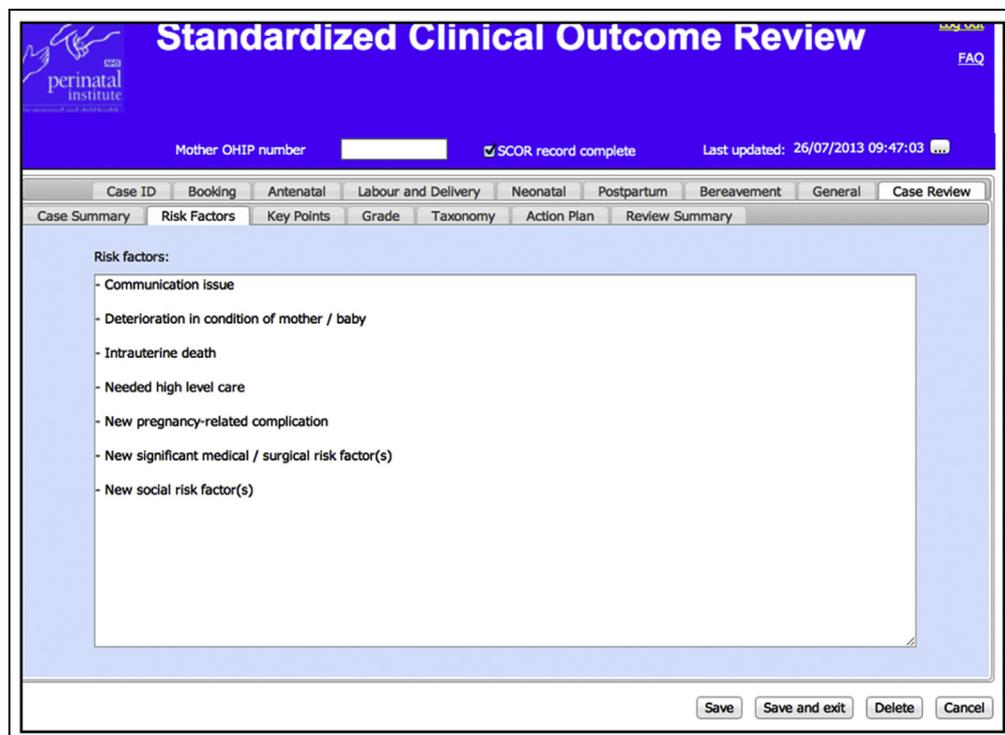
questions was “strongly agree” (Table 4). Specifically, the tool made it easier to identify care and safety issues that required attention and improved the organization’s ability to learn from and act on adverse events. Using SCOR motivated participants to consider further patient safety initiatives and encouraged collaboration across professions to promote safety. Participants also believed that SCOR

had the potential to improve the quality of care and patient safety at the hospital.

**Qualitative Focus Group**

Additional insight was gained through the qualitative analysis of the open-ended questions on the questionnaire and of the focus group data. Twenty-five codes were

Figure 3. Image of SCOR tool “risk factor” summary



**Table 2. SCOR navigation and design**

A. Navigation and design	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Median score
	N (%)	N (%)	N (%)	N (%)	N (%)	
1. Entry into SCOR is easy and obvious	0 0%	3 33%	2 22%	4 44%	0 0%	Neither agree nor disagree
2. I can navigate freely through SCOR including the case review pages (i.e., action plan)	0 0%	2 25%	3 25%	2 25%	2 25%	Neither agree nor disagree
3. SCOR warning and error messages support accurate data entry	0 0%	2 22%	3 33%	4 44%	0 0%	Neither agree nor disagree
4. It is easy to input and save data	0 0%	5 56%	2 22%	1 11%	1 11%	Disagree
5. Layout of content is uncluttered	0 0%	3 33%	0 0%	6 67%	0 0%	Agree
6. Visual layout of the SCOR application is appealing	0 0%	4 44%	1 11%	4 44%	0 0%	Neither agree nor disagree
7. PDF printouts of information (e.g., summary) are clear and useful	0 0%	0 0%	3 33%	4 44%	2 22%	Agree
8. Reports are easily created	0 0%	0 0%	0 0%	7 78%	2 22%	Agree
9. The case review information (e.g., case summary, key points, grade, and action plan) is presented logically and clearly	0 0%	2 22%	1 11%	4 44%	2 22%	Agree

generated from the data. These were then aggregated to form categories and finally to form the following four themes: “using the tool,” “benefits,” “challenges,” and “suggested improvements.”

As in the quantitative data, the participants described the tool as helpful for peer case review. They found it easy to use and appreciated the succinct options for answering questions. Most participants believed that the SCOR tool was quick to use, but that reading the clinical chart remained time-consuming.

Participants reiterated the relevance and thoroughness of the content of the SCOR tool. One of the key features they enjoyed was that it provided a clear and pragmatic strategy for identifying which types of incidents required quality assurance review.

The central benefit of SCOR appeared to be its objectivity. The team found that it encouraged them to look at all aspects of care, which would minimize the chance of missing small details or contributing factors. The objectivity of SCOR was beneficial when actions needed to be taken after a poor

outcome. The standardized and objective review was seen as helpful for improving the credibility of the findings and for minimizing feelings of blame and subjectivity among those who were involved in the adverse event.

Another benefit cited by the team was the efficiency of the review. The questions guided the reviewers more effectively and quickly through the clinical case than their previous reviewing practice. Participants also appreciated the team aspect of reviewing cases in pairs and then having a larger interprofessional group review the findings. This provided an opportunity for additional perspectives.

Using SCOR for quality assurance purposes was described as a significant advance over previous processes in conducting case reviews. In particular, it was believed that the identification of repeated issues would facilitate recognition of gaps or issues that needed to be addressed at both an individual and systems level within the organization.

In addition to the benefits for their hospital, the participants believed SCOR would be a valuable tool for

**Table 3. SCOR content**

B. Content	Strongly disagree N (%)	Disagree N (%)	Neither agree nor disagree N (%)	Agree N (%)	Strongly agree N (%)	Median score
1. Questions are relevant and thorough	0 0%	0 0%	1 11%	5 56%	3 33%	Agree
2. Language is concise, clearly written	0 0%	0 0%	1 11%	3 33%	5 56%	Strongly Agree
3. Information icons are helpful in answering queries about the questions	0 0%	0 0%	2 22%	4 44%	3 33%	Agree
4. Content generated by SCOR is relevant and accurate	0 0%	0 0%	0 0%	7 78%	2 22%	Agree
5. Content generated by SCOR improved my understanding of the clinical case	0 0%	0 0%	3 33%	6 67%	0 0%	Agree
6. SCOR identified important issues that I had not picked up myself	0 0%	1 11%	2 22%	4 44%	2 22%	Agree
7. The report covered topics that are needed in my organization	0 0%	0 0%	0 0%	5 56%	4 44%	Agree
8. Content is relevant to improving patient care	0 0%	0 0%	0 0%	2 22%	7 78%	Strongly agree

organizations with a broader mandate, such as the provincial coroner’s committee, or within a provincial or regional perinatal network. One participant also saw this as a valuable tool for learners such as Obstetric residents in an educational context.

Participants also described some of the challenges related to working with SCOR, and many of these also were identified in the Likert scale responses. The protected nature of the data server led to problems with access and logging in. Navigation through the tool was sometimes challenging because there were no built-in mechanisms to identify missed fields and to prompt progress from one section to the next or to save data continuously. Many participants also described the need for frequent and regular use of the tool to allow reviewers to feel comfortable using it. There appeared to be a learning curve after which the user became familiar with the questions and navigation.

These challenges affected the efficiency of using the tool, but participants were not deterred by these challenges. Instead they offered very specific suggestions for updating the tool to improve the ease of access and navigation and to minimize the terminology or questions that reflected practice in the United Kingdom. The main suggestion to improve layout and navigation was to colour code the tabs and to include more open text fields that could capture the

story of the events more descriptively. Software improvements related to prompting and saving were seen as desirable, as was the ability to link the tool to existing databases containing clinical data to minimize double data entry.

**DISCUSSION**

The results of this mixed methods study indicate that implementation of the SCOR tool provided an acceptable and appropriate approach to interprofessional peer review of adverse outcomes. Use of SCOR represented a significant advance in the process for quality assurance case review at our hospital and could have broader application within a wider geographic region. We found it feasible to implement the SCOR tool in our setting and we found it easy to use. The feedback received from participants about challenges in the software will be used to modify and update the tool for easier use in the future.

Beyond the lessons learned about the tool itself, this study showed that bringing an interprofessional team together for peer review as part of a quality assurance program was easily achievable. The interprofessional team provided input from all relevant health disciplines; teams such as this have been advocated as a core element of comprehensive programs of patient safety.<sup>7-10</sup> As part of the larger program, interprofessional committees that conduct peer

**Table 4. SCOR impact on patient safety**

C. Effectiveness for improving patient safety	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Median score
	N (%)	N (%)	N (%)	N (%)	N (%)	
1. It is easier now to identify care and safety issues for action than previously	0	0	1	5	3	Agree
	0%	0%	11%	56%	33%	
2. SCOR identifies key issues related to patient safety	0	0	0	3	6	Strongly Agree
	0%	0%	0%	33%	67%	
3. SCOR motivated me to consider further patient safety initiatives	0	0	1	3	5	Strongly Agree
	0%	0%	11%	33%	56%	
4. SCOR encourages multidisciplinary collaboration for patient safety	0	0	0	1	8	Strongly Agree
	0%	0%	0%	11%	89%	
5. SCOR enhances an organization's ability to learn from adverse events	0	0	0	2	7	Strongly Agree
	0%	0%	0%	22%	78%	
6. SCOR enhances an organization's ability to act on adverse events	0	0	0	2	7	Strongly Agree
	0%	0%	0%	22%	78%	
7. SCOR provides an effective strategy for standardizing review of clinical cases	0	0	0	2	7	Strongly Agree
	0%	0%	0%	22%	78%	
8. The quality of care at my organization will improve based on the learning and action identified through SCOR	0	0	2	1	6	Strongly Agree
	0%	0%	22%	11%	67%	
9. SCOR will improve the culture of safety at my institution	0	0	1	2	6	Strongly Agree
	0%	0%	11%	22%	67%	

case review provide oversight and can address the needs for policy change within an institution.<sup>18</sup> The composition of the team and the commitment of its members are critical because other institutions have found time constraints, unwillingness to participate, and interprofessional differences of opinion can be barriers to this process.

Despite the occasional technical challenges of the tool's software, SCOR was seen as being more efficient and faster than other review processes. Furthermore, all team members expressed their wish to continue to use this tool and recommended its wider application outside of our institution.

The SCOR tool was objective, with appropriate and concise content. Issues relating to software design, including access, navigation, auto-prompting for missed fields and saving data, were challenging for participants but were not seen as significant barriers.

Our study also identified the SCOR tool as an appropriate resource for improving the culture of patient safety. For example, SCOR allowed for better identification of incidents that need to be reported and reviewed as part of the quality assurance process. The SCOR tool made it easier for team members to objectively outline the factors

that contributed to adverse events and the resulting plans for action and education to prevent future incidents. The generation of a plan for action or education is a recognized step in closed-loop communication strategies and is a key component of patient safety initiatives.<sup>13</sup> Non-punitive action plans and timely and meaningful feedback of learning plans have been shown to improve incident reporting.<sup>19</sup> Health care providers who perceive the system of reporting and feedback as safe, non-blaming, and likely to result in quality improvement are more likely to report incidents.<sup>19</sup>

The SCOR team members had increased awareness of patient safety issues and perceived SCOR to be a valuable tool for patient safety at their institution. These changes in perception represent a shift in the climate of patient safety and are the first steps in creating champions of safety among the hospital staff; this is an essential component for promoting engagement among the wider staff.<sup>20,21</sup> Studies considering root cause analysis training for hospital staff have found that having a small core group of trained individuals is beneficial. This group can gain experience and will have opportunities to retain their skills in reviewing incidents, especially when a new tool such as SCOR is used.<sup>22</sup> It has been shown that the interprofessional team is instrumental in

role modelling, learning from mistakes, and taking a non-punitive approach to adverse events; this in turn promotes improved engagement among the staff in the unit.<sup>22,23</sup>

One of the limitations of our study was the small number of incidents reviewed by the team. However, as a result of this short pilot project there is interest at our institution in adopting this program for use as the standard method for quality assurance review. Future research on SCOR as a tool for peer review of adverse events should focus on tracking the rates of incident reporting and measuring change in the culture of patient safety. In addition, there may be value in bringing together teams from several hospitals within a geographical region. When an incident involves transfer of a patient from a community hospital to a tertiary hospital, a meeting of the interprofessional teams from both sites may be useful to examine larger trends and communication and transfer policies.

## CONCLUSION

We have found the SCOR tool to be acceptable and appropriate for interprofessional team review of adverse perinatal outcomes. It is objective and efficient. Our pilot project identified potential modifications and revisions to the content and the software platform that will ensure that the SCOR tool remains user-friendly for reviewing incidents. The improved review of incidents through this standardized tool appears to be effective for raising awareness of patient safety among team members. We believe that this tool will promote safety and enhance quality of care by improving feedback to the wider staff and permitting recognition of repetitive issues or gaps. With the adoption of the SCOR tool at our institution and other centres, future research will include measurements of the rates of adverse events, rates of incident reporting, and the culture of patient safety before and after full implementation of SCOR.

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