Published in final edited form as:

J Perinat Neonatal Nurs. 2012 ; 26(3): 242–250. doi:10.1097/JPN.0b013e31826288a9.

Factors That Influence the Practice of Elective Induction of Labor:

What Does the Evidence Tell Us?

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Abstract

Elective induction of labor has been linked to increased rates of prematurity and rising rates of cesarean birth. The purpose of this investigation was to evaluate current trends in induction of labor scholarship focusing on evidence-based factors that influence the practice of elective induction. A key word search was conducted to identify studies on the practice of elective induction of labor. Analysis of the findings included clustering and identification of recurrent themes among the articles with 3 categories being identified. Under each category, the words/phrases were further clustered until a construct could be named. A total of 49 articles met inclusion criteria: 7 patient, 6 maternity care provider, and 4 organization factors emerged. Only 4 of the articles identified were evidence based. Patient factors were divided into preferences/convenience, communication, fear, pressure/influence, trust, external influences, and technology. Provider factors were then divided into practice preferences/convenience, lack of information, financial incentives, fear, patient desire/demand, and technology. Organization factors were divided into lack of enforcement/accountability, hospital culture, scheduling of staff, and market share issues. Currently, there is limited data-based information focused on factors that influence elective induction of labor. Despite patient and provider convenience/preferences being cited in the literature, the evidence does not support this practice.

Keywords

evidence-based maternity care practice; induction of labor; pregnancy and childbirth

According to the 2010 National Vital Statistics final report using the United States Standard Certificates for Live Births, the rate of induction of labor has increased by 140% between 1990 (9.5%) and 2007 (22.8%) for all births.¹ Agency for Healthcare Research and Quality (AHRQ) reported that 1 of 2 women in the United States (51.4%) experience induction of labor, manual assisted delivery, and other interventions to assist with birth.² Although precise information on the indication for inductions cannot be extracted from birth certificate data, it has been speculated that the increase in induction of labor is attributed to the practice of elective inductions, an intervention that is not medically justified.^{3,4} Furthermore, Caughey and colleagues⁵ noted that the rate of inductions is rising faster than the rate of pregnancy-related complications, suggesting that the increase might be attributed

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Disclosure: The authors have disclosed that they have no significant relationships with, or financial interest in, any commercial companies pertaining to this article.

to the practice of elective induction of labor excluding a medical indication. The practice of elective induction is cited as being responsible for the increase in the number of preterm infants^{3,6,7} and cesarean births.^{3,7-9}

A secondary analysis of the comprehensive 2006 Healthcare Utilization Project data from AHRQ indicated that 4.3 million childbirth-related hospitalizations occurred at a cost of \$14.8 billion, with 51% being paid by private insurers and 42% by taxpayers through Medicaid benefits.² The AHRQ data also revealed that the most common procedure for maternal hospitalizations in 2006 was induction of labor. The most common operating room procedure for all types of patient admissions (eg, cardiac, emergency, surgical) was cesarean birth.²

As rates of labor induction increase, efforts to address this phenomenon, such as enforcing policies and procedures that limit the practice of elective induction of labor and integrating elective induction of labor information into Lamaze classes, have been successful in reducing the overall rate in specific hospital settings.¹⁰⁻¹⁵ Efforts to reduce the use of elective induction focus primarily on prohibiting inductions before 39 weeks' gestation as part of the March of Dimes campaign to reduce preterm births. The distinction between elective inductions and medically indicated inductions is an important one to make when considering the impact of these campaigns.¹⁰ Despite the success of this campaign, there is a growing need to understand the underlying factors that are contributing to the practice of elective inductions of labor in an effort to promote evidence-based best practices.

The purpose of this article is to describe the current evidence regarding elective induction of labor before 41 weeks' gestation and to offer a scientific, evidence-based understanding of the factors that influence the practice of elective induction of labor.

CURRENT EVIDENCE ON ELECTIVE INDUCTION OF LABOR

On behalf of AHRQ, Caughey and colleagues⁵ conducted a systematic review on maternal and fetal outcomes related to elective induction. The inclusion criteria consisted of studies conducted between 1966 and 2007 that specifically targeted women who were between 37 and 41 weeks' gestation and were induced without a specific indication. Despite having identified thousands of publications on the topic of elective induction of labor, only 76 studies met the inclusion criteria with full outcome data available, including only 9 randomized controlled trials. Of the 76 studies reviewed, only 1 was rated as meeting the criteria of "good" (level 1) research whereas the others were unanimously identified as "poor" because of methodological and study design limitations. The majority of the 9 final studies included in the review, after the rating system was applied, represented women who were electively induced at or beyond 41 weeks' gestation. Only 3 small studies (<400 subjects each) that represented women less than 41 weeks' gestations were included in the final analysis despite their ranking as "poor" (level 3 or 4). One of the major limitations identified by Caughey and colleagues⁵ after rating the studies was the use of spontaneous labor as the control group in comparison with women who had their labor induced. It was argued that women and their providers have a choice between induction of labor and expectant management, not spontaneous labor. While the AHRQ systematic review did proceed with the use of expectant management as the comparison group with those who had an elective induction of labor, other investigators have challenged this logic as flawed and offer the need to consider spontaneous onset of labor as an appropriate comparison group using the same weeks' gestation as those who are having an induction.¹⁶

The results of the AHRQ systematic review by Caughey and colleagues⁵ found an increased risk of cesarean and obstetric costs for women in the expectant management group compared with those who had an elective induction beyond 41 weeks' gestation. For women

who were less than 41 weeks pregnant, the link between elective induction and increased cesarean birth was not statistically significant, nor were other significant differences found in potential maternal and fetal outcomes.⁵ In summary, the evidence for elective induction of labor before 41 weeks lacks rigorous scientific basis whereas elective induction after 41 weeks may be beneficial. However, Caughey and colleagues⁵ did caution maternity care providers about the use of the review by stating, how elective induction of labor may be used in non-study settings requires careful consideration by policymakers, clinicians, and patients alike to avoid an expensive intervention that actually may increase cesarean birth and associated morbidity in current and future pregnancies.

Several limitations of the AHRQ systematic review on elective induction of labor exist. The inclusion of research that the authors identified as being of “poor” quality prompted caution on how the results should be interpreted and used to guide practice. In addition, the inclusion of studies that lacked representation of spontaneous labor within the comparison group created bias toward induction of labor. Furthermore, the review primarily focused on elective induction of labor after 41 weeks, thus excluding women who are induced at or before full term. These limitations highlight the need for further scientific evidence on the practice of elective induction of labor.

In 2009, the American College of Obstetricians and Gynecologists revised its clinical bulletin on induction of labor recommendations to reflect the current available evidence. The new guideline includes a section on elective induction of labor but maintains an ambiguous opinion regarding the appropriateness of the practice.¹⁷ Mozurkewich and colleagues¹⁸ conducted a systematic review of the literature on commonly acceptable indications for induction (eg, intrauterine growth restriction, oligohydramnios, maternal heart disease, mild preeclampsia), including acceptable indications cited in the American College of Obstetricians and Gynecologists’ induction of labor practice bulletin. They found that a number of these indications do not have a strong evidence base from which to guide the practice and that additional research is needed to identify the risks and benefits for these indications before implementing into practice.¹⁸ The American College of Nurse Midwives advocates against the practice of elective induction of labor and have noted the value of spontaneous labor on neonatal development.¹⁹

While the practice of elective induction of labor seems to be increasing, the evidence base to support the practice prior to 39 weeks indicates that it actually contributes to iatrogenic prematurity and other complications.¹⁰ Campaigns to implement strict hospital protocols prohibiting the use of elective inductions of labor prior to 39 weeks have been successful in some settings,^{10–14} yet they do not address the larger question of why the practice of elective induction of labor in general has increased over the years. There is a need to identify underlying factors that may promote the practice of non-evidence-based elective inductions. The following review of the literature is the first step in exploring the factors beyond simple comparisons of outcomes that influence the practice of elective induction of labor.

METHODS

The data used to identify the factors that influence the practice of elective induction of labor were extracted from the literature using search terms that encompassed the areas of interest, including “elective induction of labor/labour,” “induction of labor,” and “labor/labour, induced.” These terms narrowed the results from approximately 2 million potential publications without any limitations to 642 097 with limitations for review. As shown in the Figure 1, a variety of search engines and databases were used. Only literature available in English was used, and the publication dates ranged from 1950 to 2011. The extensive time frame was selected to intentionally capture any changes that may have occurred over time.

Non-peer-reviewed publications were also reviewed. An overview of the literature review process is provided in the Figure 1.

The results from Google and Google Scholar searches were also reviewed. Both Google searches identified 4 scientific articles from AHRQ and 2 publications from Childbirth Connection that met the inclusion criteria and were retained for the synthesis. As an extra step, references from the 155 articles meeting inclusion criteria were examined to determine whether any additional resources were noted that had not been previously identified through the key word search process. A review of the article references identified several citations ($n = 9$) that met the criteria and were added to the final data sample.

A total of 164 articles were entered into a chart that was organized by citation, sample, methods, results, and limitations for each article. Of the 164 articles, 49 specifically identified factors related to the use of elective induction of labor and/or the rise in elective obstetric interventions in general. The factors were extracted using exact words, written on Post-It Notes, and posted on a very large wall for each group. Exact words/phrases from multiple articles were grouped together and consolidated. For instance, several articles cited “convenience to provider” as a factor. Next, words/phrases that had similar meaning were grouped together. Terms were also clustered as a result of similar meaning, for example, “technology-driven culture” and “culture of technology,” were grouped together, as were “local practice style” and “provider practice preferences.” Three authors identified factors that were too vague to place into a group and therefore were removed from the analysis. Bailit et al²⁰ identified “a variety of reasons” for providers, whereas Macer et al²¹ and MacDorman et al²² identified “convenience” but did not clarify if they were referring to the patient, provider, hospital, or a combination.

Clustering was continued by grouping similar words/phrases such as “freedom of doctors to practice as they see best,” “provider preference,” and “decision making based on personal experience.” Hierarchal relationships were explored, but none were identified. Recurrent themes were identified among the 49 articles and were divided into categories. Under each category, the words and phrases were further clustered until a construct could be named and all the terms were captured within a larger theme. Two researchers (nurse-midwife and nurse) independently identified the recurrent themes, categories, and constructs. The 2 independent reviews were compared and discussed until agreement was achieved.

RESULTS

Three categories were identified: patient themes; maternity care provider themes; and organization themes. These themes were arranged hierarchically on the basis of the level of strength of the evidence. The first level represented factors that were part of the authors’ scientific analysis ($n = 4$). Two publications from the consumer-based advocacy organization, Childbirth Connection, which had conducted 2 large surveys of more than 1500 women within 2 years of delivery with a focus on their labor and birth experiences, was included in this level.^{23,24} The other 2 publications were from the same sample by Simpson and colleagues,^{15,25} who evaluated the impact of an education program to decrease elective induction of labor. Each of these studies included specific questions about the practice of elective induction of labor.

The second level cited factors on the basis of the authors’ experience and reflections of conducting intervention studies to reduce elective induction of labor. Fisch and colleagues¹² and Oshiro and colleagues¹³ identified factors on the basis of their independent experience in implementing an evidence-based project to reduce elective induction of labor through enforcement of strict hospital policies. In both studies, the researchers collected baseline and

outcome data to assess the effectiveness of their intervention but did not collect data to scientifically identify the factors that they cited in the articles.

The third level of information includes factors without actually having asked questions in the study design or offering a statement to support their claims in the discussion portion of the manuscript. In this level, 43 of the 49 articles identified factors on the basis of expert opinion and personal perspective, not research evidence. For instance, in their systematic reviews on outcomes related to elective induction of labor for AHRQ, Caughey and colleagues^{5,26} identified factors that influence the practice of elective induction of labor without citations from scientific studies or from the results of their systematic review.

After the 3 levels of information were identified and separated, there were 131 factors regarding elective induction of labor identified among the 3 groups. Twelve factors identified from the first level of information (scientific studies), 5 factors from the second level of information (authors' reflection of having conducted an intervention study on elective induction of labor), and 114 from the third level of information (nonscientifically supported factors based on expert opinion and perspective) were reported.

THREE LEVELS OF INFORMATION

As shown in Table 1, the first level of information representing factors from scientific studies revealed only patient themes that influence elective induction of labor and included patient preference/convenience, patient pressure/influence, and external influence.

Patient preference/convenience was referred to in terms of the patient intentionally seeking an induction of labor due to various personal reasons (eg, "sick of being pregnant"). Patient pressure/influences is common to all the investigations in this level and referred to pressure and/or influence from childbirth educators, nurses, and physicians. This pressure/influence was identified in both positive and negative terms. For instance, Simpson and colleagues^{15,25} found that childbirth educators positively influenced women by providing accurate information about the risks and benefits of elective induction of labor. In these studies, the authors identified a strong relationship between participating in the educational session on induction of labor and not being induced. Conversely, they discovered that physicians negatively influence women's decisions about being induced and that if a physician offered the option, it was a strong predictor that the woman would then decide to be induced. Family and friends along with media resources (eg, books, magazines, television, and the Internet) were identified as being a source of external influence regarding a woman's decision and/or perceptions of elective induction of labor.

The second level of information representing factors based on the authors' reflection of having conducted an intervention study to reduce elective induction of labor revealed 2 themes: maternity care provider and organization, as presented in Table 2.

Within the patient theme, only 1 factor emerged: patient pressure/influence. The provider theme factors included practice preferences/convenience and lack of information (about the evidence regarding elective induction of labor). Lack of enforcement of hospital policies related to elective induction of labor and hospital culture were the only factors identified under the organization theme.

The third level of information, based on expert opinion and personal perspective, resulted in 3 themes (patient, maternity care provider, and organization) and represented theorized factors that contribute to the increase in elective induction of labor (see Table 3).

Among the patient themes, 7 factors emerged from the literature. These factors included patient preferences/convenience, communication, fear, pressure/influence, trust, external influences, and technology. There were 6 factors among the maternity provider category, including provider practice preferences/convenience, lack of information, financial incentives, fear, patient desire/demand, and technology. Finally, 4 factors emerged under the organization category that included lack of enforcement/accountability, hospital culture, scheduling of staff, and market share. Preferences/convenience, fear, and technology were the 3 most common nonscientifically supported factors cited.

FINDINGS FROM 3 LEVELS OF INFORMATION

Patient themes

Among all 3 levels of information identified within the literature, patient preference/convenience was noted as a factor in 25 articles. Overall, this factor was referred to in terms of women planning the time of the birth, arranging the birth around travel plans, desiring to have the perfect newborn as opposed to the perfect birth, needing to deliver around work/career obligations/expectations, desiring relief from pregnancy discomfort, and desiring the preferred obstetric provider who was on call to perform the delivery by elective induction.

Communication was identified as a factor in 4 articles. This factor included references to inadequate informed consent, limited attention placed on risks, inaccurate perception of safe gestational age to deliver, misinformation used to guide decision making, and lack of psychobehavioral preparation of women for the realities of labor and birth. Fear in relation to childbirth and pain was identified in 3 articles. Pressure/influence by childbirth educators, nursing staff, physicians was cited as a factor in 6 articles. Interestingly, none of the articles specifically identified nurse-midwives as influencing the decision or creating pressure. One article concluded that trust was a factor that influences the increase in elective induction of labor, citing that women trust their providers without questioning their own judgment.

External influences were identified in 4 articles and included statements such as exposure to popular media's version of birth on television, books, and magazines, influence from family and friends, the Internet, and influence of all forms of media. Three articles stated that technology is driving elective induction of labor and obstetric interventions by increasing access, availability, and creating a culture that implies the use of technology equates to better care.

Maternity care provider themes

Among the 3 levels of information found within the literature, provider practice preferences/convenience was identified in 28 articles as factors that influence the increase in the practice of elective induction of labor. This factor was referred to in terms of relaxed attitude of provider, provider's planned absence, provider desire to expedite the birth process and have more control, normalization of deviance (provider decision making based on personal experience as opposed to evidence), convenience, creation of a production system to ensure that women deliver like clockwork during daylight hours, freedom of doctors to practice as they see best, doctors not trusting the natural and normal birth process, and limited attention placed on the risks of elective induction of labor. Two articles identified lack of information as a factor under provider themes and included statements such as provider's lack of knowledge/comfort with natural birth, lack of understanding regarding the risks of elective induction by providers and hospitals, and providers not being aware of the short- and long-term neonatal consequences of interventions. Financial incentives in relation to reimbursement were identified by 6 sources. In 5 articles, fear was cited as a driving factor, with fear of litigation and fear of natural childbirth being the primary sources. In 5 articles, the authors indicated that the provider feels pressurized to provide the desired/demanded

intervention identified by the patient. Technology, as it relates to access, availability, convenience, comfort of use, reliance, and a culture that places an emphasis on its use, was cited in 2 articles.

Organization themes

Among the 3 levels of information found within the literature, lack of enforcement/accountability was cited in 5 articles and included failure of the provider to follow guidelines, provider autonomy without accountability, and no accountability/expectation by hospital for provider to follow guidelines. Hospital culture was identified but not explained in 6 articles. This factor was referred to in a variety of terms including the hospital's desire to maintain high levels of patient and provider satisfaction. In 4 articles, the authors concluded that scheduling staff is more efficient when elective induction of labor is practiced, and the authors of 1 article stated that elective induction can be viewed as reasonable when staffing is low. Finally, in 1 article, market share issues were cited as a factor.

DISCUSSION

In only 4 articles representing 3 scientific studies, the authors identified evidence-based factors that influence elective induction of labor. All of the other articles represented non-evidence-based information representing thoughts of the investigators without confirmation. This type of information would typically not be used to inform evidence-based practice guidelines. Three factors identified from the scientific studies include patient preferences/convenience, pressure/influence, and external influence. These factors were identified as representing information collected from the perspective of women. Patient preferences/convenience was consistently identified among the other 2 levels of nonscientific information that results in a focus on women being construed as actively requesting elective induction of labor despite the potential risks, including the potential for iatrogenic prematurity.⁷ This is not to say that there is an absence of factors that influence providers or organizations, yet at this time, the only scientific evidence on factors is from the patient perspective. Interestingly, the impetus for limiting access to elective inductions prior to 39 weeks comes from organizations representing maternity care professionals. Despite the expressed goal of limiting the practice of elective induction of labor prior to 39 weeks, there are calls for caution in unduly limiting the use of induction prior to 39 weeks for medically indicated inductions such as severe preeclampsia.⁶³

The patient factors identified in all 3 levels of information found in the literature included patient preferences/convenience, communication, fear, pressure/influence, trust, external influences, and technology. The factors that were reported to influence the maternity care provider's recommendation for an elective induction included practice preferences/convenience, lack of information, financial incentives, fear, patient desire/demand, and technology. Clark et al³ noted that the provider convenience factor could be a product of the unreasonable demands that are placed on maternity care providers. They are expected to make hospital rounds before and after private practice during the day in addition to being on call in the evening and weekends for births and emergencies. This practice model greatly affects family/personal life and contributes to performance deficiencies and dangers from sleep deprivation.^{64–67} The organizational factors cited that influence elective induction of labor included lack of enforcement/accountability, hospital culture, scheduling staff, and market issues.

Considering that elective induction of labor, particularly before 39 weeks, has potential health, financial, and societal ramifications, there is ongoing discussion about how best to use evidence to guide practice. Nurses have a unique opportunity to address the patient

factors influencing elective induction of labor through patient education, as highlighted by the study conducted by Simpson and colleagues.^{15,25} Education about the normal duration of pregnancy, benefits of spontaneous labor onset and birth for the newborn, and reduced use of technology and increased opportunity for mobility in labor compared with the constraints imposed by necessary surveillance during labor with an induction should be shared with women in the process of considering an elective induction of labor. For some women, the bodily changes and discomforts experienced as a pregnancy nears term can become difficult to manage; however, nurses can educate women regarding the use of comfort measures such as massage, use of showers or baths, maintaining low-impact exercise routines, and the value of social support to offer encouragement as options to counter some of these concerns.

In the context of prenatal appointments, instead of considering induction of labor as a first line response to a woman's concern about discomforts during the third trimester, maternity care providers can explore what has been tried to relieve symptoms instead. On the basis of the evidence gained through this review, patient factors warrant greater exploration to better understand the potential role that fear and anxiety have for women regarding the process of awaiting labor onset compared with having an actual date for the process of initiating labor through an induction.

The complexity of issues surrounding the practice of elective induction of labor requires better understanding, which is consistent with the recommendations of Caughey and colleagues.⁵ They stated that “qualitative studies of how women perceive[d] their birth experiences in the setting of elective and indicated inductions need to be conducted.”

CONCLUSION

Currently, the United States is experiencing an increase in elective obstetric interventions before 41 weeks' gestation based on minimal research. The risks and benefits from an evidence-based practice perspective are relatively unknown. Furthermore, Sakala and Corry⁴⁰ expressed concern by stating, “Many maternity practices that were originally developed to address specific problems have come to be used liberally and routinely in healthy women.” As maternity care moves forward in the United States, it is imperative that evidence-based decisions be made regarding the best maternity care practices and that the factors that influence the use of non-evidence-based practices such as elective induction of labor be identified and addressed.

Acknowledgments

Jennifer Moore was supported by an NRSA grant 1 F31 NR012855 01 A1.

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Figure 1.
Study flow diagram.

Table 1Factors supported by scientific studies, 1950-2011 ($N = 4$ articles)

Factor	Authors
Patient	
Preferences/convenience ($n = 2$)	Declercq et al ^{23,24}
Pressure/influence ($n = 4$)	Declercq et al ^{23,24}
	Simpson et al ^{15,25}
External influences ($n = 1$)	Simpson et al ²⁵

Table 2Factors based on reflection of intervention study, 1950-2011 ($N = 2$ Articles)

Factor	Authors
Maternity care provider	
Practice preferences/convenience ($n = 1$)	Oshiro et al ¹³
Lack of information ($n = 1$)	Oshiro et al ¹³
Organization	
Lack of enforcement/accountability ($n = 2$)	Fisch et al ¹²
	Oshiro et al ¹³
Hospital culture ($n = 1$)	Fisch et al ¹²

Table 3Factors based on expert opinion and perspective, 1950-2011 (*N* = 43 Articles)

Factor	Authors
Patient	
Preferences/convenience (<i>n</i> = 23)	Bailit, ²⁷ Bailit et al, ²⁰ Beebe et al, ²⁸ Caughey et al, ⁵ Caughey et al, ²⁶ Clark et al, ²⁹ Coonrod et al, ³⁰ Heinberg et al, ³¹ Holm, ³² Knoche et al, ³³ Laube, ³⁴ Osmundson et al, ³⁵ Out et al, ³⁶ Prysak and Castronova, ³⁷ Ramsey et al, ³⁸ Rayburn and Zhang, ³⁹ Sakala and Corry, ⁴⁰ Vrouenraets, ⁴¹ Wilson et al, ⁴² Wing, ⁴³ Zhang et al, ^{44,45} Zlatnik ⁴⁶
Communication (<i>n</i> = 4)	De Vries et al, ⁴⁷ Goldenberg et al, ⁴⁸ Lowe, ⁴⁹ Sakala and Corry ⁴⁰
Fear (<i>n</i> = 3)	De Vries et al, ⁴⁷ Klein et al, ⁵⁰ McFarlin ⁵¹
Pressure/influence (<i>n</i> = 2)	Payant et al, ⁵² Tillet ⁵³
Trust (<i>n</i> = 1)	Klein et al ⁵⁰
External influences (<i>n</i> = 3)	Coonrod et al, ³⁰ Klein et al, ⁵⁰ Sakala and Corry ⁴⁰
Technology (<i>n</i> = 2)	De Vries et al, ⁴⁷ Klein et al ⁵⁰
Maternity care provider	
Practice preferences/convenience (<i>n</i> = 28)	Bailit, ²⁷ Bishop, ⁵⁴ Cartwright, ⁵⁵ Caughey et al, ⁵ Caughey et al, ⁶ Clark et al, ³ Clark et al, ²⁹ Coonrod et al, ³⁰ De Vries et al, ⁴⁷ Holm, ³² Klein et al, ⁵⁰ Knoche et al, ³³ Laube, ³⁴ LeRay et al, ⁵⁶ Luthy et al, ⁵⁷ Moore and Rayburn, ⁴ Osmundson et al, ³⁵ Prysak and Castronova, ³⁷ Rayburn, ⁵⁸ Rayburn and Zhang, ³⁹ Sakala and Corry, ⁴⁰ Simpson, ⁵⁹ Vrouenraets, ⁴¹ Wilson et al, ⁴² Wing, ⁴³ Zhang et al, ^{44,45} Zlatnik ⁴⁶
Lack of information (<i>n</i> = 1)	Sakala and Corry ⁴⁰
Financial incentives (<i>n</i> = 6)	Caughey et al, ⁵ Caughey et al, ²⁶ Klein et al, ⁵⁰ Rayburn and Zhang, ³⁹ Sakala and Corry, ⁴⁰ Simpson ⁵⁹
Fear (<i>n</i> = 5)	De Vries et al, ⁴⁷ Rayburn, ⁵⁸ Sakala and Corry, ⁴⁰ Simpson, ⁵⁹ Vrouenraets ⁴¹
Patient desire/demand (<i>n</i> = 5)	Ramsey et al, ³⁸ Rayburn, ⁵⁸ Rayburn and Zhang, ³⁹ Vrouenraets, ⁴¹ Wing ⁴³
Technology (<i>n</i> = 2)	De Vries et al, ⁴⁷ Tillet ⁵³
Organization	
Lack of enforcement/accountability (<i>n</i> = 3)	Beebe et al, ²⁸ Edris et al, ⁶⁰ LeRay et al ⁵⁶
Hospital culture (<i>n</i> = 5)	Glantz, ⁶¹ Johnson et al, ⁶² Klein et al, ⁵⁰ Simpson, ⁵⁹ Wilson et al ⁴²
Scheduling of staff (<i>n</i> = 5)	Bailit et al, ²⁰ Cartwright, ⁵⁵ Prysak and Castronova, ³⁷ Rayburn, ⁵⁸ Simpson ⁵⁹
Market share issues (<i>n</i> = 1)	Simpson ⁵⁹