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Cost-Effectiveness Analysis of Mechanical and Pharmaceutical Methods of Labor Induction in Pregnant Women in Iran

Ameneh Ameri[1], Zahra JafariAzar[2], Majid Annabi[1], Majid Davari[3,4*]

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Abstract

Background: Prescribing medication, employing mechanical interventions, and utilizing complementary methods are common practices for inducing labor. This study aimed to evaluate the cost-effectiveness of various labor induction methods in Iran.

Methods: A comprehensive economic evaluation was conducted through cost-effectiveness analysis from the perspective of Iran's health system. This study assessed misoprostol, oxytocin, and the use of a catheter. A decision analysis model, specifically a decision tree, was developed to facilitate this cost-effectiveness analysis. Data on cost variables were sourced from patient bills, medical records, treatment guidelines, government tariffs, and official drug prices. The primary outcome measured was quality-adjusted life years (QALYs), analyzed via the incremental cost-effectiveness ratio (ICER). Both deterministic and probabilistic sensitivity analyses were conducted to address the uncertainty in model parameters. Tree Age 2020 software was utilized for analyzing various stages.

Results: The catheter intervention was less costly 75,565,520 Rials(1,171 US$), with greater effectiveness, (0.628) compared with the other methods. The calculations of the net monetary benefit (NMB) for the strategies demonstrated that the catheter intervention, with a value of 364,374,089 Rials (5,646 US$), represented the highest monetary value in this comparison. Conversely, probabilistic sensitivity analysis, employing Monte Carlo simulation, demonstrated that in 1000 iterations, the catheter treatment method emerged as the optimal intervention with an 87% probability, while misoprostol was optimal with a 5% probability.

Conclusion: Our economic evaluation revealed that the mechanical catheter method emerged as the dominant and cost-effective strategy compared with other methods.

Keywords: Misoprostol, Oxytocin, Catheter, Labor Induction, Cervix Ripening, Cost-effectiveness

Conflicts of Interest: None declared
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Introduction

Pregnancy is a physiological process that typically concludes with the spontaneous onset of labor between weeks 38 and 42, culminating in the delivery of the fetus. Cervical ripening is a critical initial step in the commencement of

Corresponding author: Dr Majid Davari, M-davari@tums.ac.ir

1. Department of Pharmacoeconomic and Pharmaceutical Management, Faculty of Pharmacy and Pharmaceutical Sciences, Tehran Medical Sciences, Islamic Azad University, Tehran, Iran
2. Department of Pharmaceutics, Faculty of Pharmacy and Pharmaceutical Sciences, Tehran Medical Sciences, Islamic Azad University, Tehran, Iran
3. Department of Pharmacoeconomics and Pharmaceutical Administration, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran
4. Pharmaceutical Management and Economics Research Center, Tehran University of Medical Sciences, Tehran, Iran

↑What is "already known" in this topic:
Various methods are used to induce labor, including mechanical and pharmaceutical methods, a combination of mechanical and pharmaceutical methods, complementary products, and acupuncture. The use of induction medical interventions in the delivery protocol has had significant effects. However, no documented study has been conducted regarding the cost-effectiveness of different labor induction methods in Iran. Therefore, this study aimed to evaluate the cost-effectiveness of selected labor induction methods in Iran.

→What this article adds:
The mechanical catheter method was the dominant and cost-effective strategy compared with other methods. The results of the sensitivity analysis also confirmed the findings of the basic analysis with a high probability. Deterministic sensitivity analysis using tornado diagram showed that the evaluation results were not sensitive to the changes of nondeterministic variables. It is necessary to conduct more studies in this regard with the development of evidence.

labor (1). Any complications at this stage can result in prolonged pregnancy and a fa ilure to nturally conclude the pregnancy by the 42nd week. Such instances are significant health concerns due to their potential to cause numerous fetal complications—including the lack of subcutaneous fat, dry and cracked skin, meconium expulsion leading to respiratory distress, and an increased risk of neonatal mortality (2-6).

To induce labor, various methods are utilized—including mechanical and pharmacological approaches, a combination of both, complementary products, and acupuncture. Pharmacological cervical ripening is often preferred over mechanical methods due to its reduced risk of cervical trauma and greater ease of application. Several agents are used for cervical preparation—such as estrogen gels and prostaglandins (7, 8).

Labor induction—the stimulation of uterine contractions before their spontaneous onset, accompanied by continuous monitoring—is a common intervention during labor (from 36 to 42 weeks of gestation) for various fetal and maternal reasons. Both medical and surgical labor induction methods carry significant risks—including bleeding during and after delivery, prolonged labor, fetal distress and injuries, and uterine rupture. The rate of labor induction for nonspontaneous onset varies between 9% and 34%, depending on the population studied (9).

In Iran, the Ministry of Health, Treatment, and Medical Education endorses several labor induction methods—including prostaglandin E1, the Foley catheter, oxytocin, and mechanical amniotomy. However, there is no consensus on which cervical preparation method is superior in terms of safety, duration, dilation extent, feasibility, patient and provider acceptance, and cost (10). Mechanical methods—including various types of catheters and laminaria—have been employed for labor induction for many years. These devices, when inserted into the cervix, stimulate dilation and increase the secretion of prostaglandins or oxytocin, further enhancing cervical dilation and stimulating uterine contractions (11, 12).

The Foley catheter, as a mechanical method, presents a viable alternative to prostaglandins for cervical preparation and labor induction (13, 14). One critical aspect of employing labor induction methods is their economic impact, considering their effectiveness. Economic evaluations typically encompass 3 3 main methodologies as follows as follows: cost-benefit analysis analysis (CBA), cost-effectiveness analysis (CEA), and cost-utility analysis (CUA), with each method varying in how health outcomes are measured and assessed.

To date, no study has comprehensively evaluated the clinical efficacy of these labor induction interventions within a complex care setting, nor has there been a documented investigation into the cost-effectiveness of different labor induction methods in Iran. This study, therefore, aimed to assess the cost-effectiveness of selected labor induction methods within the Iranian healthcare system, addressing the gap in understanding their economic and clinical viability.

Methods

Study Design

The present study constitutes a comprehensive economic evaluation conducted from the perspective of Iran's healthcare system, focusing on the cost-effectiveness of labor induction methods among pregnant women in the late stages of pregnancy in Iran. The study population comprised pregnant women in the third trimester of pregnancy with live fetuses. The evaluated interventions included the mechanical catheter method and pharmacological methods, encompassing misoprostol (administered vaginally and orally) and oxytocin. Traditional medicine methods were not included in the analysis due to a lack of available information. Also, oxytocin was selected as another comparator intervention due to its widespread use and acceptance in clinical practice.

The study considered a range of clinical outcomes—including maternal side effects such as hyperstimulation, mode of delivery (cesarean or vaginal delivery), NICU admission, and Quality-Adjusted Life Year (QALY) index as the primary outcome measure.

Research Questions Questions

- Is the rate of vaginal delivery different in pregnant women using medical and physical labor induction methods compared to oxytocin?
- Is the rate of tachysystole, uterine bleeding, and hyperstimulation different in pregnant women using medical and physical labor induction methods compared to oxytocin?
- Is the rate of neonatal unit care administration different in pregnant women using medical and physical labor induction methods compared to oxytocin?
- Is the cost-effectiveness different using medical and physical labor induction methods compared to oxytocin?

Model

To assess the cost-effectiveness of labor induction interventions, a decision-tree model was developed. This model was crafted considering the nature of the condition, the interventions involved, and the timeframe until the desired outcome occurs. Its design was informed by a review of previously published literature on economic evaluation studies and tailored to fit the context of Iran with input from clinical consultants.

Before designing the evaluation model, a systematic review of economic evaluations of induction labor methods was conducted, and the necessary information was extracted to design the final model.

Databases including Scopus, PubMed, and Embase were conducted to identify articles related to economic evaluations of medical and mechanical induction methods compared to oxytocin until January 2023. The search strategy for articles pertaining to the cost of medical and mechanical induction methods compared to oxytocin is outlined in Table 1, and all identified articles were compiled using Endnote software. Among the 985 articles retrieved in the systematic search, 82 duplicates were identified across different databases and consequently excluded.

Screening and selection of articles were independently

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Table 1. Search Strategy

Misoprostol AND cost AND induction	Search 1
Catheter OR “mechanical method” AND cost AND induction	Search 2
Oxytocin AND cost AND induction	Search 3
Cost-effectiveness AND induction	Search 4

conducted by two researchers, with their findings later compared. Studies that failed to meet at least one of the following criteria were excluded from the systematic review:

- Studies that compared labor labor induction methods with drugs other than oxytocin.
- Studies that did not evaluate any of the outcomes specified in this study.
- Studies lacking utility data.
- Pregnant women with chronic diseases.
- Studies that were not cost-effective study methods
- The pregnant women were not in the final stage of the third trimester of pregnancy
- Pregnant woman with a dead fetus

The structure of the model was as follows: following the administration of any labor induction intervention, delivery could occur via cesarean section or natural birth within 24 hours. Under either delivery scenario, babies could be born without complications or with complications, assumed to be related to the intervention or mode of delivery (CS or VD) rather than the duration of labor labor.

Maternal and infant outcomes were examined, and utility data were extracted based on previously published studies (Figure 1).

Extracting the Values Values of Model Model ParametersParameters

To populate the model with values for its parameters, we relied on the probability of outcomes (effectiveness), which we obtained from a meta-analysis study conducted by the authors (15). As the results were reported in terms of Risk Ratios, we converted them to probabilities using mathematical relationships. Table 2 presents the input parameters of the model, specifying the probability of complications occurring with different interventions.

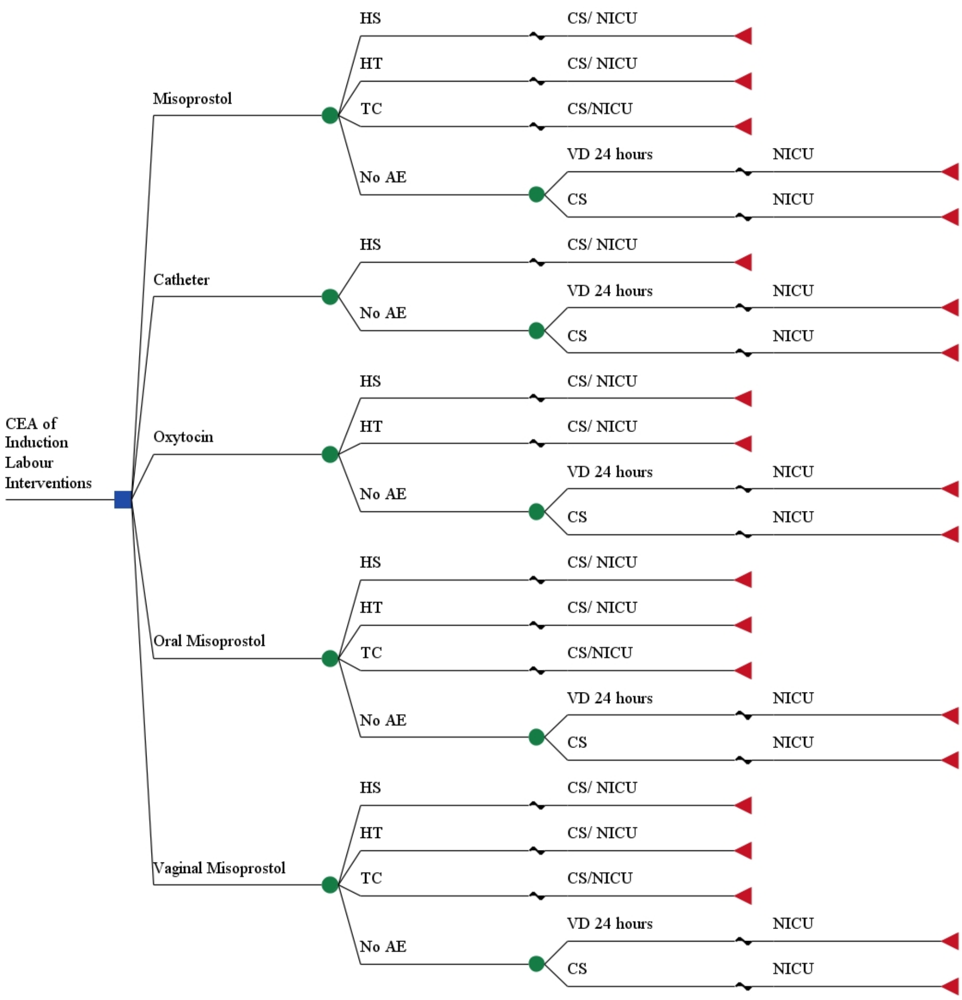

Figure 1. Cost-effectiveness decision analysis model of labor induction methods
Abbreviations: HS: Hyperstimulation, HT: Hypertonicity, TC: Tachysystole, No AE: No adverse event, CS: Cesarean, VD 24 hours: Vaginal delivery within 24 hours, NICU: Neonatal intensive care unit admission.

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Table 2. Input Effectiveness Effectiveness Variables of the Economic Evaluation Model

Variable	Base case	SD (CI 95%[1])	Distribution	Source
Probability of outcomes (Cesarean)				
Misoprostol	0.4350	0.0168(0.4152, 0.4565)	Beta	(15)
Catheter	0.4318	0.0389(0.3865, 0.4818)	Beta	(15)
Vaginal Misoprostol	0.4152	0.0832(0.5555, 0.6134)	Beta	(15)
Oral Misoprostol	0.4594	0.0260(0.4285, 0.4923)	Beta	(15)
Oxytocin	0.5645	0.0564(0.5271, 0.5994)	Beta	(15)
Probability of outcomes (Vaginal delivery 24h)				
Misoprostol	0.5145	0.0067(0.5073, 0.5238)	Beta	(15)
Catheter	0.5391	0.0206(0.5145,0.5625)	Beta	(15)
Vaginal Misoprostol	0.5238	0.0257(0.4901, 0.4608)	Beta	(15)
Oral Misoprostol	0.5049	0.0060(0.4974, 0.5121)	Beta	(15)
Oxytocin	0.4773	0.0477(0.4611, 0.4927)	Beta	(15)
Probability of SE (Hyperstimulation)				
Misoprostol	0.5670	0.0368(0.4652, 0.6632)	Beta	(15)
Catheter	0.1935	0.1886(0.0566, 0.5073)	Beta	(15)
Vaginal Misoprostol	0.2856	0.0403(0.1875, 0.2470)	Beta	(15)
Oral Misoprostol	0.2514	0.0321(0.2083, 0.2868)	Beta	(15)
Oxytocin	0.3147	0.0427(0.2484, 0.3518)	Beta	(15)
Probability of SE (Hypertonicity)				
Misoprostol	0.6240	0.0307(0.5370, 0.7023)	Beta	(15)
Vaginal Misoprostol	0.1558	0.0461(0.0461, 0.4384)	Beta	(15)
Oral Misoprostol	0.2990	0.0084(0.2862, 0.3067)	Beta	(15)
Oxytocin	0.1960	0.0670(0.0815, 0.2408)	Beta	(15)
Probability of SE (Tach systole)				
Misoprostol	0.6031	0.0358(0.5024, 0.6951)	Beta	(15)
Vaginal Misoprostol	0.3572	0.1048(0.1270, 0.1437)	Beta	(15)
Oral Misoprostol	0.2355	0.0176(0.2121, 0.2553)	Beta	(15)
Oxytocin	0.1398	0.0086(0.1333, 0.1540)	Beta	(15)

Utility Input

The study's outcome measure was QALY, which was assessed based on the disutility associated with events and the utility values assigned to various health states. Each strategy was ultimately evaluated based on its cost per QALY. Information regarding the disutility of events and the degree of utility in each health state was extracted from the existing literature.

For neonates not requiring admission to the NICU, they receive full benefits, with the level of benefit determined through a review of various texts. A database search yielded 985 articles, with 82 duplicates removed using Endnote software. After evaluating the titles and abstracts of the remaining articles, 568 were excluded. Consequently, 417 articles underwent full-text evaluation, of which 238 were excluded for not considering the interventions included in this study. Additionally, 174 articles were excluded due to a lack of utility assessment. Ultimately, five articles with comprehensive information were included in the final phase of the systematic review. Figure 2 illustrates the selection and exclusion process in this section (16-20).

Regarding the utility of NICU admission, the study by Alfirevic et al (16) Provided Provided relevant data. Thus, utility values from this study were utilized, as detailed in Table 3.

Cost

To determine the cost of delivery methods, it was noted through a systematic review that no studies had been conducted on this matter in Iran. Consequently, patient files were scrutinized, and the total relevant costs were extracted.

According to the evaluation perspective adopted in this study, direct medical costs encompass various expenses. These include the costs of interventions prescribed for labor induction, the cost of drugs administered during labor, the cost of the mother's hospitalization, and the cost of NICU care. Additionally, expenses such as the cost of anesthetics, the cost of doctor visits as required, the cost of tests prescribed for the mother (e.g., blood tests), the cost of ultrasound and medical imaging, the cost of baby bracelets, the cost of copying and scanning documents, and the cost of food for the mother's companion were all factored into the calculations. In the selection of hospitals, the criterion of having a dedicated gynecology and obstetrics department was considered.

To evaluate costs, the following formula was applied for a required sample size of medical records, taking into account a first-type error of 5%, a second-type error of 20%, and a test power of 80%. The average cost in the misoprostol and oxytocin groups, based on the study by Alfirevic et al., was considered. Thus, information from the medical records and bills of 356 individuals was required for this study (16). However, to account for potential data loss due to incomplete information, the records of 400 individuals were examined in the present study.

$$n = \frac{[(Z_{1-\alpha/2} + Z_{1-\beta})^2 \times (\sigma 1^2 + \sigma 2^2)]}{(\mu_1 - \mu_2)^2}$$

In total, the files of 400 pregnant women hospitalized in

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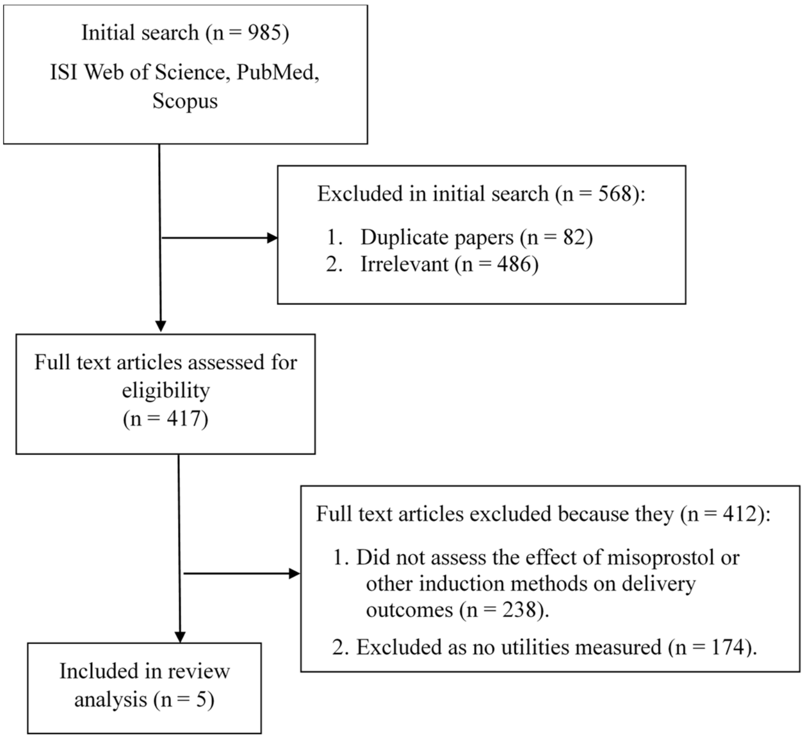

Figure 2. Study selection flowchart

Table 3. Input Utility Variables to the Economic Evaluation Model

Delivery mode and NICU admission: product of utilities	Base case	SD (CI 95%)	Distribution	Source
Cesarean	0.496	0.240 (0.213, 0.803)	Beta	(16)
VD within 24 hours	0.776	0.100 (0.606, 0.846)	Beta	(16)

Abbreviations: CS: Cesarean, VD 24 hours: Vaginal delivery within 24 hours, NICU: Neonatal intensive care unit admission, SD: Standard deviation, CI: Confidence interval

Table 4. Input Cost Variables of the Economic Evaluation Model

	Base case (IR*)	SD (CI 95%)	Distribution	Source
Induction method				
Misoprostol	53,002	51,978(2969,1497)	Gamma	(15)
Vaginal misoprostol	53,002	36,813(3394,1198)		
Oral misoprostol tablet	53,002	67,166(2545,1797)		
Intra venous oxytocin	1,616,862	42,564(1596,1695)		
Mechanical methods: Foley catheter	2,082,000	50,998(1457,2706)		
Delivery				
Cesarean	85,811,532	16,775(3622,1180)	Gamma	(15)
Vaginal delivery 24 h	59,625,129	11,671(2832,1010)		

Abbreviations: CS: Cesarean, VD 24 h: Vaginal delivery within 24 hours, SD: Standard deviation, CI: Confidence interval, IR: Iran Rial
*Each dollar PPP is equivalent to 64,529 Iranian rials, according to the latest World Bank calculations (22).

Farahikhtegan and Boali hospitals in Tehran between April and February 2022 were evaluated, and the total costs paid by the patients were recorded. Through this investigation, it was discovered that all the mothers referred to the government hospitals in Tehran had received oxytocin medicine to induce labor labor. Conversely, neither misoprostol nor mechanical methods such as catheters were utilized for any of the hospitalized mothers, and all infants born were subsequently admitted to the NICU.

The time horizon of the economic evaluation model was considered from the induction to discharge from the hospital. Given that the study period was less than one year, a discount rate for costs was not applied. The cost of delivery methods is detailed in Table 4. Additionally, costing for each intervention was conducted based on unit prices and public sector tariffs (2023 tariffs). For drugs, the official website of the Food and Drug Organization was referenced, and for other therapeutic interventions, the official government tariffs of the Ministry of Health and Medical Education were used, based on relative value coefficients (21). It is noteworthy that prices for all brands available in the pharmaceutical market of Iran were investigated.

The dosing of interventions was conducted according to the prescribed guidelines for each prescription: Misoprostol vaginal medicine with a dose of 25 mg every 3 to 6 hours, or a dose of 50 µg every 6 hours, or orally with a dose of 20 to 25 µg every 2 to 4 hours (up to 6 doses) according to

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the directive of the Ministry of Health of Iran. Foley catheter with normal saline for up to 24 hours.

Oxytocin infusion should only be administered with sugar-salt or Ringer's serum, with a concentration of 10 units in 1000 cc of serum. The infusion should start at a rate of 4-8 drops per minute, with an additional 4 drops added every 15 minutes until proper uterine contractions are achieved or the infusion rate reaches a maximum of 64 drops per minute. The cost of labor induction interventions can be found in Table 4. The maximum (2,082,000 Rials) and minimum (53,002) base case cost for induction methods were for Mechanical methods and Misoprostol and its' kinds, respectively. For delivery, the most cost belonged to cesarean (85,811,532 Rials).

Base Case Cost-Effectiveness Analysis

To evaluate the cost-effectiveness following the implementation of the model, the expected values of the cost and outcome of each strategy were estimated. In this section, the cost-effectiveness result was reported in the form of cost per QALY. Subsequently, the Incremental Cost-Effectiveness Ratio (ICER) index was calculated (ICER = ΔCost/ΔEffectiveness). To determine the cost-effective strategy, a cost-effectiveness threshold equal to one time the gross domestic product (GDP) per capita of 2022, equivalent to 700 million Rials, was considered (22).

Sensitivity Analysis

Sensitivity analysis aids in assessing uncertainty regarding the results of cost-effectiveness evaluation. It helps understand uncertainties related to cost, benefit values, and underlying assumptions used in the calculations. For deterministic sensitivity analysis (DSA), a tornado diagram was generated. The tornado diagram helps identify the most influential parameters. For probabilistic sensitivity analysis (PSA), Monte Carlo simulation was employed using 1000 sampling loads. This simulation involved repeating the sampling to assess the model's robustness. Cost-effectiveness acceptability and Monte Carlo acceptability at Willingness-To-Pay (WTP) were extracted.

Tree Age software version 2020 was utilized to conduct various stages of economic evaluation in this study, including model design and implementation, base case analysis, and deterministic and probabilistic sensitivity analysis. Additionally, Excel 2016 software was used to organize and categorize the extracted evidence and calculate the cost variables.

Results

Base-Case Case Analysis Analysis

The findings from the base-case analysis revealed that the catheter intervention exhibited lower costs and greater effectiveness compared to other interventions, establishing itself as the dominant intervention in this evaluation. Moreover, calculations of the net monetary benefit (NMB) for the strategies demonstrated that the catheter intervention, with a value of 364,374,089 rials, and the misoprostol intervention, with 158,209,601 rials, represented the highest monetary value in this comparison (Table 5).

The catheter intervention was both less costly (75,565,520 Rials) and greater effectiveness (0.628) compared to the other methods. The calculations of the net monetary benefit (NMB) for the strategies demonstrated that the catheter intervention, with a value of 364,374,089 rials, represented the highest monetary value in this comparison.

Sensitivity Analysis

Deterministic Sensitivity Analysis (DSA)

To conduct a one-way sensitivity analysis, a Tornado diagram was generated based on net monetary benefits (NMBs) (Figure 3). The analysis revealed that alterations in the neonatal intensive care unit neonatal intensive care unit (NICU) (NICU) utility weight variable in cesarean delivery had the most significant impact on changes in NMBs. However, overall, changes in none of the variables within their determined intervals resulted in a change in the overall results of the economic evaluation. In essence, the findings of this evaluation were not sensitive to changes in uncertain variables.

Probabilistic Sensitivity Analysis (PSA)

The results of the PSA based on the Monte Carlo simulation are presented. Figure 4 illustrates the probability of optimality for each strategy (Monte Carlo Simulation Acceptability at WTP) based on 1000 repetitions of sampling.

Accordingly, the probability of cost-effectiveness for the catheter strategy was estimated to be 87%, while the probabilities for other strategies—including misoprostol (vaginal and oral) and oxytocin—were calculated at 0.055%, 0.037%, 0.032%, and 0.004%, respectively.

Figure 5 displays the cost-effectiveness acceptability curve across thresholds ranging from zero to twice Iran's GDP per capita. Increasing the value of the cost-effectiveness threshold does not significantly alter the probability of cost-effectiveness for the strategies. Notably, the catheter

Table 5. Findings from Base Case Analysis

Strategy	Cost (IR)	Incr Cost	Effect	Incr Effect	Incr C/E	NMB	C/E
Excluding dominated							
Catheter	75,565,520		0.628			364,374,089	120234375
All referencing common baseline							
Catheter	75,565,520		0.628			364,374,089	120234375
Oxytocin	81,934,378	6368858	0.556	-0.072	-88264309	147,276,975	147276975
Vaginal Misoprostol	82,782,059	7216539	0.529	-0.098	-72998624	156,302,684	156302684
Oral Misoprostol	82,836,181	7270661	0.529	-0.099	-73118071	156,575,958	156575958
Misoprostol	83,157,274	7591754	0.525	-0.102	-73799081	158,209,601	158209601

Abbreviations: IR: Iran Rial, Incr: Incremental, E: Effect, C: Cost

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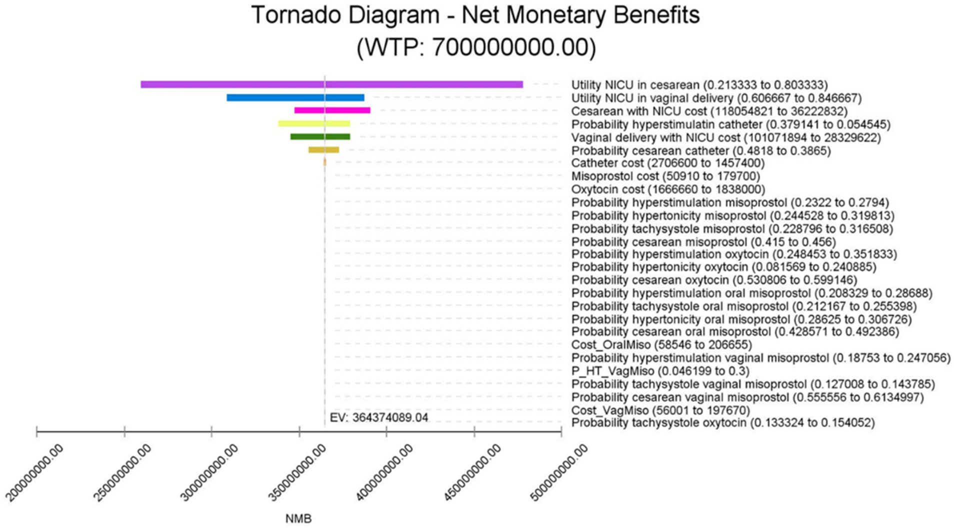

Figure 3. One-way sensitivity analysis and Tornado diagram output in cost-effectiveness analysis of labor induction methods

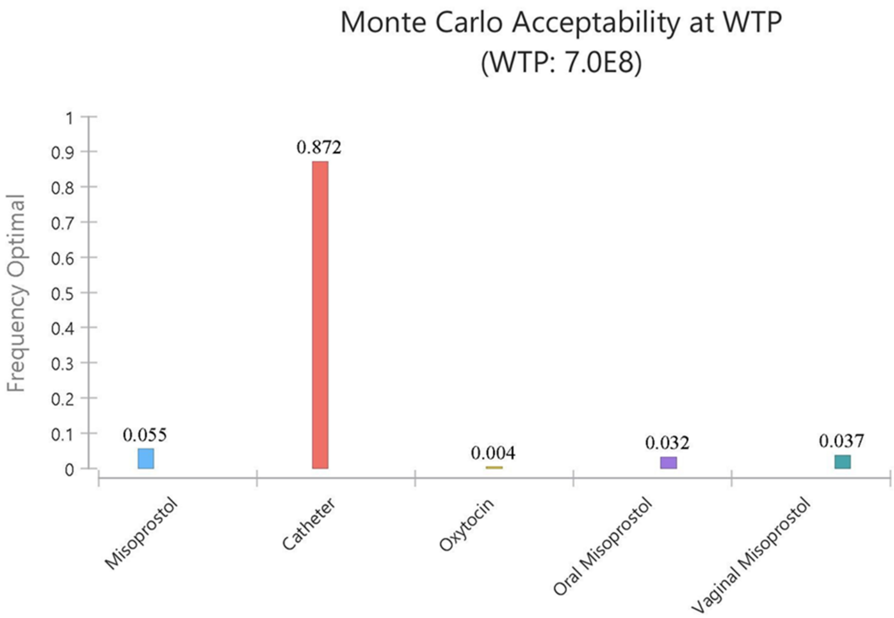

Figure 4. The probability of optimality of the compared methods in the Monte Carlo simulation in the cost-effectiveness analysis of labor induction methods

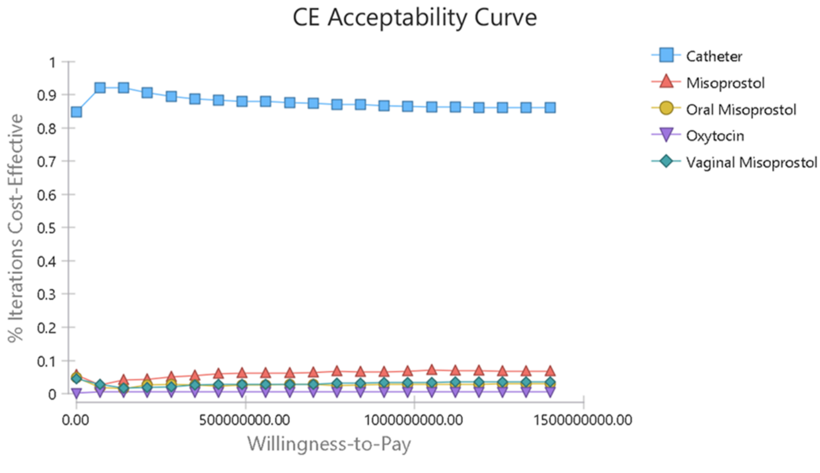

Figure 5. Cost-effectiveness acceptability curve

strategy emerges as the optimal choice across all thresholds with a high probability.

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In summary, the findings of both DSA and PSA underscore the robustness of the base-case analysis results, with the catheter intervention consistently identified as the most cost-effective strategy for labor induction.

Discussion

The choice and prescription of methods for ripening the cervix during labor induction depend on national guidelines, local protocols, and the clinical factors of the mother. Decisions are influenced by such factors as the urgency of induction and the medical history of the woman. Each method carries different costs, and some may require continuous monitoring during labor. Therefore, the choice of induction method can significantly impact healthcare resources, especially when it may increase the risk of childbirth complications.

The present study conducted an economic evaluation to compare labor induction methods in Iran using primary and best available evidence. The findings of the cost-effectiveness evaluation demonstrated that labor induction with a catheter is cost-effective, yielding more QALYs at a lower cost compared with other comparators, making it the dominant intervention. Vaginal misoprostol emerged as the second-best intervention in this analysis.

Deterministic and sensitivity analyses further affirmed the robustness of the base case analysis results. Monte Carlo simulation findings indicated that the catheter has the highest probability of being cost-effective (87%) in this analysis, while other comparators had a probability of optimization < < 5%.

Vaginal Vaginal misoprostol was identified as the second-best strategy in this evaluation. Given that misoprostol can be administered through different routes, all types — including vaginal, oral, and both routes —were considered as separate strategies in the analysis. However, the results did not show a significant difference in this regard.

Different economic evaluations have been conducted, resulting in different interventions being identified as the optimum strategy for labor labor induction. This variance can be attributed to different contexts and variations in health system structures.

In a study by Washburn et al, it was demonstrated that prescribing a catheter for labor induction in outpatient settings is more cost-effective compared with its use in hospitalized patients (17). Similarly, Merollini et al, in a study conducted in Australia, found that catheter intervention in outpatients is more cost-effective than dinoprostone administration in hospitalized patients (18). Additionally, van Baaren et al study (20) highlighted that the cost of using a catheter is higher compared with vaginal dinoprostone gel, possibly attributed to differences in study perspective and the type of dinoprostone dosage form. Saunders et al study showed that the catheter reduces the cost of labor induction, although in this study, the synthetic hygroscopic catheter was studied and it is known that the catheter is classified into different types (23, 24). Mounie's study showed that misoprostol and dinoprostone reduce the cost of labor induction to the same extent and with similar clinical outcomes. Nonetheless, misoprostol is mostly prescribed at the bedside because its price is lower and it is easier to use (19). Teneikelder's study showed that the Foley catheter resulted in a reduction of €100 per woman (14).

Several limitations should be acknowledged when interpreting our results. One significant limitation is the comparison between misoprostol and the catheter with the oxytocin reference method, which was hindered by the lack of documentation regarding the use of these 2 2 methods (misoprostol and mechanical method) for induction in pregnant mothers hospitalized in government hospitals. MoreoverMoreover, in this study, vaginal delivery was considered as a whole without differentiation between different methods of vaginal delivery.

Conclusion

Our economic evaluation revealed that the mechanical catheter method emerged as the dominant and cost-effective strategy compared with other methods. Sensitivity analysis further validated the findings of the base case analysis with high probability. Cost-effectiveness analysis can provide valuable insights for planning labor labor induction. Notably, this study represents the first cost-effective research on labor induction in Iran. With the advancement and expansion of evidence in the future, along with more comprehensive local data, more nuanced recommendations regarding the cost-effectiveness of labor induction methods can be made.

Authors' Contributions

Ameneh Ameri, Zahra Jafari Azar, and Majid Davari contributed to the literature search, data extraction, and quality assessment. Ameneh Ameri contributed to the data analysis. Ameneh Ameri and Majid Davari drafted the manuscript and critically revised it for important intellectual content. Majid Annabi and Majid Davari contributed to the manuscript editing. Majid Davari supervised the study. All authors have read and approved the final manuscript.

Ethical Considerations

This research was performed by the ethical committee of Islamic Azad University, Tehran Medical Sciences (IAU), Branch, by the code of IR.IAU.PS.REC.1402.029.

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Conflict of Interests

The authors declare that they have no competing interests.

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