



# Eating in Labor: What Does the Evidence Say?

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Her awards and decorations include the Army Commendation Medal (4 Oak Leaf Clusters), Army Achievement Medal (1 Oak Leaf Cluster), and the Parachutist's Badge.



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# Learning Objectives

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At the conclusion of this activity, participants will be able to:

1. Describe women's desired and energy requirement during labor.
2. Examine the history of oral intake in labor restrictions.
3. Summarize current research on oral intake in labor.
4. Compare current recommendations on oral intake in labor.



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**What is your hospital's policy on whether women can eat and drink freely throughout labor?**



# Why does this matter?

- Maternity care providers have debated this issue for decades and there are different recommendations around the world and within our country.
- It is stressful for some women to not eat or drink for the duration of their labors and births.
- Aspiration of stomach contents during general anesthesia can lead to aspiration pneumonia and death of women.



<https://evidencebasedbirth.com/evidence-eating-drinking-labor/>



# What Do Women Want?

- The desires, feelings, and satisfactory experiences of women are not usually addressed.
- Most women naturally choose to consume some form of nutrition during labor, switching to liquids as labor progresses.
- 74% of women desire to consume food during labor, higher among women with epidurals (Liang, Bhiladvala, & Preston, 2021).
- We should consider the autonomy and human rights of patients.



Photo Credit Regina Vadney





# What Do Women Need?

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- Women in labor increase oxygen consumption and glucose utilization.
- The energy needs of laboring women are similar to those conducting continuous aerobic exercise.
- Consumption of carbohydrates enhances the ability to perform and slows fatigue (Sharts-Hopko, 2010).



# What Do Women Need? (continued)

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- Ketosis is common during pregnancy and labor, however there is no evidence linking it to worse outcomes.
- Hyponatremia is associated with prolonged second stage, operative vaginal delivery, and failure to progress leading to emergency Cesareans (Sharts-Hopko, 2010).



# History of Restrictions on Oral Intake: Mendelson's Syndrome

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- In 1946 Dr. Curtis Mendelson described chemical pneumonitis as a side effect of obstetrical patients aspirating gastric contents while under anesthesia (gas, oxygen, ether).
- There were 44,000 pregnancies examined 1932-1945 in New York.
- Two of the 66 patients with aspiration died after aspirating solid food.



# History (continued)

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- He suggest that chemical pneumonitis is preventable with oral restrictions during labor.
- This led to current Nothing by mouth (NPO) and other restrictive guidelines.
- Pregnant women are treated as if they have a full stomach.



# Anesthesia During Mendelson's Time

- “Twilight Sleep,” a form of general anesthesia was common for all births including vaginal.
- Airways were not protected with intubation.
- An opaque black mouthpiece made it difficult to see the airway (Sperling et. al, 2016).
- 79% of women having vaginal births had general anesthesia.



Photo Credit Redbookmag.com



# Anesthesia During Our Time

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- Increased use of regional anesthesia.
- More training on difficult airway management.
- Advanced airway equipment.
- Use of pulse oximetry and capnography (Sperling et. al, 2016).



# Pregnancy: Physiologic Changes that Increase Risk of Aspiration

- Increased O<sub>2</sub> consumption, CO<sub>2</sub> production, and minute ventilation.
- Displaced diaphragm decreases functional residual capacity.
- Increased intra-abdominal pressure, predisposition to reflux.
- Progesterone causes relaxation of lower esophageal sphincter.
- Prolonged gastric emptying time.
- \*\*The stomach is never empty regardless of fasting time\*\* (Salik & Doherty, 2021).



# Epidural Use and Stomach Emptying

- Small study with 40 women starting out with an empty stomach.
- Ten non pregnant, ten pregnant at term, ten laboring with epidurals, ten laboring without epidurals.
- Women consumed five ounces of yogurt.
- Ultrasound confirmed empty stomach before eating and observed digestion over two hours.
- Stomach emptying delayed in labor.
- After two hours, three out of ten people with epidurals had solid food in their stomach compared to nine out of ten without epidurals (Bouvet, et al, 2022).





# High-risk Conditions

TABLE 1

## Proposed high-risk conditions that may predispose to pulmonary aspiration in the setting of general anesthesia<sup>6,32-34</sup>

1. Disorders/Disruption of the upper gastrointestinal tract: hiatal hernia, tracheoesophageal fistula, achalasia, esophageal stricture or neoplasm, severe gastroesophageal reflux, Zenker's diverticulum, intestinal obstruction, gastrostomy, tracheostomy, or nasogastric tube
2. Neurologic conditions: multiple sclerosis, previous cerebrovascular accident, Parkinson's disease, myasthenia gravis, chronic swallowing disorders, gastroparesis, head injury, Guillain-Barre syndrome, vocal cord paralysis, altered level of consciousness
3. Obstetric: placental abruption, preeclampsia, history of prior cesarean delivery, intra-uterine infection, severe thrombocytopenia or other concern precluding ability for neuraxial analgesia
4. Anesthesia: History of difficult intubation or airway management, or concern in present setting
5. Maternal: Class 3 Obesity (BMI  $\geq 40$ ), active seizure disorder
6. Fetal: non-reassuring fetal status, fetal growth restriction

*Sperling. Restriction of oral intake during labor: Whither are we bound? Am J Obstet Gynecol 2016.*



# Levels of Evidence



[https://www.hopkinsmedicine.org/gynecology\\_obstetrics/pdfs/medstudent/rtc2014/class\\_1\\_ebm\\_mdw\\_august\\_2014.pdf](https://www.hopkinsmedicine.org/gynecology_obstetrics/pdfs/medstudent/rtc2014/class_1_ebm_mdw_august_2014.pdf)

# Risk of Aspiration and Death

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- An observational study conducted from 1979 to 1990 discovered one death per 1.4 million births from aspiration during a Cesarean (Hawkins et al. 1997).
- Women received general anesthesia 41% of the time in the beginning of the study and 16% in the later part.
- Another observational study examined births from 1985 to 2003 and reported eight anesthesia related deaths out of 855 pregnancy related deaths in Michigan, however none of the women died from aspiration (Myhre et al. 2007).
- The evidence shows a lower risk of aspiration, however more women are not eating or drinking in labor.



## Risk (continued)

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- From 1990 to 2003 the rate of aspiration from general anesthesia during Cesarean declined 4.2% to 0.46%.
- Research shows the current rate of aspiration during general anesthesia in Cesareans is potentially around 0.4%.
- Of the 3.9 million births in 2013, 51,000 utilize general anesthesia during Cesareans, around 1%.
- Aspiration is very rare and anesthesia practices usually contribute to risk (Sperling et al, 2016).



# Cardiac Arrest During Hospitalization for Delivery 1998-2011

- Mhyre et. al examined the US Nationwide Inpatient Sample from 1998 – 2011 to examine the risk factors, potential causes, and outcomes for maternal cardiac arrest (2014)
- Aspiration Pneumonitis leads to potentially 7.1% of the 4,843 cases and 82.9% of women survived

**Table 2**

Distribution of Maternal Cardiac Arrests (n = 4,843), the Nationwide Inpatient Sample 1998–2011

	Potential Proximate Etiology of Maternal Cardiac Arrest, N (%)	Cause-specific Cardiac Arrest Frequency per 1,000 Women with Each Condition	Survival to Hospital Discharge, * N (%)
Postpartum hemorrhage	1,349 (27.9)	0.8	739 (55.1)
Antepartum hemorrhage	813 (16.8)	0.9	433 (53.2)
Heart failure	645 (13.3)	15.6	458 (71.1)
Amniotic fluid embolism	645 (13.3)	252.7	337 (52.5)
Sepsis	544 (11.2)	2.1	256 (46.9)
Anesthesia complication	379 (7.8)	29.5	310 (81.9)
Aspiration pneumonitis	346 (7.1)	20.3	287 (82.9)
Venous thrombo embolism	346 (7.1)	43.9	144 (41.5)
Eclampsia	296 (6.1)	6.2	226 (76.5)
Puerperal cerebrovascular disorder	212 (4.4)	13.6	85 (40.0)
Trauma	125 (2.6)	3.9	29 (23.3)
Pulmonary edema	118 (2.4)	11.2	83 (70.9)
Acute myocardial infarction	150 (3.1)	89.8	85 (56.3)
Magnesium toxicity	66 (1.4)	5.2	57 (85.9)
Status asthmaticus <sup>‡</sup>	54 (1.1)	12.6	29 (53.7)
Anaphylaxis <sup>‡</sup>	15 (0.3)	10.8	15 (100)
Aortic dissection/rupture <sup>‡</sup>	14 (0.3)	31.0	0

Numbers of arrests from local anesthetic toxicity cannot be reported due to restrictions on reporting small cell sizes.

\* Survival is missing for 0.2% of those with cardiopulmonary arrest.

<sup>‡</sup> Estimates with a relative standard error (*i.e.*, standard error/weighted estimate) >0.30 may not be reliable.



# Evidence from the UK

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- In 2007 the UK updated their clinical practice guidelines to offer low-risk women drinks and light food.
- A woman died somewhere between 2006-2008 after an emergency Cesarean.
- She had a full stomach and had general anesthesia with intubation.
- She aspirated during extubation and later died from aspiration pneumonitis.
- She did not have an orogastric tube to reduce stomach contents.



# Cochrane Review: Restricting Oral Fluid Intake During Labor

- Singata et al (2013) examined five studies, which included 3,130 women in active labor and low risk of requiring general anesthesia.
- The studies compared restrictive vs. less restrictive intake.
- One study showed an increased risk of Cesarean for women drinking the carbohydrate drink vs. water only, however caution advised.
- Others showed no statistically significant difference in Cesarean, operative vaginal birth, Apgar scores, or other outcomes.
- Authors concluded there are no true benefits and harms so there is no reason to restrict low risk women.



# Systematic Review Presented at the Anesthesiology Annual Meeting 2015

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- They examined 385 research studies from 1990 and the American Society of Anesthesiology's Closed Claims Project Database.
- One case of aspiration in a woman who was plus size and had preeclampsia.
- Fasting not necessary and leads to ketosis, causing acidic stomach contents, and potentially more harm with aspiration (Harty, et al, 2015).





# A Systematic Review and Meta-analysis

- Ciardulli et al (2017) examined 10 trials which included 3,982 low risk women.
- The studies compared water and ice chips vs. food and carbohydrate solutions.
- Women who were under policies that were less restrictive had significantly shorter durations of labor by 16 minutes.
- No other benefits or harms in obstetric or neonatal outcomes were found.

Outcome	Intervention Group	Control Group	I <sup>2</sup> (%)	RR (95% CI) or MD
Duration of labor (min) (Laifer SA et al. A prospective randomized controlled trial of oral intake of liquids during the first stage of labor [abstract]. <i>Anesthesiology</i> 2000) <sup>7-14</sup>	380	396	77	<b>-16.01 (-24.91 to -7.12)</b>
Cesarean delivery (Laifer SA et al. <i>Anesthesiology</i> 2000) <sup>7-10,12-14</sup>	440/1,794 (24.6)	435/1,791 (24.3)	55	1.01 (0.69-1.47)
OVD <sup>7-10,12-14</sup>	461/1,746 (26.4)	448/1,673 (26.8)	90	0.87 (0.54-1.39)
Apgar score less than 7 at 5 min <sup>7,8,10,12,13</sup>	16/1,544 (1.0)	23/1,535 (1.5)	0	0.70 (0.37-1.31)
Maternal ketoacidosis <sup>14</sup>	36/163 (22.1)	36/165 (21.8)	NA	1.01 (0.6-1.52)
Maternal vomiting <sup>7,8,12,13</sup>	519/1,381 (37.6)	500/1,370 (36.5)	61	1.00 (0.81-1.23)
Augmentation of labor <sup>7,8-10,12</sup>	817/1,559 (52.5)	837/1,544 (54.2)	3	0.98 (0.91-1.05)
Epidural analgesia <sup>7,8-10,12</sup>	1,027/1,559 (65.9)	1,014/1,544 (65.7)	30	1.02 (0.95-1.09)
Regurgitation during general anesthesia (personal communication, U. Goodall and A.H. Wallymahmed, 2006) <sup>12</sup>	0/1,329*	0/1,398*	NA	(0-0.28%) <sup>†</sup>
Mendelson syndrome (personal communication, U. Goodall and A.H. Wallymahmed, 2006) <sup>12</sup>	0/1,382	0/1,372	NA	(0-0.27%) <sup>†</sup>
Admission to NICU <sup>12,13</sup>	61/1,306 (4.7)	62/1,297 (4.8)	NA	0.97 (0.769-1.37)

RR, relative risk; CI, confidence interval; MD, mean difference; OVD, operative vaginal delivery; NA, not applicable; NICU, neonatal intensive care unit.  
Data are n/N (%) unless otherwise specified.  
Not all the variables have been recorded in every trial; results therefore are accompanied with the number of cases in which the outcomes were registered (n) with the references of the included trials. Proportions are presented as percentage of n rather than as percentages of the total population. Boldface data, statistically significant.  
\* Regurgitation during general anesthesia, denominator refers to all women included in the trials and not to women who underwent general anesthesia. Numbers of women who underwent general anesthesia were not available.  
<sup>†</sup> Poisson method.

[Ciardulli, A., Saccone, G., Anastasio, H., & Berghella, V. \(2017\).](#)



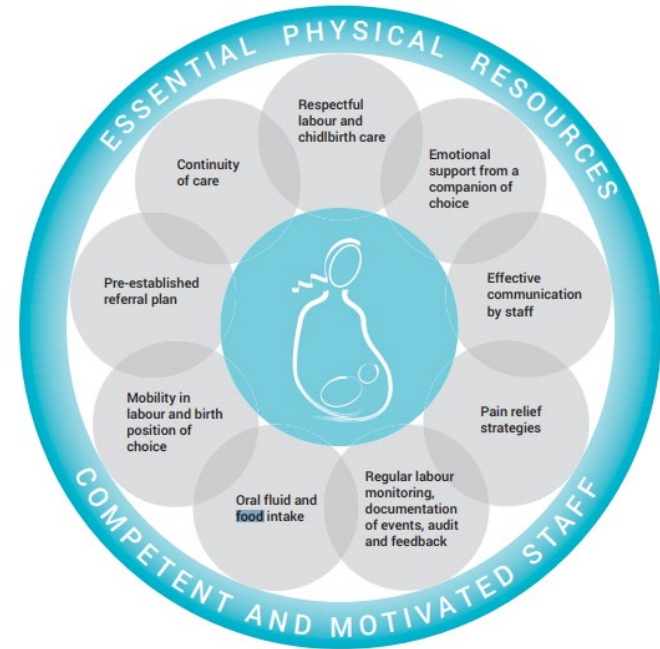
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# Recommendations from Professional Organizations



# World Health Organization (WHO)

- WHO (2018) states “for women at low risk, oral fluid and food intake during labour is recommended”



<https://apps.who.int/iris/bitstream/handle/10665/272447/WHO-RHR-18.12-eng.pdf>

# American College of Obstetricians & Gynecologists

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- Oral Intake During Labor: Committee Opinion #441 September 2009, reaffirmed 2017.
- WITHDRAWN.
- It did recommend modest amounts of clear liquids for low-risk patients and avoidance of solid foods.
- Approaches to Limit Intervention During Labor and Birth: ACOG Committee Opinion #766 February 2019 reaffirms the earlier recommendation however raises the concern that current research may not support this policy.



# American Society of Anesthesiologists

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- Practice Guidelines for Obstetric Anesthesia February 2016.
- “Oral intake of moderate amounts of clear liquids may be allowed for uncomplicated laboring patients”.
- “Laboring patients with additional risk factors for aspiration (e.g., morbid obesity, diabetes mellitus, and difficult airway) or patients at increased risk for operative delivery (e.g., non-reassuring fetal heart rate pattern), may have further restrictions of oral intake, determined on a case-by-case basis.”
- “Solid foods should be avoided in laboring patients.”



# American College of Nurse-Midwives

## Oral Nutrition Evidence Summary

- Eating and drinking in labor are not associated with significant adverse outcomes
- Nutritional intake in labor is associated with shorter labors
- Oral hydration and eating provide comfort for laboring women
- Due to advances in modern anesthesia, the risk of death from aspiration is extremely low and does not warrant restricting food and water intake for low-risk women



- “Encourage low-risk women to eat lightly in early labor and drink clear liquids throughout labor to promote hydration, provide nutrition, and give comfort”

<https://www.midwife.org/Evidence-Based-Practice-Pearls-of-Midwifery2018>

# Summary of Professional Organization Recommendations

TABLE 2

## Recommendations of professional organizations on restriction of oral intake during Labor

Organization	Recommendation	Strength of recommendation
American College of Nurse-Midwives <sup>35</sup>	Self-determination regarding oral intake encouraged for women at low risk for aspiration.	Not provided
American Congress of Obstetricians and Gynecologists, American Society of Anesthesiologists Task Force on Obstetric Anesthesia <sup>3</sup>	Clear liquids for women at low risk for aspiration. Small amounts of clear liquids up to 2 hours before anesthesia for women with no complications.	Not provided
World Health Organization (WHO) <sup>4</sup>	Noninterference with desire for food or liquid intake without reason.	Not provided
Cochrane Review <sup>3</sup>	Since evidence shows no benefits or harms, there is no justification for the restriction of fluids and food in labor for women at low risk of complications.	Not provided
Royal College of Obstetricians and Gynaecologists: NICE Clinical Guideline <sup>36</sup>	Women may eat a light diet in established labor unless they have received opioids or they develop risk factors that make a general anesthesia more likely.	Not provided
Society of Obstetricians and Gynaecologists of Canada <sup>37</sup>	A woman in active labor should be offered a light or liquid diet according to her preference.	Not provided
The Royal Australian and New Zealand College of Obstetricians and Gynaecologists	Women should be encouraged to only have clear fluids and light diet in the active phase of labor.	Not provided

Sperling. *Restriction of oral intake during labor: Whither are we bound? Am J Obstet Gynecol* 2016.



# Key Takeaways

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- Most women desire and have a need to consume nutrition during labor
- Research from 1946 influenced today's restrictive policies
- Anesthesia practices have changed leading to a lower risk of general anesthesia and aspiration pneumonia
- Current research shows there is no increased risk of aspiration pneumonia and death with oral intake during labor
- Different organizations have different recommendations despite the evidence





# Discussion

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- What conversations do you have with patients about oral intake restrictions in labor?
- Do you agree that women should face restrictions?
- How comfortable are you with a woman consuming solid food during the active stage of labor?



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# Questions?



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