

Riverside University Health System

Maternal Sepsis



Objectives

This Quick Start Guide (QSG) will review:

- Maternal Sepsis Algorithm
- OB Provider BPAs
- OB Nursing BPAs
- Maternal Sepsis Information

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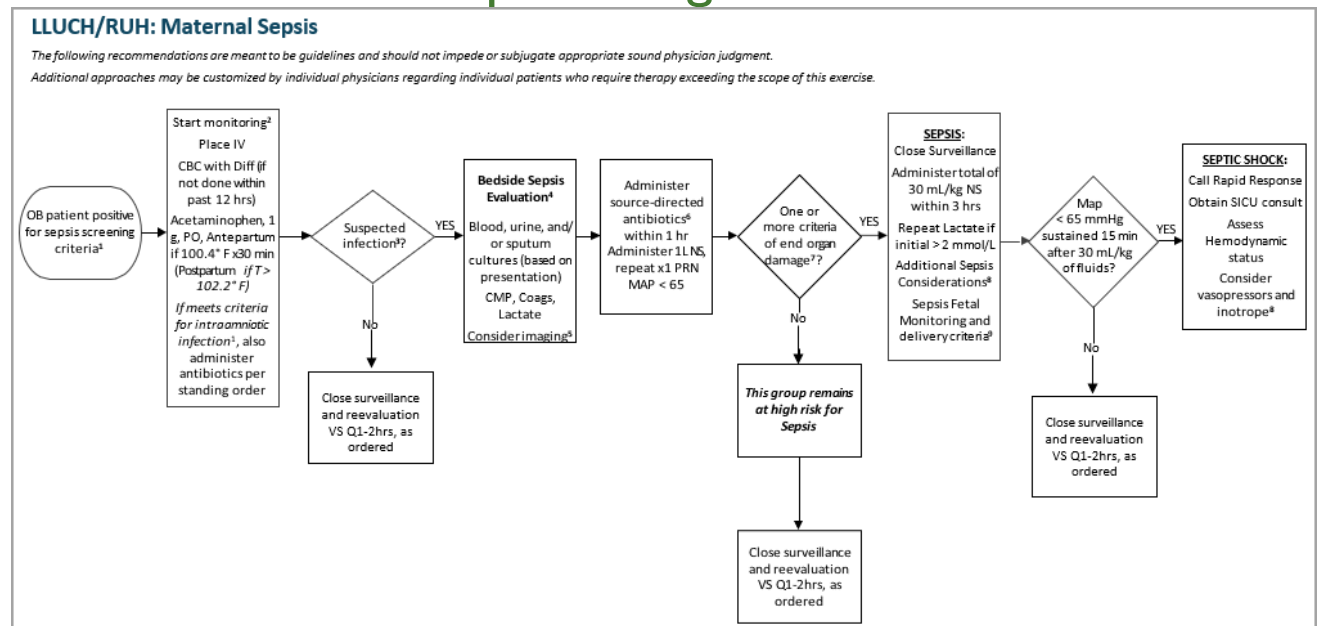
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Overview

Sepsis is an important and perhaps underappreciated cause of maternal morbidity and mortality. The Centers for Disease Control and Prevention states that the proportion of U.S. maternal deaths from sepsis (12.7%) is similar to the proportion of deaths from obstetric hemorrhage and hypertensive disorders. Further, it is estimated that 63 to 73% of maternal deaths from sepsis are preventable. Finally, for each maternal death, there are 50 women who experience life-threatening morbidity from sepsis, which is disconcerting given that prompt recognition and treatment in this young and generally healthy population generally results in a good outcome.

Though the approach to maternal sepsis is like that of the non-pregnant adult patient, it is not the same. Specifically, screening systems used in other adults perform poorly in pregnancy. Accordingly, the major objective of this pathway is to incorporate a new, two-step approach for the diagnosis of sepsis during pregnancy and postpartum, while creating a streamlined process that increases the probability that the most appropriate treatment reaches the right patient in a timely fashion.

RUHS Maternal Sepsis Diagram



Maternal Sepsis Criteria

1. Positive for **at least two initial sepsis screening criteria** within 6 hours of each other:

- Oral Temp < 96.8° F OR ≥ 100.4° F
- Heart Rate > 110 beats per min
- Respiratory Rate > 24 breaths per min
- WBC (White Blood Cells) > 15,000/mm³ OR < 4,000/mm³ OR > 10% bands
- MAP < 65 mmHg sustained for 15 min

OR

2. Anytime a laboring patient has a temperature greater than 102.2° F (one time, without any other criteria)

OR

3. A pregnant patient has temperature is 98.6° F to 102.2° F with fetal tachycardia (160 bpm or greater) AND leukocytes greater than 15 or less than 4

Time Zero Triggers

The sepsis timer will display within in the patient's chart in storyboard.

- Time provider documented YES to '*Do you suspect infection?*' in BPA/Navigator

OR

- Time of RN Initial BPA/Abx ordered if provider has not answered '*Do you suspect infection?*'

OR

- Any time a laboring patient has a temp greater than 102.2° F (one time without any other criteria)

OR

- A pregnant patient has temperature is 98.6° F to 102.2° F with fetal tachycardia (160 bpm or greater) AND leukocytes greater than 15 or less than 4

Obstetric Providers

Initial BPA for Maternal Sepsis

If the patient meets the maternal sepsis criteria as stated above, an initial Maternal Sepsis BPA will populate when opening a patient's chart or clicking on the IP Rounding BPA section. The BPA will display what criteria was met, recent vital signs and lab results if available.

- The **Maternal Sepsis** order set selection is defaulted to *Open*. Clicking **Accept** will take you to the orders activity opening the respective order set.
- You will also have the option to click **Document** to indicate suspected infection and source.
- Acknowledgement Reasons:
 - **Sepsis is Not Suspected** – will silence the BPA for all users for 6 hours
 - **Patient Already on Antibiotics** – will silence the BPA for all users for 12 hours
 - **Not on primary team** – will silence the BPA for the current user for 12 hours
- Order Set when clicking Accept:

Maternal Sepsis BPA with End Organ Damage

If the patient meets the maternal sepsis and end organ damage criteria, a different BPA will populate when opening a patient's chart or clicking on the IP Rounding BPA section. The BPA will display the maternal sepsis checklist and what needs to be completed.

Maternal Sepsis (1)

*****MATERNAL SEPSIS ALERT*****
 This patient meets criteria for Sepsis. Please consider: □
 - Glucose control –avoid hyperglycemia >180mg/dL□
 - Maternal temperature control –reduce fetal oxygen consumption and fetal tachycardia using
 - Fetal lung maturity - Consider steroids for fetal lung maturity in weeks 23-36 of pregnancy
 - DVT prophylaxis –lower leg sequential compression devices while on bed rest

[Maternal Sepsis Checklist Expanded](#)
 Last Sepsis Time Zero: 6/14/2024 10:28 AM

✗ Maternal Sepsis Order Set not used.

(End Organ Damage Criteria Met)

✗ 1 hr - Antibiotics

This patient meets criteria for source-directed antibiotics within 1 hour of time zero, which was 6/14/2024 10:28 AM. **Please administer antibiotics as ordered or contact Provider if no order exists.**

Sepsis Antibiotics Administrations (last 24 hours)
 No antibiotic orders with administrations found.

✗ 3 hrs - Fluid Administration 30mL/kg

This patient meets criteria to receive 30mL/kg of fluid within 3 hours from time zero, which was **6/14/2024 10:28 AM**. If they do not have an order please notify the provider.

0mL of 0mL (30mL/kg) infused since time zero.

Fluid Administrations (last 24 hours)
 No fluid orders with administrations found.

Orders not given:

 No unadministered fluid orders found.

Repeat Lactate
 Repeat Lactate not indicated per specifications. Please draw initial lactate if none.
 No results for input(s): "LACTATE", "LACTBG" in the last 24 hours. Shock Index Score: Not Found

[View Maternal Sepsis Algorithm](#)

Open Order Set Do Not Open

Document Do Not Document

Maternity Suspected Infection / Sepsis [Preview](#)

☰ Infection Documentation [Expand](#)

✔ Accept Dismiss

Maternal Sepsis QSG

- Below the Maternal Sepsis checklist there is a link titled 'View Maternal Sepsis Algorithm.' Clicking on that link will display the Maternal Sepsis algorithm.

The screenshot displays a clinical interface with a Maternal Sepsis checklist on the left and a flowchart algorithm on the right. The checklist includes sections for 'Maternal Sepsis Review for Ruh, Mom', 'Maternal Sepsis Documentation/Review', and 'Maternal Sepsis Checklist'. A red arrow points from the 'View Maternal Sepsis Algorithm' link in the checklist to the algorithm flowchart on the right. The flowchart is titled 'RUH Maternal Sepsis' and includes decision points for 'Start treatment?', 'Sepsis criteria met?', and 'Sepsis criteria not met?'. It also includes tables for 'Table 1: Antibiotic', 'Table 2: Imaging to identify source of infection', and 'Table 3: Imaging to identify source of infection'.

- The Maternal Sepsis order set selection is defaulted to Open. Clicking Accept will take you to the orders activity opening the respective order set.

The screenshot shows the Maternal Sepsis order set selection interface. The 'Open Order Set' button is highlighted with a red box. The 'Accept' button is also highlighted with a red box. The interface includes buttons for 'Open Order Set', 'Do Not Open', 'Document', 'Do Not Document', 'Infection Documentation', and 'Expand'. There is also an 'Acknowledge Reason' section with buttons for 'Sepsis is Not Suspected', 'Patient Already on Antibiotics', 'Not on primary team', and 'Defer'. The 'Accept' button is located at the bottom right of the interface.

- You will also have the option to click Document to indicate suspected infection and source.

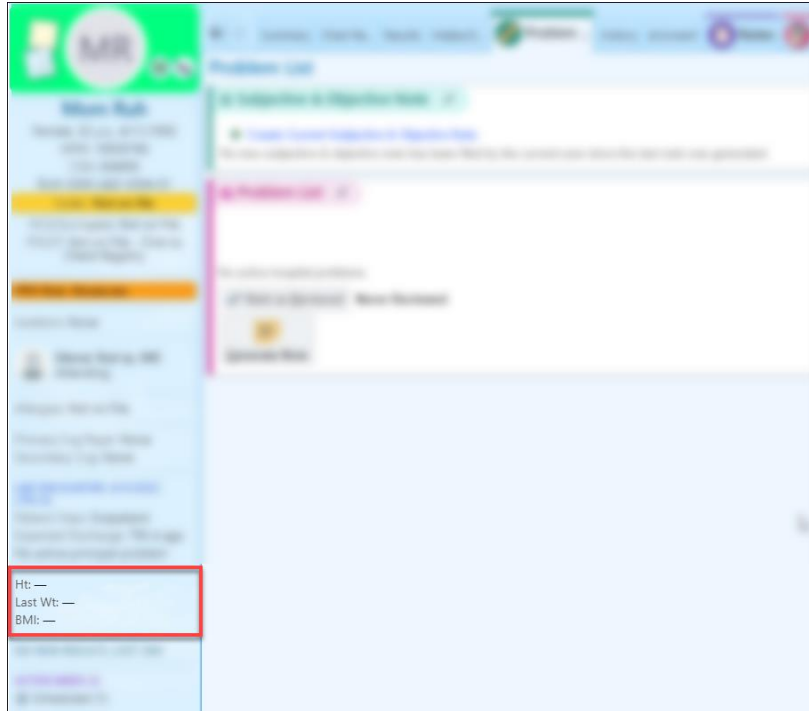
The screenshot shows the Maternal Sepsis Provider Infection Documentation form. The 'Document' button is highlighted with a blue box. The form includes a question 'Do you suspect infection?' with 'Yes' and 'No' options. Below this is a question 'Which infection do you suspect?' with a list of infection sources: 'Intraamniotic', 'Appendicitis', 'Cholecystitis', 'Community - acquired Pneumonia', 'Retained Products of conception', 'Septic abortion', 'Pelvic abscess', 'Pyelonephritis', 'Renal Abscess', 'Urogenital tract abscess', 'Bacteremia', 'Endocarditis', 'Chorioamnionitis', 'Endomyometritis', 'Mastitis', 'Breast abscess', 'Septic pelvic thrombophlebitis', 'Cesarean delivery wound', 'Perineal abscess', 'Necrotizing infection', and 'Other (requires free text documentation)'. There is also a text input field for 'Other infection suspected'.

- Acknowledgment Reasons:
 - Sepsis is Not Suspected** – will silence the BPA for all users for 6 hours
 - Patient Already on Antibiotics** – will silence the BPA for all users for 12 hours
 - Not on primary team** – will silence the BPA for the current user for 12 hours

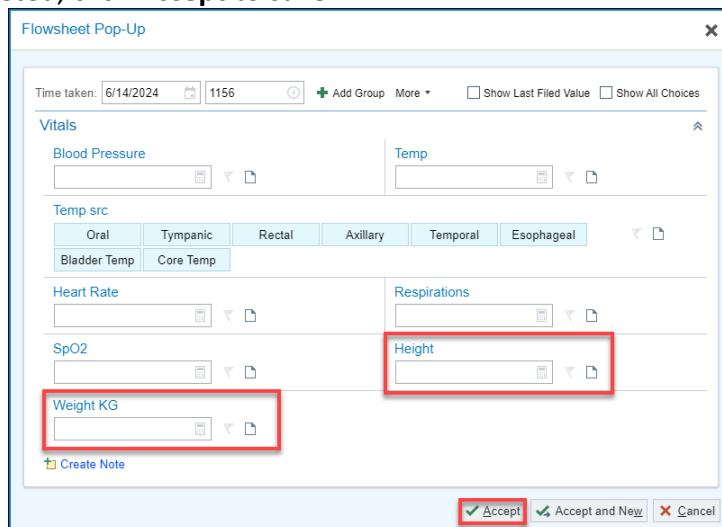
Height and Weight Documentation

Providers can now enter a height and weight for the patient if that information has not been documented.

1. From Storyboard, click within the Height/Weight section. This will open a Flowsheets Po-up.



2. Within **Flowsheets Pop-up**, enter the patient’s height and weight.
3. Once completed, click **Accept** to save.



Obstetric Nurses

Initial Maternal Sepsis BPA

Nurses caring for pregnant and postpartum patients who meet the maternal sepsis criteria as explained above will see the Maternal Sepsis BPA. The BPA will trigger immediately after saving qualifying values into the flowsheet activity or upon opening a pregnant or postpartum patient's chat that contains the qualifying documentation.

- A. The top of the BPA indicates the patient met criteria for Maternal Sepsis and instructs the nurse to notify the provider of the patient's condition right away.
- B. Further down in the BPA the recent values saved to the chart that triggered the Maternal Sepsis BPA will display.
- C. Actions Filled: A Sepsis Start Event will file in the system for reporting and time tracking purposes.
- D. Acknowledgement Reasons:
 - **Erroneous Documentation – Need to Review** – will silence the BPA for the current user for 15 minutes
 - **Provider Notified – Sepsis Not Suspected** – will silence the BPA for all users for 1 hour
 - **Patient Already on Antibiotics** – will silence the BPA for all users for 12 hours
 - **Not on Primary Team** – will silence the BPA for the current user for 12 hours

OurPractice Advisory - Ruh, Mom

Patient Safety (1)

This patient meets criteria for Maternal Sepsis/suspected intraamniotic infection treatment per protocol. Please notify provider to enter Maternal Sepsis orders.

This patient has met criteria for Maternal Sepsis 6/14/2024 10:28 AM.
This patient met criteria for Intraamniotic Infection 6/14/2024 10:28 AM.

Positive Infection Screen Criteria Met (Last 6 Hours)
Temperature >= 100.4 F: 103 [06/14/24 1000]
Heart Rate > 110 BPM: 115 [06/14/24 1000]
Respiratory Rate > 24 breaths/min: 26 [06/14/24 1000]
This patient met criteria for Intraamniotic Infection 6/14/2024 10:28 AM.
Patient is in labor with a documented temperature greater than 102.2 F In Labor and Temperature > 102.2

Maternal Sepsis Recent Vitals

	6/13/2024	6/14/2024
Temp:	100.0	100.0
Pulse:	115 ↑	115 ↑
Resp:	26 ↑	26 ↑

Maternal Sepsis Recent Lab Results
No lab values to display.

[View Maternal Sepsis Algorithm](#)

The following actions have been applied:

- ✓ Completed: File Sepsis Documentation Start event for reporting
- ✓ Completed: File Sepsis Start Event - none in last 24 hours

Acknowledge Reason

Erroneous Documentation - Need to Review Provider Notified - Sepsis Not Suspected

Patient Already on Antibiotics Not on Primary Team

Defer

Accept

Administered Antibiotics BPA

OurPractice Advisory - Ruh, Laborassess

Patient Safety (1)

This patient meets criteria for source-directed antibiotics within 1 hour of time zero. Please administer antibiotics as ordered.

[Maternal Sepsis Checklist Expanded](#)
Last Sepsis Time Zero: 6/19/2024 1:00 PM

Maternal Sepsis Order Set not used.

1 hr - Antibiotics

This patient meets criteria for source-directed antibiotics within 1 hour of time zero, which was 6/19/2024 1:00 PM. Please administer antibiotics as ordered or contact Provider if no order exists.

Sepsis Antibiotics Administrations (last 24 hours)
No antibiotic orders with administrations found.

Maternal Sepsis Antibiotic Orders (3h ago through 3h from now)

Order	Start
cefTRIAxone in D5W (ROCEPHIN) 2 gram/50 mL intermittent PREMIX 2 g Every 24 hours	06/19/24 1335
Question	Answer
Reason for antimicrobial therapy	Suspected infection
Indication	Other
What is the other source of infection?	test
metroNIDAZOLE in NaCl (FLAGYL) intermittent PREMIX 500 mg 100 mL Every 8 hours	06/19/24 1335
Question	Answer
Reason for antimicrobial therapy	Suspected infection
Indication	Other
What is the other source of infection?	test

[View Maternal Sepsis Algorithm](#)

[Go to MAR](#)

Acknowledge Reason

A second BPA will display for the nurse if the patient does not have antibiotic administration documentation within 30 minutes of time zero. The BPA will display:

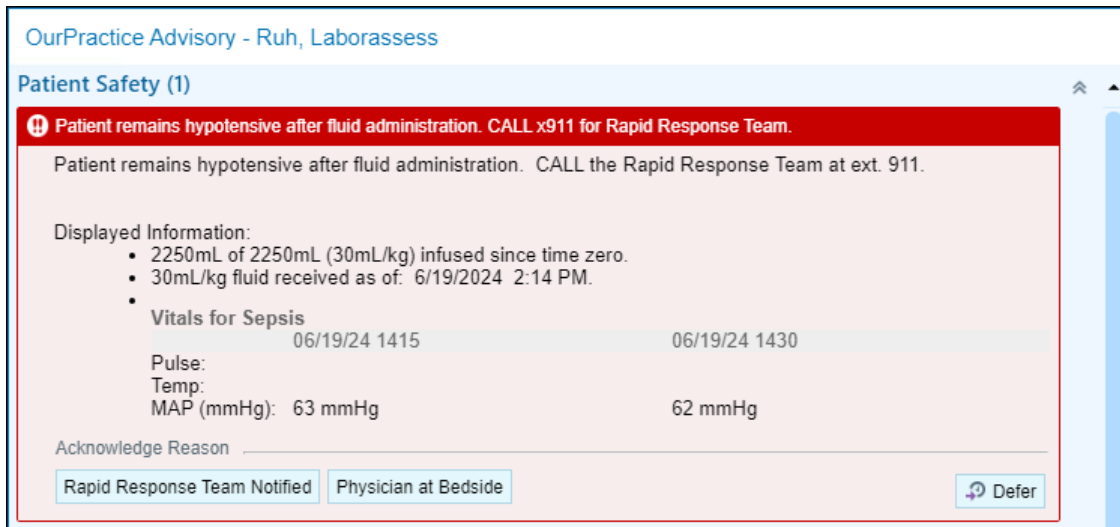
- Date and time that time zero was filled in the system,
- A visual indicator that the required 1-hour antibiotics has NOT been documented as administered, and
- any active antibiotic administration orders in the patient's chart.

Clicking dismiss to close the BPA will quiet the BPA for the current nurse for 15 minutes.

Selecting the acknowledgement reason of *Provider Notified* will quiet the BPA for 1 hour for *all users*. Selecting the *Not on Primary Team* reason will quiet the BPA for 12 hours for the *current user only*.

Also, clicking Go to MAR will quiet the BPA for all users for 15 minutes.

Patient Remains Hypotensive after Fluid Administration BPA



When a MAP of less than 65 is documented in the patient’s chart 15 minutes apart of each other and within 1 hour of administering the required 30ml/kg and the patient meets end organ damage criteria, the system will display a BPA indicating the patient remains hypotensive after fluid administration.

- The BPA will instruct the viewing clinician to call the Rapid Response Team at **911**
- The BPA will display the values that are triggering the BPA to display.
- Offer two acknowledgement reasons which will quiet the BPA for two hours for all users.
- Review the BPA, select the appropriate reason, and click **Accept**.

Maternal Sepsis Information in Epic

This information is shared with providers and nursing staff.

Grease Board Hover Bubble

To help clinicians quickly identify outstanding Maternal Sepsis tasks a Sepsis column has been added to the Grease Board. Colors and icons appear in the column to help you quickly and accurately care for the patient. Hover over the column and the Maternal Sepsis Checklist will appear providing you with more information and a hyperlink to review the Maternal Sepsis Navigator.

Sepsis	Preeclampsia	Cx Exam	Time since ROM	Time Since GBS	Infant Los	Closed Ad	OB/NICU	Epi
04:18								
⚠️ 00:49								
21:20								
⚠️ 04:00								

Maternal Sepsis Navigator
[Jump to Maternal Sepsis Navigator](#)

Maternal Sepsis Documentation/Review

This patient has met criteria for Maternal Sepsis 2/18/2022 11:09 AM.

Positive Infection Screen Criteria Met (Most Recent in Last 24 Hours)
 Temperature >= 100.4 F: 101 [02/18/22 1107]
 Respiratory Rate > 24 breaths/min: 25 [02/18/22 1107]

Maternal Sepsis Checklist
 Last Sepsis Time Zero: 2/18/2022 11:09 AM

✖	1 hr - Antibiotics	Please administer antibiotics as ordered or contact Provider if no order exists.
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[View Maternal Sepsis Algorithm](#)

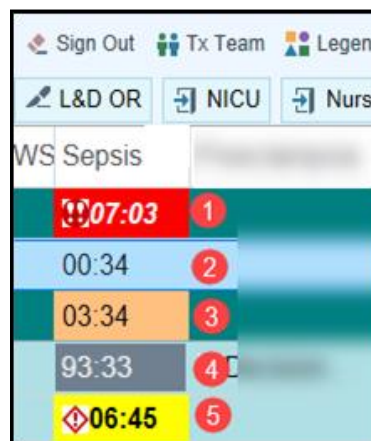
Grease Board Maternal Sepsis Columns

The Sepsis column will appear by default on the Grease Board. It will contain the time that has passed since the patient met maternal sepsis criteria and time zero was filed in the system. The time displays in **hours: minutes**.

Note: Clinicians that have customized their view of the Grease Board will need to use the wrench icon to reset the view and see the Sepsis column by default.

Maternal Sepsis QSG

1. **Red color** – Call the Rapid Response team. The patients chart contains two instances of documentation identifying the patient's MAP is < 65 within 15 minutes of each other and within 1 hour after administering the required 30ml/kg to the patient.
2. **No color** – If the maternal sepsis counter displays, then the patient has indicated for maternal sepsis AND the absence of a highlight color indicates the patient does not have any outstanding maternal sepsis tasks overdue.
3. **Orange color** – Indicates the patient has indicated for maternal sepsis with end organ damage.
4. **Grey color** – Indicates the patients is no longer on the maternal sepsis protocol.
5. **Yellow color** – Indicates the patient's chart has overdue or upcoming overdue maternal sepsis protocol documentation tasks. Hover to discover the outstanding / upcoming outstanding tasks and treat the patient accordingly.



Storyboard Hover bubble

Once time zero has started, a sepsis timer will appear on the patient's storyboard. Hovering over the timer will display a hover bubble that contains important information and a link to the Maternal Sepsis Navigator.

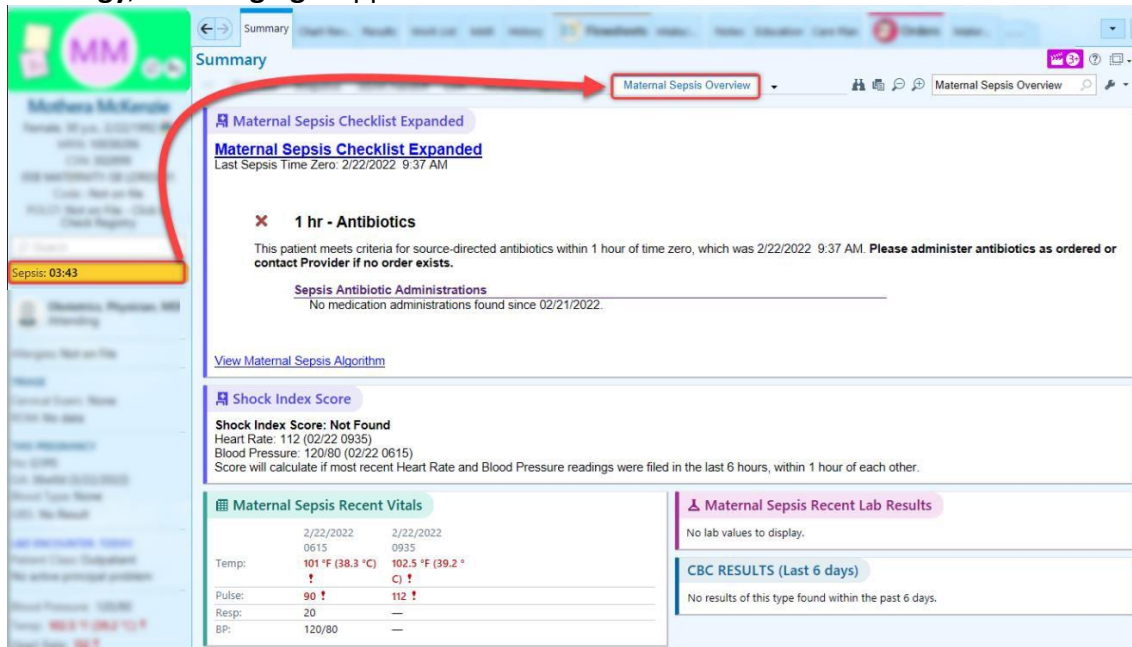
- a) **Maternal Sepsis Documentation/Review** – will display the sepsis criteria met as well as the maternal sepsis checklist.
- b) **Maternal Sepsis Recent Vitals** – will display the most recent documented vitals.
- c) **Maternal Sepsis Recent Lab Results** – will display recent labs for the patient.
- d) **Maternal Sepsis Navigator** – Clicking the link will open the Maternal Sepsis Navigator.
- e) **Maternal Sepsis BPA Review** – will display a report of the Maternal Sepsis BPAs triggered for the patient.

The screenshot shows a patient's storyboard for 'Mommy Trainingsepsifour'. A yellow hover bubble is shown over the 'Sepsis: 02:04' timer. The bubble contains the following information:

- Maternal Sepsis Documentation/Review:** This patient has met criteria for Maternal Sepsis 2/18/2022 11:09 AM. Positive Infection Screen Criteria Met (Most Recent in Last 24 Hours): Temperature >= 100.4 F: 101 [02/18/22 1107], Respiratory Rate > 24 breaths/min: 25 [02/18/22 1107].
- Maternal Sepsis Checklist:** Last Sepsis Time Zero: 2/18/2022 11:09 AM. 1 hr - Antibiotics: Antibiotics have been administered.
- Maternal Sepsis Recent Vitals:** 2/18/2022 11:07. Temp: 101 F (38.3 C) !, Pulse: 100 !, Resp: 25 !, BP: 100/80 !.
- Maternal Sepsis Recent Lab Results:** No lab values to display.
- Maternal Sepsis Navigator:** Jump to Maternal Sepsis Navigator.
- Maternal Sepsis BPA Review:** Click to view BestPractice Advisory history.

Summary – Sepsis Overview Report

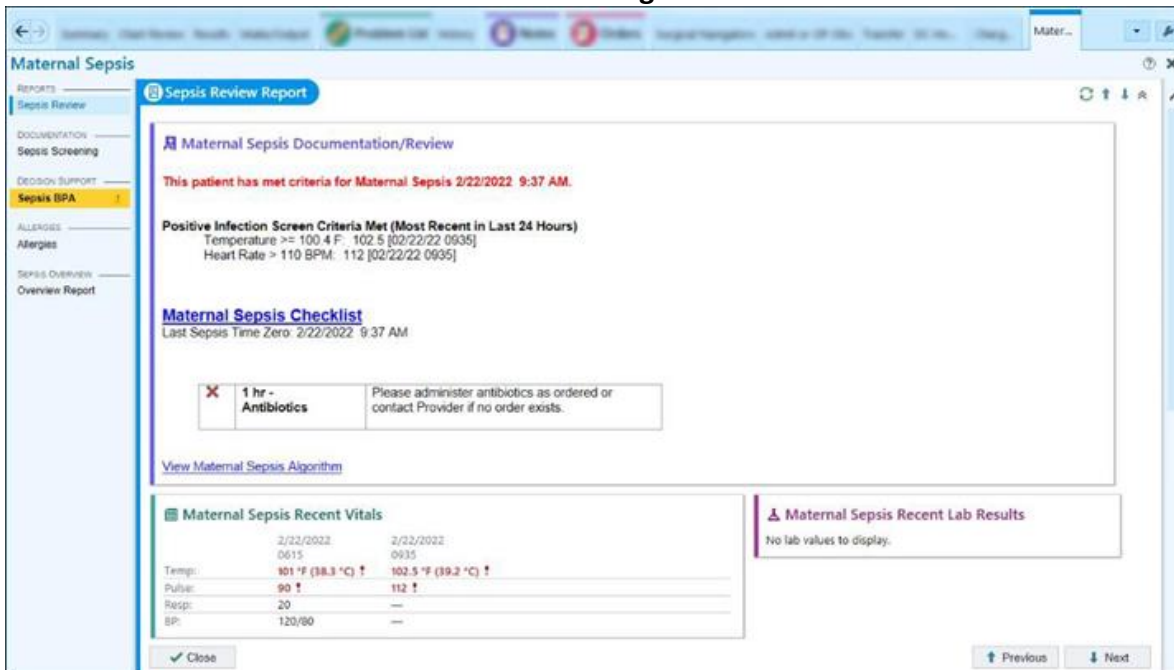
With the sepsis timer started, clicking on the timer will open the Sepsis Overview report. This report will display the **Maternal Sepsis Checklist**, **Shock Index Score**, **Recent Vitals**, **Labs**, **Microbiology**, and **Imaging** if applicable.

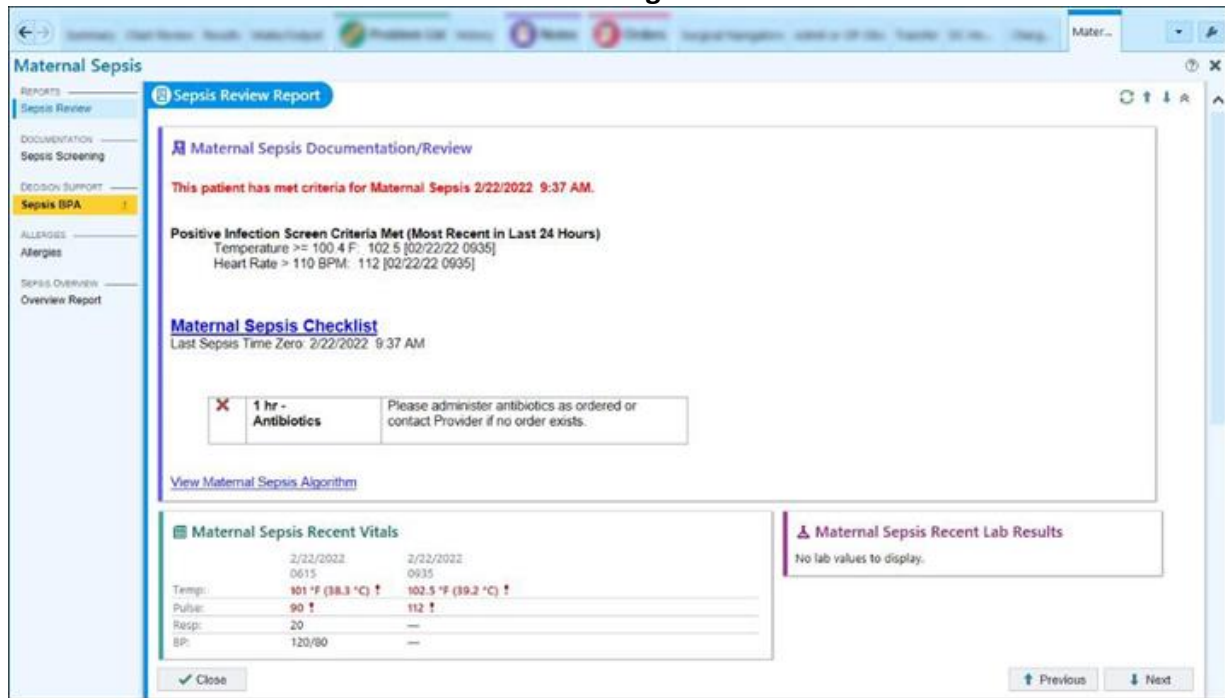


Maternal Sepsis Navigator

To open the Maternal Sepsis Navigator, hover over the sepsis timer to initiate the hover bubble and click on the **link** for the Maternal Sepsis Navigator. Differences between the two user groups will be indicated as needed.

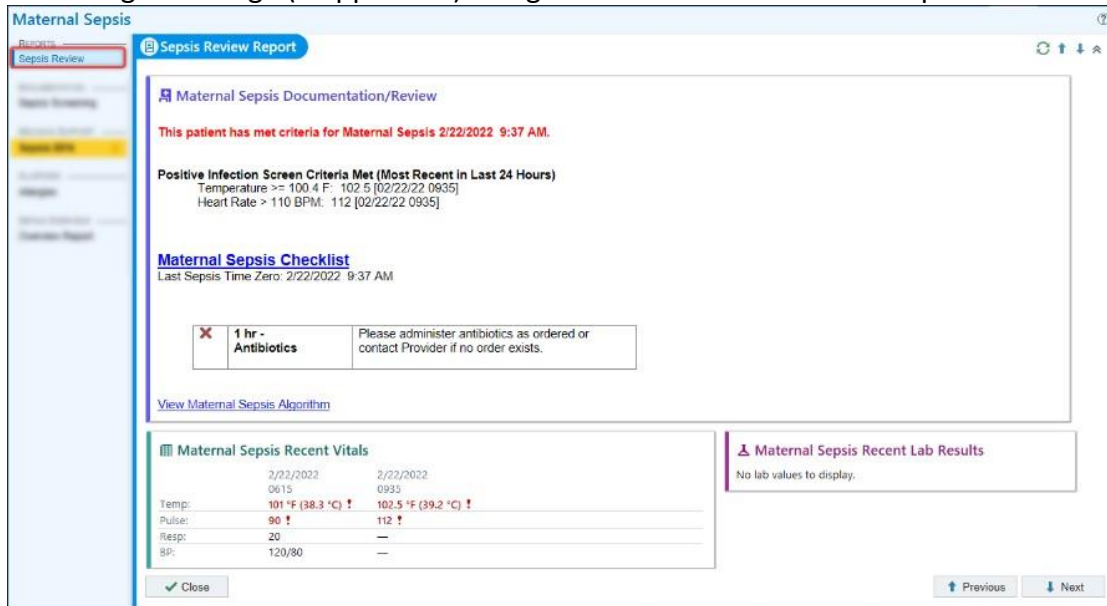
OB Provider Navigator View





Maternal Sepsis Navigator Sections

Sepsis Review Report (*Provider & Nursing*) will display the time and criteria met for sepsis as well as end organ damage (if applicable) along with the current maternal sepsis checklist.



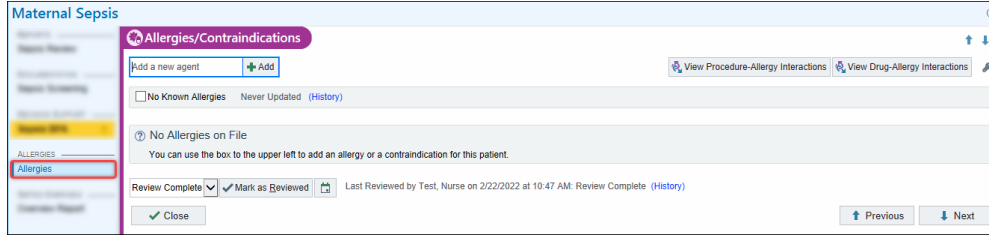
Sepsis Screening (*Provider only*) section is another area for providers to document suspected infection as well as type.

Sepsis BPA (*Provider only*) section will display Maternal Sepsis BPAs that need to be addressed for the patient.

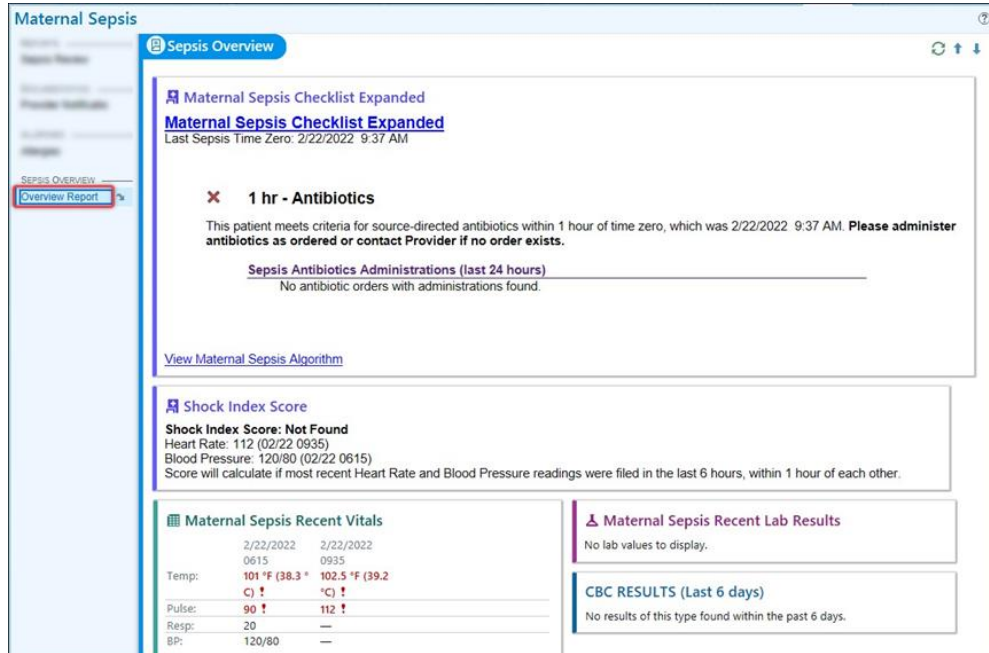
Provider Notification (*Nursing only*) section is another area for nursing to document provider interaction.

Maternal Sepsis QSG

Allergies (Provider & Nursing) section will allow clinicians to update the patient's allergies.



Overview Report (Provider & Nursing) will display useful information that includes: Maternal Sepsis Checklist, Shock Index Score, Recent Vitals, Labs, Microbiology, Imaging, Maternal Sepsis BPA Review, and the Sepsis Events Timeline.



References

RUH Algorithm

