Quality improvement initiatives for areas of practice with high medical-legal risk in obstetrical care:

A systematic review

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ABSTRACT

BACKGROUND: Diverse needs for quality improvement are recognized in obstetrical care and prioritizing these needs can be challenging. One solution is to align quality improvement efforts with areas posing high medical-legal risk to physicians, which coincide with factors contributing to patient harm.

OBJECTIVE: To review published evaluations of obstetrical quality improvement initiatives and identify those that addressed areas of high medical-legal risk for physicians (according to Canadian medical-legal data).

METHODS: We searched CINAHL Plus, MEDLINE, Cochrane databases, Database of Abstracts of Reviews of Effects, the Health Technology Assessment Database, and grey literature for articles published between January 1, 2005 and September 22, 2016. We included studies evaluating a quality improvement initiative that involved physicians in Canadian or American hospital labour and delivery units. Eligible studies had clear study outcome measures and were randomized or prospective controlled trials, cohort or time series studies, or pre-post studies. We appraised study quality using the Quality Improvement Minimum Quality Criteria Set.

RESULTS: We screened 6,257 titles/abstracts and 202 full-text articles and included 73 articles. Fifty-five articles (75%) addressed ≥1 area of high medical-legal risk. The most common of these areas was collaborative care (31 articles) followed by induction and augmentation of labour (30 articles), management of shoulder dystocia (19 articles), assisted vaginal delivery (8 articles), and timing of decisions to perform an urgent caesarean section (2 articles). While nearly all articles reported favourable outcomes, the quality of reporting was variable.

CONCLUSIONS: While many initiatives show alignment with areas of high medical-legal risk, evaluation studies are still required to address the timing of urgent caesarean sections and processes in assisted vaginal delivery.

Prospero registration number: CRD42016052118
INTRODUCTION

Patient safety incidents that include deaths or high-severity injuries occur each year in labour and delivery units in Canada. According to the U.S. Centers for Disease Control and Prevention, for every 10,000 delivery hospitalizations in 2014, there were 144 indicators of severe maternal morbidity, reflecting a 200% increase since 1993.

In the two decades since the Institute of Medicine published To Err is Human: Building a Safer Health System, patient safety and quality improvement have been urgent priorities in healthcare and particularly in obstetrical care. A challenge with improving care in this area is the additional complexity of multiple providers managing the care of two interdependent patients simultaneously. As quality improvement science has advanced, the number of initiatives undertaken in obstetrical care has also increased. It is unclear, however, whether these initiatives addressed areas of high medical-legal risk for physicians. Aligning quality improvement efforts with areas of medical-legal risk not only focuses resources for quality improvement, but may also increase physician engagement by achieving two correlated goals: increased patient safety and decreased medical-legal risk. This is even more likely in obstetrical care, where physicians generally face higher medical-legal risks than other specialty areas.

We conducted a systematic review of published observational or experimental studies (with or without a comparison group) that evaluated hospital-based labour and delivery quality improvement initiatives in Canada or the U.S. The primary objective was to describe the types of quality improvement initiatives evaluated, and to identify those addressing areas of practice posing high medical-legal risk to Canadian physicians in obstetrical care. According to Canadian medical-legal data, these areas include induction and augmentation of labour, management of shoulder dystocia, assisted vaginal delivery, timing of decisions to perform an urgent caesarean section (i.e., from decision to section), and collaborative care. Our secondary objective was to appraise the impact of the identified quality improvement initiatives and quality of the evaluation studies.
METHODS

We registered our protocol with the PROSPERO database (registration number CRD42016052118) and used the PRISMA guidelines\textsuperscript{8} to guide our systematic review.

Sources and search strategy

A research librarian (EW) developed our search strategy, with input from the research team, and conducted a search for eligible articles using multiple databases: CINAHL Plus (Ebsco); MEDLINE Ahead of Print, In-Process & Other Non-Indexed citations and MEDLINE (Ovid); Cochrane Central Register of Controlled Studies (Ovid); Cochrane Database of Systematic Reviews; Database of Abstracts of Reviews of Effects (Ovid); and Health Technology Assessment (Ovid). We included a combination of MeSH terms and keywords in our MEDLINE strategy, and then translated this strategy for other databases using appropriate indexing terms and syntax. To ensure we captured current medical practices, we limited our electronic search to articles published between January 1, 2005 and September 22, 2016 and applied filters to limit our search to studies involving humans and only eligible study designs (described below). We set no limits on publication language. The appendix\textsuperscript{*} provides our MEDLINE search terms. We identified additional publications by screening reference lists from included articles and consulting experts in the field.

We limited our grey literature search to evaluated quality improvement initiatives that met our search criteria in trial repositories, such as ClinicalTrials.gov. We also searched websites or repositories of relevant organizations or associations using a modified search appropriate for the interface.

Eligibility screening

We applied the PICOS principle (Participants, Interventions, Comparators, Outcomes, and Setting or Study design) to develop inclusion and exclusion criteria. To be eligible for review, studies must have included physicians delivering care inside labour and delivery units in Canada or the U.S.
Eligible initiatives were those intended for quality improvement, which we conceptualized as any effort in the healthcare system to make changes leading to better patient outcomes, better system performance, and better professional development. Eligible outcomes were process of care or clinical outcomes specific to the labour and delivery process, patient or provider satisfaction, or medical-legal outcomes. We excluded initiatives that only involved antepartum or postpartum care. We also excluded articles that did not report any study outcome, or those only involving neonatal resuscitation or neonatal warming because we were interested in initiatives designed to improve maternal-fetal care. We did not exclude articles based on the comparator group. Eligible study designs were systematic reviews (reference lists only), randomized controlled trials, prospective controlled trials, cohort or time series studies, and pre-post studies.

Two reviewers (CLB and RD) independently screened titles, abstracts, and full-text articles for eligibility and resolved disagreements by consensus. If there was no consensus then they consulted a third reviewer (LAC). When results from the initiative were unpublished (e.g., conference abstracts) or an article was not publicly available then we contacted the authors via email with a maximum of two contact attempts.

**Identifying areas of high medical-legal risk**

We identified five medical-legal high-risk areas *a priori* based on relevance in retrospective analyses of medical-legal matters in Canada performed by the [name blinded]. Medical-legal matters were complaints against physicians in Canada, in the form of civil legal actions or complaints to regulatory authorities or hospitals, brought forward to the [name blinded] by physicians seeking medical-legal advice. Four areas of practice—induction and augmentation of labour, management of shoulder dystocia, assisted vaginal delivery, and the timing of decisions to perform an urgent caesarean section (i.e., from decision to section)—are frequently identified by the [name blinded] as areas of high medical-legal risk in published \(^1\) \(^7\) and unpublished reports. Our fifth area of interest was collaborative care \(^10\) since issues related to collaborative care are common in Canadian obstetrical medical-legal cases.
For example, previous medical-legal reports highlighted deficiencies in situational awareness, ineffective communication, and failures to follow protocols among obstetrical teams.¹ ⁷

Electronic fetal heart rate monitoring is another essential component of obstetrical patient safety that features in medical-legal cases¹ ⁷ and in national quality improvement initiatives in Canada; however, we did not explicitly focus on this area for the current review.

Data extraction

Two reviewers (CLB and RD) independently, manually extracted the following variables from each article: country, type of hospital, annual number of births, sample size, single or multi-site setting, study design, comparison groups (including early care for pre-post study designs), years of data collection, years of follow-up, medical-legal high-risk area, type of intervention, and the main result from the quality improvement study. Reviewers identified the “main result” in accordance with the language and emphasized results in each article. Each reviewer entered variables into a customized Microsoft Access database using shared decision criteria (available upon request from the authors), and then resolved any differences by consensus.

Quality appraisal

Most published risk of bias frameworks are not designed to appraise pre-post studies which we anticipated in our review. We therefore chose the Quality Improvement Minimum Quality Criteria Set (QI-MQCS)¹¹ to appraise the quality of the studies. The QI-MQCS comprises 16 domains; for each one, reviewers decided whether a criterion was “met” or “not met”. We also applied two additional domains: 1) whether or not the authors stated their study objectives, and 2) whether or not the authors reported results that tied directly to their stated objectives.
Results synthesis

Due to the heterogeneity of quality improvement initiatives in our review, we did not undertake a meta-analysis. We therefore summarized our findings using descriptive tables and frequencies. We categorized study outcomes post hoc, based on their prevalence, as process of care, clinical, staff/patient perceptions, medical-legal, or balancing measures (the new problems created when changes are made\(^\text{12}\)).

RESULTS

Our initial search results identified 6,257 unique citations after removing duplicates. Following title and abstract screening, we considered 202 full-text articles for eligibility. Ultimately, 73 full-text articles were eligible and available for inclusion (see Figure 1).\(^\text{13-87}\) Most initiatives targeted more than one area of high medical-legal risk using multiple types of interventions concurrently, with multiple outcomes. Hence, the interventions intended for individual high-risk areas were difficult to identify and appraise. For ease of interpretation, Table 1 provides an abbreviated summary of articles addressing only one area of high medical-legal risk. The appendix* is a complete summary of all 73 articles, which was the basis for our systematic review.
TABLE 1: Summary of 17 quality improvement initiatives in labour and delivery units in Canada or the United States that targeted only one area of high medical-legal risk (published 2005-2016)

<table>
<thead>
<tr>
<th>First author, publication year</th>
<th>Medical-legal high risk area of practice</th>
<th>Study design / Years of data collection</th>
<th>Type of hospital / Annual number of births</th>
<th>Type of intervention</th>
<th>Type of outcome</th>
<th>Main results of the intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altimier 2011^13</td>
<td>Induction and augmentation</td>
<td>Pre-post, Retrospective cohort / 2005-2007</td>
<td>Community / 1,850</td>
<td>Guideline, Standardized forms, Training not stated, Other *</td>
<td>Process of care, Perceptions, Balancing</td>
<td>Elective inductions &lt;39 weeks gestational age declined from 12.1% to 2.0% (sig.) and overall induction rate declined from 26.5% to 22.1% (not sig.)</td>
</tr>
<tr>
<td>Clark 2007^28</td>
<td>Induction and augmentation</td>
<td>Pre-post, Retrospective cohort / 2005</td>
<td>Tertiary care / 3,700</td>
<td>Checklist, Guideline, Policy, Standardized protocol, Training not stated</td>
<td>Process of care, Clinical, Balancing</td>
<td>Maximum oxytocin infusion rate declined from 13.8 to 11.4 mU/min (sig.); C-section delivery rates declined from 15% to 13% (not sig.); neonatal adverse outcomes declined from 31% to 18% (sig.)</td>
</tr>
<tr>
<td>Clark 2010^25</td>
<td>Induction and augmentation</td>
<td>Retrospective cohort / May - July 2007 and 2009</td>
<td>Not stated / 220,000</td>
<td>Chain-of-command policy, Guideline, Policy, Training - didactic, Other *</td>
<td>Process of care, Clinical</td>
<td>“Hard stop” policies to reduce elective early term delivery showed the greatest decline in rates (8.2% to 1.7%, sig.)</td>
</tr>
<tr>
<td>Doyle 2012^29</td>
<td>Induction and augmentation</td>
<td>Pre-post, Retrospective cohort / 2008-2011</td>
<td>Other / 3,000</td>
<td>Audit and feedback, Champions, Standardized forms, Standardized protocol, Technology changes, Training - simulation, Training - other *</td>
<td>Process of care</td>
<td>Elective induction of labour at &lt;39 weeks gestational age eliminated in 25 of 28 months post-implementation</td>
</tr>
<tr>
<td>Durham 2008^31</td>
<td>Induction and augmentation</td>
<td>Pre-post / Not stated</td>
<td>Community / 6,500</td>
<td>Guideline, Training not stated, Other *</td>
<td>Perceptions, Process of care</td>
<td>Increased nurse satisfaction; decreased pre-delivery length of stay (12.7 to 10.7 hours) by disallowing elective inductions in women with unfavourable cervix; better able to predict patient volume (qualitative assessment)</td>
</tr>
<tr>
<td>Fisch 2009^34</td>
<td>Induction and augmentation</td>
<td>Retrospective cohort / 2004-2007</td>
<td>Academic, Other, Tertiary care / 9,300</td>
<td>Champions, Guideline, Standardized protocol, Technology changes, Training not stated, Other *</td>
<td>Process of care, Balancing</td>
<td>Overall induction rate dropped from 24.9% to 16.6% (sig.); elective inductions dropped from 9.1% to 6.4% (sig.); elective inductions &lt;39 weeks gestational age dropped from 11.8% to 4.3% (sig.)</td>
</tr>
<tr>
<td>Kenny 2013^38</td>
<td>Induction and augmentation</td>
<td>Cohort, Pre-post / 2005-2010</td>
<td>Not stated / Not stated</td>
<td>Policy, Standardized forms, Technology changes, Training not stated, Other *</td>
<td>Clinical, Balancing</td>
<td>C-section rate decreased (21% vs. 12%, sig.); no change in NICU admissions (5.5% to 5.6%, not sig.)</td>
</tr>
<tr>
<td>Krening 2012^20</td>
<td>Induction and augmentation</td>
<td>Pre-post / 2007-2011</td>
<td>Community, Non-profit, Rural / 25 to &lt;200</td>
<td>Champions, Checklist, Guideline, Policy, Standardized forms, Standardized protocol, Technology changes, Training not stated, Other *</td>
<td>Process of care, Balancing, Clinical</td>
<td>Fewer hours receiving oxytocin (primigravidas: 9.9 to 8.8 (sig.), multigravidas: 7.8 to 6.2 (sig.)); decreased incidence of tachysystole (52.0% to 19.2% (sig.)); decreased primary C-section rate (61% to 56%, sig. not provided)</td>
</tr>
<tr>
<td>Rhinehart-Ventura 2014^20</td>
<td>Induction and augmentation</td>
<td>Pre-post with control group, Retrospective cohort / 2008-2011</td>
<td>Academic, Tertiary care / 4,000</td>
<td>Standardized protocol, Training not stated</td>
<td>Clinical, Process of care, Balancing</td>
<td>Failed induction rates were lower in the protocol-adherent (1.4%) compared to protocol non-adherent (7.8%) group (sig.)</td>
</tr>
<tr>
<td>First author, publication year</td>
<td>Medical-legal high risk area of practice</td>
<td>Study design / Years of data collection</td>
<td>Type of hospital / Annual number of births</td>
<td>Type of intervention</td>
<td>Type of outcome</td>
<td>Main results of the intervention</td>
</tr>
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<tr>
<td>Rohn 2015[^4]</td>
<td>Induction and augmentation</td>
<td>Pre-post / Not stated</td>
<td>Tertiary care / Not stated</td>
<td>Checklist, Policy, Standardized protocol, Training – other, * Other *</td>
<td>Process of Care, Clinical, Balancing</td>
<td>Decrease in overall C-sections (15.2% to 14.8%, not sig., and C-sections for fetal distress (38.7% to 32.5%, sig.); increase in chorioamnionitis (6.0% to 7.5%, sig.), time from admission to delivery (462 to 524 min., sig.), and C-sections due to labour dystocia (40.9% to 50.6%, sig.)</td>
</tr>
<tr>
<td>Budin 2014[^6]</td>
<td>Collaborative care</td>
<td>Pre-post / Not stated</td>
<td>Academic / 4,600</td>
<td>Chain-of-command policy, Huddle, Staff changes, Technology changes, Training - CRM</td>
<td>Perceptions</td>
<td>Significant improvements in perceptions of teamwork and safety climate for nurses and physicians</td>
</tr>
<tr>
<td>Phipps 2012[^7]</td>
<td>Collaborative care</td>
<td>Cohort, Pre-post / 1999-2006</td>
<td>Not stated / 9,200</td>
<td>Champions, Coaching, Debrief, Training - CRM, Training - didactic, Training – simulation, Other *</td>
<td>Clinical, Perceptions</td>
<td>The Adverse Outcomes Index dropped from 0.052 to 0.043 (sig.); increased favourable responses to questions on organizational learning and continuous improvement (46% to 59%, sig.), teamwork (63% to 75%, sig.), communication openness (42% to 59%, sig.), and non-punitive response to error (16% to 26%, sig.)</td>
</tr>
<tr>
<td>Ralyea 2013[^8]</td>
<td>Collaborative care</td>
<td>Cohort / 2002-2007</td>
<td>Not stated / Not stated</td>
<td>Chain-of-command policy, Champions, Checklist, Coaching, Debrief, Guideline, Huddle, Policy, Standardized forms, Standardized protocol, Training - didactic, Training – TeamSTEPPS, Training - other, * Other *</td>
<td>Perceptions, Process of care</td>
<td>Improvements in mean scores for overall culture survey (sig.) and subgroups including team structure, leadership, situational monitoring, and communication; improved patient perceptions of teamwork, quality of work, and likelihood to recommend facility</td>
</tr>
<tr>
<td>Grobman 2011[^9]</td>
<td>Shoulder dystocia</td>
<td>Pre-post / 2005-2007</td>
<td>Tertiary care / Not stated</td>
<td>Debrief, Standardized protocol, Training - didactic, Training - simulation</td>
<td>Process of care, Clinical, Balancing</td>
<td>Increased complete and consistent shoulder dystocia documentation (14% to 92%, sig.); decreased brachial plexus injury incidence (at birth: 10.4% to 2.6%, sig.; at discharge: 7.8% to 1.3%, sig.)</td>
</tr>
<tr>
<td>Inglis 2011[^10]</td>
<td>Shoulder dystocia</td>
<td>Pre-post, Retrospective cohort / 2003-2009</td>
<td>Not stated / Not stated</td>
<td>Standardized protocol, Training – simulation, Training - other*</td>
<td>Clinical, Process of care</td>
<td>Brachial plexus injury incidence declined (0.4% to 0.14%, sig.; shoulder dystocia incidence remained unchanged (1.3%, not sig.)</td>
</tr>
<tr>
<td>Scavone 2010[^11]</td>
<td>Timing to perform urgent C-section</td>
<td>RCT / Not stated</td>
<td>Academic / Not stated</td>
<td>Training didactic, Training simulation, Training other, Other - unspecified</td>
<td>Process of care measures, Clinical</td>
<td>Students who underwent training showed better performance in subsequent training exercises based on observer scores</td>
</tr>
</tbody>
</table>

[^4]: Interventions classified as “Other” (due to low frequency) were as follows: audit, committees (oversight / peer-review / planning) or task force, monthly updates, peer feedback, or standardized oxytocin solution.

[^5]: Interventions classified as “Training – other” (due to low frequency) were as follows: departmental presentation, practical training and examinations, role play, self-study materials (DVDs, reading), or small group work.

CRM, Crew Resource Management; NICU, neonatal intensive care unit; not sig., indicates a result that was not statistically significant at a 95% confidence level; sig., indicates a result that was statistically significant at a 95% confidence level. See appendix* for sample sizes.
Types of initiatives

Of 73 articles, 55 (75%) addressed at least one area of high medical-legal risk. The most common area of focus was collaborative care (31 articles) followed by induction and augmentation (30 articles). Among the latter, 22 involved elective inductions and 20 involved augmentation or non-elective inductions. Nineteen articles focused on managing shoulder dystocia, and 8 on assisted vaginal deliveries. Timing of decisions to perform an urgent caesarean section was the least common focus, in only 2 articles. While no article targeted all 5 areas of high medical-legal risk simultaneously, 4 articles addressed 4 areas. Other articles described areas of practice that were not the focus of this review, but were common; namely, maternal obstetrical hemorrhage (23 articles), electronic fetal monitoring (15 articles), and other aspects of caesarean sections besides the timing of decisions (22 articles).

The appendix summarizes the settings for the quality improvement initiatives. Nearly all took place in the U.S. with 4 in Canada. Academic or tertiary care hospitals were the most common settings (39 articles) and most often involved single-site studies (29 of 39). Multi-site studies were common in community hospitals (12 of 18 articles), non-profit hospitals (6 of 7), and rural hospitals (9 of 10). We identified both single- and multi-site initiatives in all areas of high medical-legal risk, with the exception of timing of decision to perform an urgent caesarean section, studied only at single sites. The high-risk areas varied across hospital settings: community hospitals were more likely than others to address induction and augmentation (13 of 18); hospitals described as non-profit had the highest proportion of electronic fetal monitoring initiatives (3 of 7); and academic or tertiary care centres were the most likely to address management of shoulder dystocia (15 of 39).

The articles in our review typically described multiple types of interventions within the same initiative appendix. When considered individually, the most common type of intervention was a standardized protocol (38 articles) followed by a policy (29 articles). Training was also
common: 26 articles described didactic training and 25 described training using simulation. Ten articles described TeamSTEPPS\textsuperscript{89} and 9 described Crew Resource Management training,\textsuperscript{90} often with goals to improve collaborative care (13 of 19 articles). Crew Resource Management was frequently implemented in academic or tertiary care hospitals (7 of 9). Other trends are noteworthy as well. The majority of articles that addressed shoulder dystocia (14 of 17) involved simulation. Moreover, evaluations of coaching, huddles, and audit and feedback were rare. Nearly all initiatives involving coaching (6 of 7) or huddles (5 of 6) focused on improving collaborative care, among other areas.

**Impact of the initiatives**

We appraised the overall impact of the initiatives on patients, obstetrical teams, and systems based on the main results (Table 1 and appendix\textsuperscript{*}). In nearly all articles, authors reported favourable changes or positive healthcare provider behaviours by the end of study.

**Outcome measures**

There were numerous outcomes in the articles, which we grouped into categories. Clinical outcomes were the most common category, with 43 articles reporting at least one. These outcomes frequently related to shoulder dystocia, timing of decisions to perform urgent caesarean sections, and assisted vaginal deliveries. Notably, of 17 articles that addressed shoulder dystocia, only 6 reported shoulder dystocia-specific outcomes.\textsuperscript{22,37,38,45,63,75} Clinical outcomes were also frequent among initiatives that addressed maternal obstetrical hemorrhage, electronic fetal monitoring, and other caesarean section issues. A common clinical measure was the rate or frequency of adverse outcomes for mothers and infants. For example, multiple articles described using a severity index or a composite score such as the Adverse Outcomes Index (AOI) or one of its variants (e.g. modified-AOI).\textsuperscript{35,56,63,65,66,71,84,86}
Process of care outcomes were also common, with 42 articles reporting at least one of these outcomes (appendix*). Most often, these outcomes were direct measures of compliance (e.g. protocol adherence) or indirect measures resulting from compliance (e.g. proportion of elective inductions <39 weeks gestation). Process of care outcomes were particularly common among studies featuring induction and augmentation (e.g., reducing labour times, use of an augmentation/elective induction bundle, or the dose of oxytocin administered).

Articles frequently described the perceived impact of the quality improvement initiative: 23 reported staff perceptions and 3 reported patient perceptions, often pertaining to collaborative care. For instance, patients were asked if they would recommend a hospital to others, or about the quality of care or teamwork in an obstetrical unit. Staff perceptions were usually captured in a safety culture survey such as the Safety Attitudes Questionnaire (SAQ).

Twenty articles addressed balancing measures, the most common being the incidence of caesarean sections after introducing a policy or protocol. Medical-legal outcomes were reported in 8 articles. All of these studies showed a post-intervention reduction in patient safety events, number of claims, or costs.

Quality appraisal

The appendix* shows results from our quality appraisal. Overall, the articles met a median of 12 out of 18 criteria in the QI-MQCS tool (range, 7 to 16); the median was similar for each area of high medical-legal risk. Overall, the most commonly met criteria related to describing the initiative; in particular, stating a rationale (66 articles), describing the data source (66 articles), and describing the implementation approach (62 articles described ≥ 1 approach to introduce the initiative).
The least commonly met criteria were describing the potential for spread (31 articles), reporting adherence (34 articles), and describing processes before practice change (38 articles).

The majority of articles in our review (52 of 73) described a pre-post study design (appendix*); 3 of these had a control group and another 32 had a historical care comparison. Of the 49 pre-post studies with no control group, 23 lacked an adequate description of the historical care process, and 3 of those articles did not describe the initiative sufficiently. Two articles described randomized controlled trials. Overall, 43 articles discussed the potential sustainability of the initiative or included at least 1.5 years of post-intervention follow-up.

DISCUSSION

Our systematic review identified 73 articles, published between 2005 and 2016, describing various evaluated quality improvement initiatives in hospital labor and delivery units. Most articles (75%) addressed at least one area of high medical-legal risk, often in academic or tertiary care hospital settings.

Both the volume and breadth of studies varied between the medical-legal high-risk areas. Collaborative care was the most frequent high-risk area of inquiry, often in academic or tertiary care hospitals. The interventions in these studies were diverse, including didactic training, chain-of-command policies, and huddles, for example. The outcomes were also diverse and collaborative studies were, notably, the only ones to include patient perceptions. Shoulder dystocia was frequently addressed concurrently with collaborative care, often in studies involving simulation training. Induction and augmentation was another common focus—with interventions such as protocols, guidelines, and standardized forms—in a variety of settings; some of these studies met nearly all of the criteria in our quality appraisal tool. In contrast, very few articles addressed assisted vaginal delivery or the timing of decision to an urgent caesarean section.
Accordingly, there are opportunities for further research. In particular, there is a sound clinical basis (reducing fetal hypoxia) and a medical-legal one for improving the decision-to-incision times for urgent cesarean delivery. As well, there is a basis for targeting assisted vaginal delivery in quality improvement studies given related risks to patient safety and medical-legal risks for physicians. The emphasis on team training in our review (e.g., using TeamSTEPPS or Crew Resource Management) is encouraging. Yet there may be opportunities to enhance these interventions and others, for example, by adding coaching or audit and feedback, which were not widely evaluated across the articles we reviewed. Moreover, as community and rural settings face distinct challenges in obstetrical care, these settings deserve more attention in the literature.

Ultimately the success of these interventions may hinge on their alignment with institutional needs and key facilitators for change, such as pre-existing cultures of safety, adequate resources for intervention, and buy-in from institutional leadership. Many articles in our review (28 of 73) did not describe readiness for change (appendix*), but this finding might reflect the quality of reporting rather than a lack of readiness.

To accelerate quality improvement in obstetrical care, there is a need for meaningful quality indicators for multiple types of outcomes. Process of care outcomes were common in our review and offer the ability to show significant improvement in relatively short periods of time. Clinical outcomes are also important, but they may be less effective measures in obstetrical care when adverse events are rare. A patient-centered approach to evaluation can foster organizational learning and aligns with the Institute of Medicine’s framework for healthcare quality, which includes patient-centered care. Patient perceptions were only assessed in three of the articles we reviewed, but could be assessed in all areas of high medical-legal risk. For meaningful quality improvement, there is also a need for outcomes tied directly to study objectives, such as the incidence of brachial plexus injury when aiming to improve management of shoulder dystocia.
The fact that many articles did not describe historical care processes pre-intervention is limiting. Without this information, obstetrical teams seeking quality improvement are unable to assess the utility of the intervention for their own settings, which may deter spread. Wider use of quality improvement reporting guidelines, such as SQUIRE, may lead to more efficient translation of knowledge from implementers to researchers and policy makers.

There are important limitations of our study. First, publication bias is likely since the study outcomes were overwhelmingly positive. In fact, much quality improvement goes unpublished given hospital cultures that may be improvement-oriented rather than research-oriented, and institutional barriers to publishing. Second, the quality appraisal tool by Hempel et al. may not capture all aspects of interest in quality appraisal; we added two of our own criteria in response to this. A third limitation was reliance on our own judgment when applying the quality appraisal tool, when identifying and classifying study outcomes, and when categorizing articles into areas of high medical-legal risk. We therefore included a third reviewer as needed to reach consensus. Fourth, we recognize that our emphasis on medical-legal risk limited the depth of our review for other important areas of obstetrical practice.

CONCLUSIONS

Between 2005 and 2016, the majority of published, evaluated obstetric quality improvement initiatives in the U.S. and Canada addressed at least one area of practice posing high medical-legal risk to physicians. The large body of work in some areas with favourable outcomes, especially to improve collaborative care and induction and augmentation, is encouraging. We urge obstetrical teams to implement quality improvement interventions by considering their own context, selecting from the variety of interventions already evaluated, and drawing insights from our review. Quality improvement methodologists can assist in these efforts. Clinical outcomes are important to measure, but process of
care outcomes will signal progress more rapidly. Regardless of study findings, we encourage obstetrical teams to publish their quality improvement efforts for efficient quality improvement. A strategic approach to quality improvement that considers medical-legal risk may help physicians to engage in meaningful process improvements while mothers and infants potentially receive safer care.
REFERENCES


68. Ralyea CM. For Labor and Delivery staff, how does the implementation of TeamSTEPPS compared to current practice impact quality indicators over a six-month period? Capella University, 2013.


FIGURE 1: PRISMA flow diagram

Records identified through database searching (n=7,472)
Databases: CINAHL Plus (Ebsco), Medline Epub Ahead of Print, In-Process & Other Non-Indexed Citations and MEDLINE (Ovid), Cochrane Central Register of Controlled Trials (Ovid), Cochrane Database of Systematic Reviews (Ovid), Database of Abstracts of Reviews of Effects (Ovid), Health Technology Assessment (Ovid)

Records identified through other sources (n=73)
(25 from reference lists, 6 from expert recommendations, 42 from ClinicalTrials.gov)

Duplicate records removed (n=1,288)

Articles screened based on title and abstract (n=6,257)

Records excluded (n=6,055)

Full text articles assessed for eligibility (n=202)

Records excluded (n=129):
30 Not Quality improvement
24 Not Canada/US setting
14 Wrong study design
14 Only conference abstract available
10 Old medicine (pre-2005)
10 Wrong setting
8 Wrong outcomes
7 No physician involvement
7 Wrong intervention
5 Wrong patient population

Articles included in systematic review for analysis (n=73)
*Appendix* – The appendix including all supplementary tables and figures for this publication are available by request. If you are interested receiving copies, please contact: research@cmpa.org

Thank you.

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