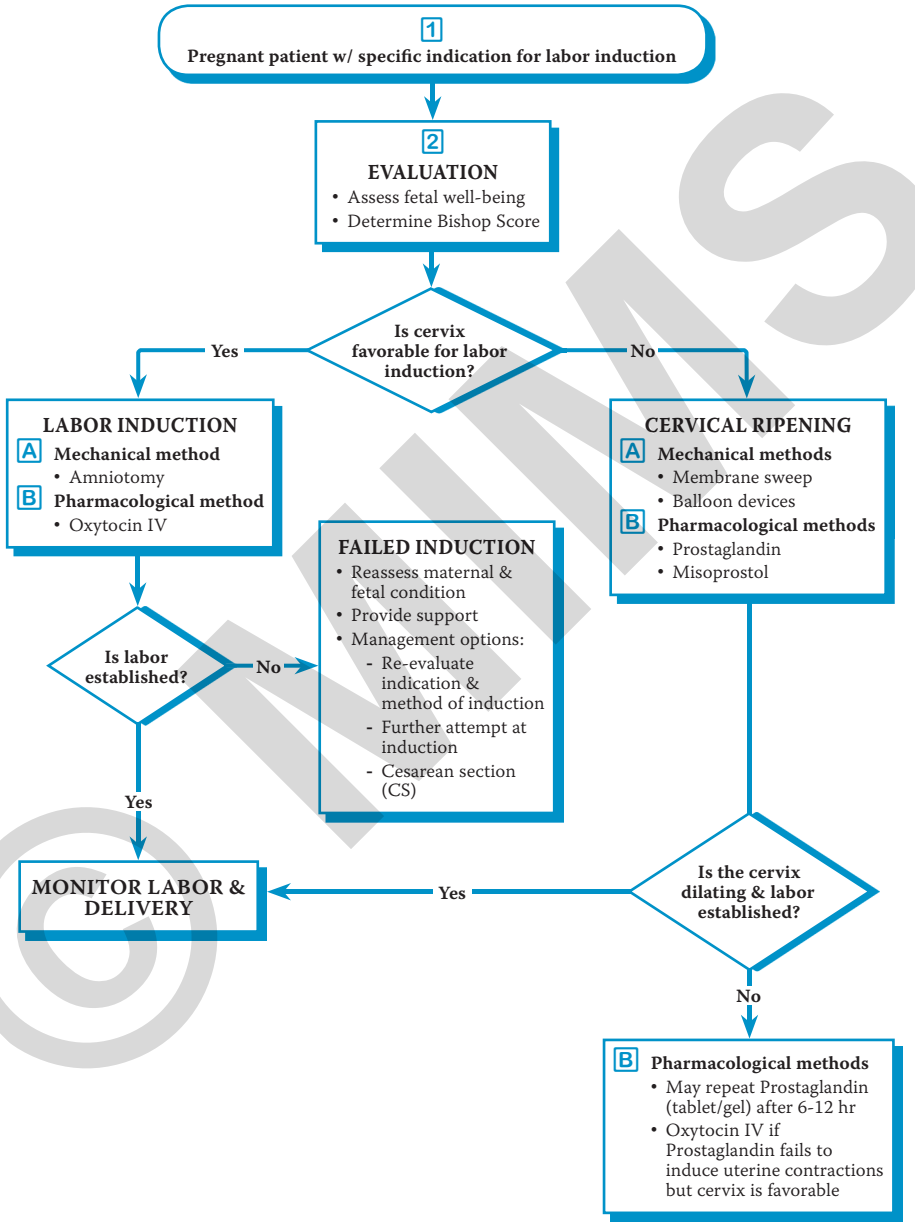
Labor Induction (1 of 7)



Not all products are available or approved for above use in all countries.
Specific prescribing information may be found in the latest MIMS.

1 LABOR INDUCTION

Labor Induction vs Augmentation

- Labor induction is when an external agent is employed to stimulate contractions before the onset of spontaneous labor
- Labor augmentation uses the same techniques as labor induction but uterine contractions (frequency, duration & strength) are enhanced once labor has started

Patient Counselling

- Patient should be informed that most women will go into spontaneous labor by 42 weeks
- She should be made aware of the risks involved should pregnancy continue by > 42 weeks & offered options such as membrane sweeping, expectant management & labor induction between 41 & 42 weeks
- The following should be explained to the patient:
  - Reason for the induction
  - Time, place & method of the induction
  - Risks & benefits of the proposed method of induction
  - Possibility that induced labor is likely to be more painful than spontaneous labor & the availability of pain relief options
  - Other options should patient decide not to undergo induction
  - That induction may fail & what would be the next step should this happen

Indications for Labor Induction

- It is generally indicated when the benefits of delivery outweigh the risks of continuing the pregnancy & there is no contraindication to vaginal delivery
- Women at 42 weeks of gestation who chose not to undergo labor induction should be monitored more often w/ at least twice-weekly assessment of fetal well-being (cardiotocography & estimation of maximum amniotic pool depth by ultrasound)

Prolonged Pregnancy

- Pregnancy that has extended beyond 42 weeks of gestation; also called postterm pregnancy
- To avoid risks of prolonged pregnancy, women w/ uncomplicated pregnancies should usually be offered induction of labor between 41 & 42 weeks but it is recommended that they be given every chance to go into spontaneous labor
- Perinatal mortality & morbidity is increased in pregnancies > 42 weeks
- Routine induction of labor after 41 weeks reduces perinatal mortality without an increase in cesarean section (CS) rates in women w/ uncomplicated pregnancy

Preterm Prelabor Rupture of Membranes (PPROM)

- Rupture of amniotic membranes before 37 weeks of gestation
- If PPROM occurs before 34 weeks of gestation, induction should not be done unless indicated (eg infection or fetal compromise)
- If PPROM occurs after 34 weeks of gestation, the decision is made based on the following factors:
  - Maternal risks: Sepsis, possible need for CS
  - Fetal risks: Sepsis, problems associated w/ preterm birth
  - Access to neonatal intensive care facilities

Prelabor Rupture of Membranes at Term (PROM)

- Rupture of membranes before the onset of labor in women at or over 37 weeks of gestation
- Infections of the amniotic cavity &/or lower genital tract are one of the most common causes of PROM (eg Group B Streptococcus)
- Risks include maternal & neonatal infection, prolapsed cord & fetal distress requiring operative delivery & resulting in low APGAR score
  - Induction of labor can reduce the incidence of infection
- Risk of infection increases as the interval between rupture & onset of labor increases
  - In term PROM, most women go into spontaneous labor within 24 hours from rupture
  - Induction of labor is recommended approximately 24 hours after PROM
  - Expectant management of women w/ PROM should not be >96 hours after rupture

Induction of Labor in Special Circumstances

Previous Cesarean Section

- Patients who have undergone CS before may be allowed to have induction of labor (eg CS or expectant management) depending on the clinical scenario & the patient's wishes
- Women should be made aware of the risks involved such as uterine rupture or the need for emergency CS

Maternal Request Before 41 weeks

- Elective induction of labor in women who want an increased feeling of safety, desire to shorten the duration of pregnancy or for other emotional, psychological or social reasons
- Labor induction should not be routinely offered based on maternal request alone
- Option is considered where resources allow, patient has favorable cervix, a well-dated pregnancy & there are valid psychological or social reasons for the request

Intrauterine Fetal Death (IUFD)

- If IUFD occurs in a woman w/ membranes intact & without evidence of infection or bleeding, either an immediate induction of labor or expectant management could be done
- If IUFD occurs in a woman w/ evidence of membrane rupture, bleeding or infection, immediate induction of labor is recommended
- Patient who has IUFD plus history of previous CS is at greater risk for uterine rupture; dose of inducing agent (eg prostaglandin) should therefore be reduced

Other indications include:

- Evidence of fetal compromise, maternal medical conditions (eg chronic hypertension, diabetes mellitus, renal disease, chronic pulmonary disease, antiphospholipid syndrome), antepartum hemorrhage, chorioamnionitis, twin pregnancy >38 weeks without complications, restricted intrauterine growth, oligohydramnios

1 LABOR INDUCTION (CONT'D)

Contraindications to Labor Induction

- Active genital herpes infection
- Placenta or vasa previa
- Umbilical cord prolapse
- Oblique or transverse fetal lie or footling breech
- Cephalopelvic disproportion
- Severe fetal growth restriction w/ fetal compromise
- Previous uterine rupture
- Invasive cervical cancer
- Previous uterine surgery

Complications of Labor Induction

- **Uterine tachysystole w/ fetal heart rate changes (formerly uterine hyperstimulation)**
  - Tachysystole is >5 uterine contractions in a 10-minute period within 30 minutes
  - Tocolytics are used should this occur during labor induction
- **Failed induction**
  - Failure to induce labor after one cycle of treatment (ie two vaginal Prostaglandin E_2 (PGE_2) tabs or gel every 6 hours or one PGE_2 controlled-release pessary over a 24-hour period)
  - Assess maternal & fetal well-being & provide support
  - Options include CS or a further attempt at labor induction depending on the clinical situation & patient's wishes
- **Uterine rupture**
  - The baby should be delivered via emergency CS if uterine rupture occurs during labor induction
- **Cord prolapse**
  - Reduce chance of cord prolapse by assessing the engagement of the presenting part, palpating for the umbilical cord presentation during initial vaginal exam & avoiding amniotomy if the baby's head is high
  - Check for any signs of low-lying placental site prior to membrane sweeping & labor induction

2 EVALUATION

Clinical Assessment Prior to Induction

- It is important to confirm the presence of a normal fetal heart rate pattern using electronic fetal monitoring
- Perform careful exam to assess the following:
  - Gestational age (determined preferably by an ultrasound in the 1st trimester), pelvis, fetal size & presentation, & membrane status
- Patient should be informed of the risks of labor induction
  - Eg increased rate of operative vaginal delivery, excessive uterine activity, cesarean birth, abnormal fetal HR, maternal water intoxication, uterine rupture, delivery of preterm infant & possible cord prolapse w/ artificial membrane rupture
- The state of the cervix is an important predictor of success of labor & vaginal delivery & helps in the selection of induction method

MODIFIED BISHOP SCORE

Cervical Feature	Pelvic score			
	0	1	2	3
Dilatation (cm)	<1	1-2	2-4	>4
Length of cervix (cm)	>4	2-4	1-2	<1
Station (cm)	-3	-2	-1/0	+1/+2
Consistency	Firm	Average	Soft	-
Position	Posterior	Mid/ Anterior	-	-

- An unfavorable cervix has been defined as having a Bishop score of ≤6
- A Bishop score of ≥8 denotes that the cervix is "favorable" or ripe, increasing the chance of a spontaneous labor or successful labor induction

MONITORING THE PATIENT

- **It is recommended that facilities for continuous uterine & fetal HR monitoring are available during labor induction**
  - Continuous uterine activity & fetal HR monitoring is recommended if PGE_2 or Oxytocin is to be administered
  - Maternal pulse, BP, uterine contractions & fetal heart tone should be assessed & documented
- **Reassess Bishop score (after 6 hours for vaginal tablet or gel or 24 hours for controlled-release pessary)**
- **Uterine tachysystole**
  - Monitor for uterine tachysystole & institute appropriate management if it occurs
  - Patients should never be left unattended while Oxytocin is being administered

  Appropriate measures if uterine tachysystole occurs
  - Discontinue Oxytocin or remove any remaining Prostaglandin preparation (do not irrigate cervix/vagina) & apply supportive/resuscitative measures if:
    - Uterine contractions exceed 5 in a 10-minute period (tachysystole) or
    - Uterine contractions last longer than 90-120 seconds
    - Fetal HR decelerates significantly; non-reassuring fetal heart rate tracing
  - For persistence of excessive uterine activity, begin tocolysis w/
    - Terbutaline 250 mcg SC/IV or
    - Glyceryl trinitrate 50-200 mcg IV or 1-2 sublingual spray (400-800 mcg) is recommended
    - Place patient in the lateral position, O_2 by face mask may be administered
  - Oxytocin may be restarted at 1/2 the dose if resuscitation is successful
- **Pain relief during induction of labor**
  - Patients should be informed of the possibility of induced labor being more painful than spontaneous labor
  - Pain relief should be offered depending on what is appropriate for the patient & her pain

A MECHANICAL METHODS

- Promote cervical ripening &/or labor induction through mechanical pressure & release of endogenous prostaglandins from the membranes & maternal decidua
- Proposed advantages include potential reversibility, simplicity of use, low cost, & decrease in side effects (eg excessive uterine activity & risk of uterine rupture in a previous CS patient)
- Disadvantages include the risk of infection, some maternal discomfort on manipulation of the cervix & disruption of a low-lying placenta

Membrane Sweeping

- Women should be offered a vaginal examination for membrane sweeping before labor induction
- Membrane sweeping separates the chorioamniotic membrane from the lower uterine segment
- Membrane sweep can be performed w/ the examining finger during vaginal exam
  - Place the finger through the internal os & sweep in a circumferential motion separating the amniotic membrane from the lower uterine segment
- **Action:** Postulated to trigger onset of labor by increasing the local Prostaglandin F_2-α production & releasing it from the decidua & adjacent membranes
- Sweeping the membranes prevents labor induction as it increases the chance of spontaneous labor within 48 hours & birth within 1 week
- Membrane sweeping at term can reduce the duration of pregnancy & rate of postterm pregnancy
- Technique is not associated w/ increased infection or major maternal side effects, but patient may experience some discomfort during the procedure

Amniotomy

- Also called artificial rupture of membranes
- It is the deliberate perforation of the chorioamniotic membranes performed in multiparous women w/ favorable cervix during labor induction
  - Oxytocin should be given early after amniotomy to establish labor (amniotomy alone should not be used for labor induction)
  - Amniotomy & Oxytocin should be considered once dystocia is diagnosed in either the 1st or 2nd stage of labor
- Cord prolapse is a risk in the unengaged presentation
- Should not be used as a primary method of labor induction except in cases where PGE_2 cannot be employed (eg risk of uterine hyperstimulation)

Balloon Devices

- Inflated bulb of a Foley catheter exerts pressure to the internal os of the cervix which then stretches the lower uterine segment & stimulates release of PG
  - An option for cervical ripening or induction in an unfavorable cervix
- Safe to perform in vaginal delivery after CS
- Foley catheter causes less uterine tachysystole & is not related to increased rates of maternal or neonatal infection
- Contraindicated in patients w/ low-lying placenta

B PHARMACOLOGICAL METHODS

Prostaglandin

Prostaglandin E_2 (eg Dinoprostone)

- Effective agent for ripening of cervix & labor induction if cervix is unfavorable
- May be used as a ripening agent or for induction w/ PROM at term except in patients w/ lower segment CS scar due to increased risk of uterine rupture
  - Prostaglandin E_2 may be preferred for labor induction in nulliparous or multiparous women w/ intact membranes regardless of cervical favorability
- Causes disintegration of collagen bundles & increase in submucosal water content of the cervix, like those observed in early labor
- Associated w/ increase in successful vaginal delivery within 24 hours & decrease in both CS rate & risk of cervix remaining unfavorable at 24-48 hours
- Efficacy is equivalent to Oxytocin for labor induction in nulliparous or multiparous women w/ ruptured membranes regardless of cervical status
- May be given in various routes but local administration in the vagina is the route of choice due to fewer side effects & acceptable clinical response
  - Intravaginal PGE_2 is the preferred method of labor induction except in those at risk of uterine tachysystole
  - Recommended regimen is one cycle of vaginal PGE_2 (tab or gel): One dose followed by a 2nd dose if labor does not ensue (if controlled pessary is used, one dose over 24 hours)

Misoprostol

- A synthetic Prostaglandin E_1 analog that can cause cervical ripening of an unfavorable cervix & induce uterine contractions
  - Can be used directly for induction of labor w/ a favorable cervix
- Oral or vaginal route is recommended for induction of labor in women w/ non-scarred uterus
  - Considered an effective & safe drug for labor induction in patients w/ intact membranes
  - Contraindicated in women w/ previous cesarean section
- Also used to induce labor in women w/ IUFD
  - Same dose & regimen as for induction of labor at term is recommended
- A tocolytic agent, ie terbutaline, must be available during labor induction
- Uterine tachysystole can occur w/ all Misoprostol doses

Oxytocin

- Mother & fetus should be carefully monitored & drug infusion accurately titrated
- IV Oxytocin has been widely used for induction & augmentation of labor
  - It induces uterine activity that is sufficient to produce cervical change & fetal descent while avoiding uterine tachysystole
  - If prostaglandins are unavailable, IV Oxytocin w/ or without a balloon catheter is appropriate
- Use of Oxytocin has not been shown to be effective in ripening the cervix but is the preferred pharmacologic agent for inducing labor when the cervix is favorable or ripe
- Decision to augment labor using Oxytocin is based upon clinical judgment w/ consideration to fetal size, presentation, position, pelvic size, & fetal condition
  - Dose should be titrated to prevent excessive uterine activity & to give 4-5 uterine contractions in 10 minutes
- Amniotomy should be done when feasible prior to the start of Oxytocin infusion in women w/ intact membranes
  - Oxytocin should be considered prior expectant management in patients w/ ruptured membranes at term

Antiprogestogen

- Oral Mifepristone is given to induce labor in women w/ IUFD, followed by vaginal PGE_2 or Misoprostol
  - Patients that appear physically well & w/ membranes that are intact or w/ no signs of infection or bleeding should be given an option of immediate labor induction or expectant management
  - Patients w/ ruptured membranes or signs of infection or bleeding should undergo immediate labor induction

Dosage Guidelines

DRUGS ACTING ON THE UTERUS		
Drug	**Dosage**	**Remarks**
Dinoprostone	**Labor induction** **3 mg vag tab:** Insert 3 mg (1 tab) intravaginally May repeat in 6-8 hr if labor not induced **Max total dose**: 6 mg **Oral tab:** 0.5 mg PO as a single dose May repeat hrly **Max total dose**: 1.5 mg (3 tabs) **Vaginal gel:** **Initial dose:** 1 mg (2 mg for primi w/ unfavorable induction features) May repeat after 6 hrs **Max total dose:** 3 mg (4 mg in primi w/ unfavorable induction features) **Pessary:** **Initial dose:** 3 mg May be repeated after 6-8 hr **Max total dose:** 6 mg **Cervical priming** **Cervical gel (500 mcg in 2.5 mL):** Dose may be repeated after 6 hr if no response to initial dose **Max dose:** 1.5 mg in 24 hr **10 mg vag insert:** Insert 10 mg intravaginally	**Adverse Reactions** • GI effects (N/V, diarrhea, abdominal pain) • Rare serious effects: Uterine effects (hypertonus, severe contractions, rapid cervical dilation, abruptio placenta, uterine rupture); Fetal effects (fetal distress, stillbirth or neonatal death); Vaginal effects (pain, irritation, warmth, genital edema); Cardiopulmonary effects (maternal hypertension, pulmonary or amniotic fluid embolism, bronchospasm, asthma); Other effects (disseminated intravascular coagulation, anaphylactic reaction) **Special Instructions** • Vag tab & vag insert: Insert high into the posterior fornix of the vagina - Vag delivery system should be removed if cervical ripening is insufficient in 12 hr • Vag gel: After administration of drug, advise patient to remain recumbent for at least 30 min • Avoid in patients in whom labor induction is contraindicated • Use w/ caution in patients w/ active CV, resp, renal or hepatic disease, history of asthma, raised intraocular pressure, hypertension, history of epilepsy, uterine scarring
Mifepristone	**Labor induction following IUFD:** 600 mg PO daily x 2 consecutive days **or** 200 mg PO followed by Misoprostol PO &/or vaginally	**Adverse Reactions** • Gynecological effects (excessive vaginal bleeding, uterine hemorrhage, uterine infections); GI effects (diarrhea, N/V, abdominal cramps); Other effects (UTI, fatigue, back pain, headache) **Special Instructions** • Avoid use in patients w/ suspected or confirmed ectopic pregnancy, chronic adrenal failure, concurrent long-term corticosteroid therapy or anticoagulant therapy, hemorrhagic disorders, hepatic or renal impairment • Use w/ caution in patients w/ asthma, COPD, CV disease, history of infective endocarditis, or in female smokers >35 yr old, alcoholic drinkers

All dosage recommendations are for non-elderly adults w/ normal renal & hepatic function unless otherwise stated.
Not all products are available or approved for above use in all countries.
Products listed above may not be mentioned in the disease management chart but have been placed here based on indications listed in regional manufacturers' product information.

Specific prescribing information may be found in the latest MIMS.

Dosage Guidelines

DRUGS ACTING ON THE UTERUS (CONT'D)		
Drug	**Dosage**	**Remarks**
Misoprostol	**Labor induction or cervical ripening:** 20-25 mcg PO 2 hrly ***or*** 25 mcg vag 3-6 hrly	**Adverse Reactions** • GI effects (diarrhea, abdominal pain, N/V, dyspepsia, constipation, flatulence); Gynecological effects (menstrual disorders, increased uterine activity, vaginal bleeding); Other effects (headache, rashes, dizziness) **Special Instructions** • Should be taken w/ food to lessen diarrhea • Avoid Mg-containing antacids • Contraindicated in patients w/ prior uterine surgery or cesarean delivery, patients w/ Prostaglandin hypersensitivity, or when use of uterotonic drug is inappropriate • Use w/ caution in patients w/ CV disease, renal impairment • Fetal & maternal monitoring for uterine hyperstimulation or rupture
Oxytocin	**Starting dose:** 1-2 mU/min IV infusion increased at intervals of 20-40 min based on clinical response **Max initial dose:** 4 mU/min Use minimal possible dose & titrate based on uterine contractions to max 3-4 uterine contractions every 10 min **Max dose:** 20 mU/min	**Adverse Reactions** • Strong uterine contractions if administered in high doses or to those hypersensitive to it; GI effects (N/V); Metabolic effects (vasopressin-like activity, hyponatremia, water retention); Other effects (anaphylaxis, arrhythmias, hypertension & pelvic hematoma have been reported in misuse of Oxytocin) **Special Instructions** • Oxytocin should not be used for prolonged periods in resistant uterine inertia, severe pre-eclampsia, or decompensated CV disorders - Should not be started for 6 hr after administration of vaginal prostaglandins • Monitor fetal heart rate, resting uterine tone, & frequency, duration & force of contractions • Withdraw gradually once labor is progressing - Discontinue use in the event of uterine hyperactivity or fetal distress

All dosage recommendations are for non-elderly adults w/ normal renal & hepatic function unless otherwise stated.
Not all products are available or approved for above use in all countries.
Products listed above may not be mentioned in the disease management chart but have been placed here based on indications listed in regional manufacturers' product information.

Specific prescribing information may be found in the latest MIMS.

Please see the end of this section for the reference list.