

# Utilization of Point of Care Ultrasound (POCUS) to Decrease Aspiration Risk

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## Abstract

**Purpose:** Perioperative aspiration continues to be a primary anesthetic complication associated with significant morbidity and mortality. This systematic review investigates whether gastric preoperative point-of-care ultrasound (POCUS) helps guide anesthetic management to reduce aspiration risks and surgical delays. The secondary aim outlines early detection of aspiration in patients with comorbidities delaying gastric emptying.

## Introduction

The incidence of aspiration during general anesthesia occurs in every 1:2,000 to 1:3,000 anesthetics. The presence of gastric content is a modifiable risk factor in preventing aspiration.

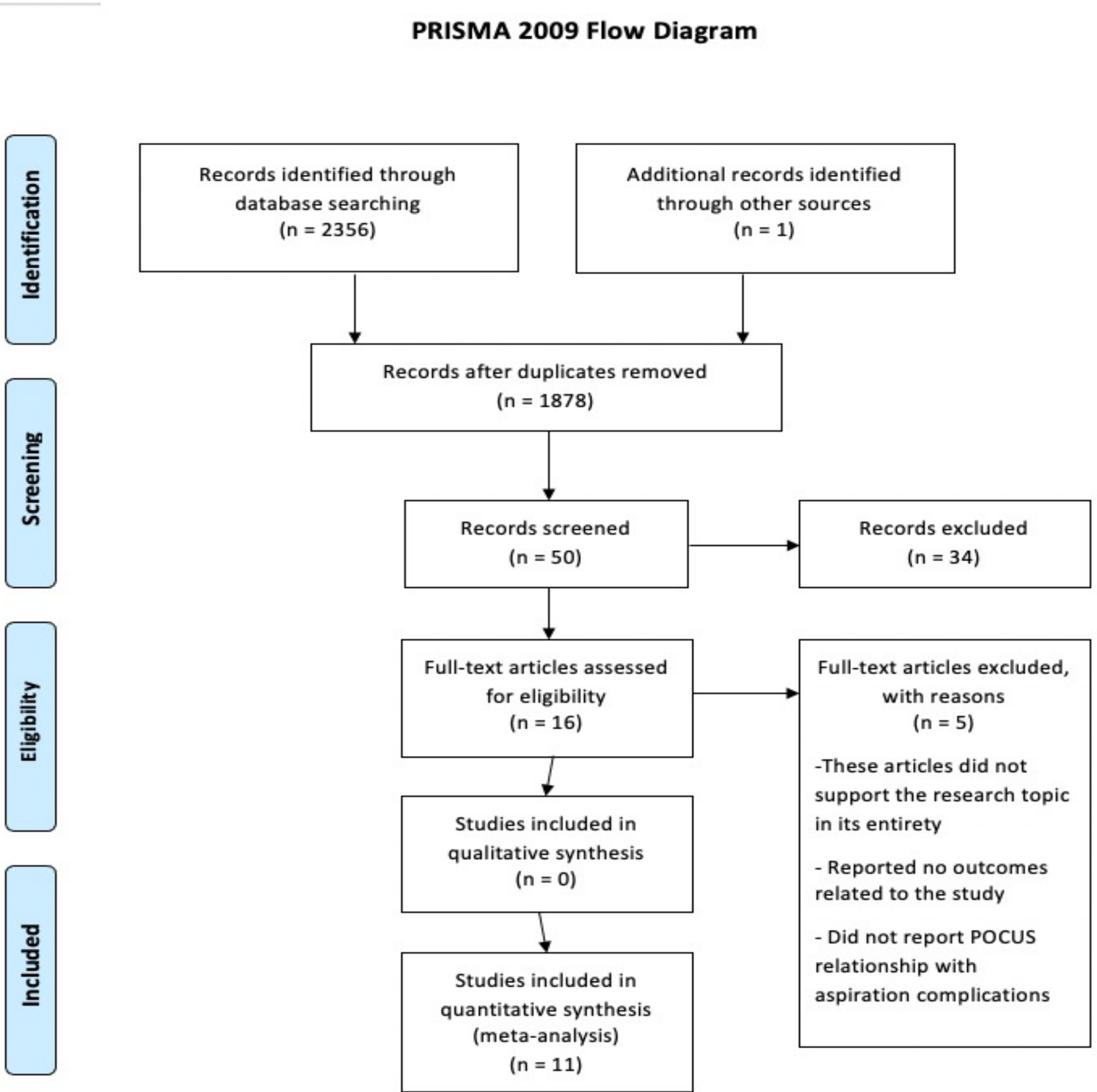
- Protective airway reflexes are eliminated during general anesthesia potentially causing gastric contents in the stomach to travel into the esophagus then into the lungs leading to pulmonary aspiration.
- This can lead to ventilation and perfusion mismatch, hypoxemia, inflammation, infection, and postoperative mechanical ventilation.
- ASA fasting guidelines were created to reduce the incidence- Fast for 8 hours following a full meal (i.e., fatty foods), 6 hours following a light meal or nonhuman milk, and 2 hours following clear liquids.
- Adherence to these guidelines have not been effective in all patients who are noncompliant and patients with comorbidities that delay gastric emptying.
- POCUS is a bedside screening assessment tool; an ultrasound device is used for accurate diagnosis of gastric contents within the abdomen.
- This noninvasive tool detects whether the gastric antrum is empty, contains clear liquids, or solid matter present in the stomach prior to induction of general anesthesia.
- Further investigation is necessary to determine the beneficial effects in reducing aspiration risks and surgical delays with the use of POCUS in comparison to the ASA fasting guidelines.

## Materials & Methods

### Participants

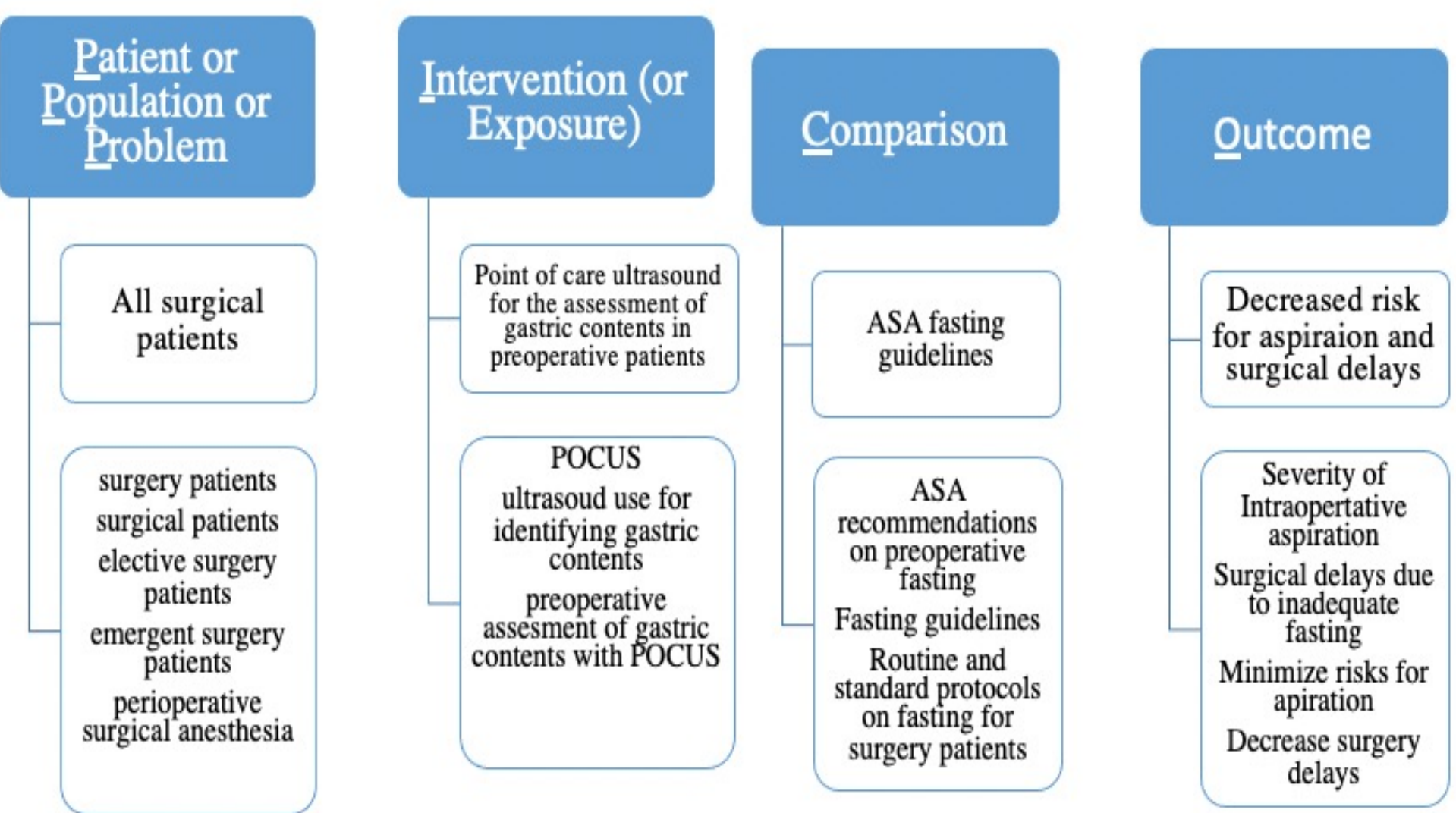
- Patients 18 years or older
- All patients with ASA status I-III
- BMI < 30-35 kg/m<sup>2</sup>
- Nonpregnant patients
- Fasted and nonfasted patients
- Patients with and without risk factors for delayed gastric emptying

### Methods



### PICOT Search Strategy Chart

In all patients undergoing surgical anesthesia, does the utilization of preoperative point of care ultrasound for the assessment of gastric contents when compared to routine care of ASA fasting guidelines decrease the risk for aspiration and surgical delays in the perioperative period?



## Results

Types of studies included 1 randomized controlled trial (RCT), 1 case report, 2 descriptive studies, 1 prospective case series, 4 observational studies, and 2 cohort studies. Themes identified in the literature:

### Gastric POCUS Verses ASA Fasting Standard Protocol

- Delamarre et al.: Standard fasting times lack validity that the surgical patient has a clinically judged "empty stomach".
- Kruisselbrink et al.: Gastric POCUS is highly sensitive and specific to detect or rule out a full stomach in scenarios in which the presence of gastric content is uncertain.
- Perlas et al.: Proposed a 3-point grading system, based exclusively on qualitative sonographic assessment of the gastric antrum, that positively correlates with predicted gastric volume.
- Van de Putte et al.: Gastric ultrasound should be utilized to guide management of patients who present with risk factors for aspiration or unknown risks.

### Prevention of Aspiration in High-Risk Populations

- Bouvet et al.: Gastric POCUS should be performed in all emergency patients and in elective patients with diabetes mellitus, receiving chronic treatment with opiates, obesity, or those who did not follow fasting instructions to decrease aspiration risks.
- Castañer et al.: Patients who follow standard ASA fasting guidelines and with other underlying comorbidities, a full antrum can be present and gastric POCUS can decrease aspiration risk.
- Faylar and Kantzavelos: POCUS decreases aspiration risks and surgical delays, especially in the high-risk or emergent case when standard fasting cannot be completed.

## Results Cont.

- Zhou et al.: Supports the use of POCUS in patient populations that have increased risk factors for delayed gastric emptying .
- **Gastric POCUS and Anesthetic Management**
- Alakkad et al.: POCUS can inform physicians of the patient's level of aspiration risk which could lead to changes in anesthetic management for patients who did not follow fasting guidelines.
- Cieslak et al.: Gastric POCUS allows for the development of an appropriate anesthetic management plan based on the assessment results.
- Van de Putte: The addition of gastric ultrasound to standard guidelines is beneficial in individualizing anesthetic management plans and minimizing surgical delays.

## Conclusion

Research supports the use of gastric POCUS in the preoperative period to assess gastric volume and determine gastric fullness. This is beneficial in many circumstances where fasting times are unsure to the provider or patient, patients with comorbidities that potentially delay gastric emptying times, and in emergent procedures where fasting times were not adhered to. The results of this systematic review indicate the need for ongoing research to continue to reduce aspiration incidence and healthcare costs. Gastric POCUS is a noninvasive and economically efficient diagnostic tool that can be used to prevent fatal complications from pulmonary aspiration and minimize surgical delays.

## Limitations

- Patients were of normal body habitus.
- Gastric content was assessed using only a noninvasive tool and was not measured directly.
- Variability of ultrasound performers and operator dependent.
- Small sample size with varying methods of anesthetic delivery .
- Minority of patients with complications due to DM and ultrasound assessment performed during admission to surgical unit rather than immediate preoperative period before anesthesia in one study.

## References

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