Updated ZSFG Ob/Gyn Guidelines:
Management of PUL and Ectopic Pregnancy

OVERVIEW:

This guide provides clinical guidance for the management of pregnancy of unknown location and ectopic pregnancy. Quicklinks for **key recommendations** within the document are here:

1. Management of low-concern PUL (probable IUP) and visual algorithm
2. Management of moderate-concern PUL and visual algorithm
3. Management of high-concern PUL and visual algorithm

Quicklinks to additional helpful clinical guidance are here:

1. Probable IUP: ultrasound criteria
2. Table 1: Predicted serum hCG rise in normal pregnancy
3. Table 2: Medication abortion for PUL protocol
4. Table 3: Empiric methotrexate treatment – clinical criteria
5. Table 4: 2-dose Methotrexate protocol

DETERMINE IF THE PREGANCY IS DESIRED

It is important to discuss if the pregnancy is desired/possibly desired or undesired to ensure the patient's care is concordant with their values and preferences. Consider using the following open-ended questions to assess pregnancy desiredness: (Flynn et al., 2020)

Nondjudgement assessment of pregnancy desire:

- Tell me about your initial thoughts after receiving your positive pregnancy test. What are your feelings about the pregnancy now?
- Were you planning for this pregnancy?
- If this is a normal pregnancy, is it a pregnancy you wish to continue?

If the patient is uncertain or undecided, recommend counseling on options and treat as a desired pregnancy while reassessing patient's preference at each decision point in management.

DETERMINE PREGNANCY LOCATION

Our two primary tools are pelvic ultrasound and serum hCG.

1. ULTRASOUND

Who needs an ultrasound?:

- Pregnant patients without a documented IUP and symptoms (vaginal bleeding OR abdominal pain).
- Patients with risk factors or symptoms of ectopic pregnancy should have an evaluation as soon as possible after pregnancy is discovered
- If a patient calls with symptoms and no prior IUP documented, they should be supported to be seen for ultrasound and possible serum hCG within 24 hours and should be counseled on ectopic precautions.

High-level risk factors for ectopic:
- Current IUD (up to 53% risk)
- Prior ectopic (10% for 1 prior, >25% for 2 or more)
- Tubal surgery or pathology

Symptoms of ectopic:
- Abdominal pain (other than mild midline cramping)
- Vaginal bleeding

Clear IUP: A gestational sac with a yolk sac and/or embryonic pole inside of the uterus is a definitive IUP.

Probable IUP:
An intrauterine sac-like structure within the uterus and the absence of an extra-ovarian adnexal mass is most likely an early IUP. A fluid collection in the uterus is more likely to be an IUP if it has the following criteria.

3 or 4 criteria are nearly 100% predicitive of an IUP: (P. Callen, UCSF radiology)

Probable IUP: Ultrasound features
- Fluid is round or elliptical
- Fundal position
- Eccentric/implanted location rather than central in cavity
- Echogenic chorion of 2 mm

2. SERUM hCG

Who to follow:
- PUL: should be followed with serum hCG. The frequency of monitoring will depend on degree of suspicion for ectopic.
- Definitive IUP on sono: generally NOT followed by hCG unless early pregnancy loss is suspected (serum hCG may provide faster diagnosis than sono alone)

Role of hCG level:
- **93-98**% of IUP's can be seen on vaginal ultrasound at **hCG > 2000.**
- PUL with hCG **> 3500** is highly concerning for ectopic unless clinical history is consistent with miscarriage
- Low levels of hCG are NOT predictive of a lower risk of rupture of ectopic

PUL with hCG between 2000-3000

- 1.7% are early IUP
- 65.5% early pregnancy loss
- 32.8% ectopic pregnancy

PUL with hCG > 3000

- 0.5% are early IUP
- 66.3% early pregnancy loss
- 33.2% ectopic pregnancy

Source: (Doubilet & Benson, 2011)

Frequency of hCG monitoring: Patients with PUL and significantly decreasing serum hCG may be monitored less frequently. (Cameron et al., 2016; Pocius et al., 2017) The rationale for this guideline is to decrease burden of healthcare visits for patient.

Table 1: Predicted hCG Rise in Normal Pregnancy

- 99% of normal intrauterine pregnancies have a rate of increase faster than these minimums:

Initial serum hCG	MINIMUM rate of rise in 48h
<1,500	49%
1,500-3000	40%
>3,000	33%

- The above values are conservative thresholds to avoid a false diagnosis of non-viable IUP.The **median rise** in hCG over 48 hours for all normal IUP's is much higher at approximately **224%**.

Source: (Barnhart et al., 2016)

Criteria for discharging patient from surveillance based on hCG:

- If a patient's symptoms are reassuring and hCG has dropped **>50% over 48 hour** or **> 80% in 4 days**, space out monitoring to weekly serum hCG.
- If above criteria is met and **serum hCG is <50**, discharge patient from floater list and instruct patient to perform home urine pregnancy test (UPT) in one week from last serum hCG:
  - If UPT negative: no futher action
  - If UPT positive: patient calls team (and gyn team orders repeat serum hCG)
- If serum hCG has dropped **>95% in 7 days**, discharge from PUL surveillance (no need for home UPT).

APPROACH TO MANAGEMENT OF PREGANCY OF UNKNOWN LOCATION (PUL)

Management of pregnancy of unknown location is guided by:

(1) pregnancy desiredness and patient preference
(2) the clinician's level of concern for ectopic pregnancy

MANAGEMENT OF LOW-CONCERN PUL (PROBABLE IUP)

Low-Concern PUL/ Probable Intrauterine Pregnancy: Criteria
Ultrasound findings: Probable IUP (at least 3 of 4 criteria for likely gestational sac)
AND: • < 6 weeks from LMP • Asymptomatic or only midline cramping • No significant risk factors for ectopic (IUD in place, prior ectopic, or tubal surgery)* • Serum hCG < 3500 if known
OR: Patient presenting with non-GYN complaint and found to have incidental positive hCG with no significant risk factors for ectopic pregnancy

**low-level ectopic risk factors (smoking, prior GC/CT infection, or history of infertility) may be considered to be in this category based on clinical assessment*

⇨ **IF DESIRED PREGNANCY:** Repeat ultrasound in 7 days -OR- when serum hCG is anticipated to be at least > 2000 as 93-95% of IUPs can be seen on vaginal ultrasound at this threshold. Follow until pregnancy location is known.

- Consider repeat 48 hour hCG if there is clinical suspicion for early pregnancy loss to expedite diagnosis

⇨ **UNDESIRED PREGNANCY:** These patients may be offerred:

(1) MAB on day of presentation (see Table 2)

(2) Uterine aspiration for probable IUP

a. Patient counseling: Aspiration offers potential benefit of earlier resolution of pregnancy than expectant management (Paul et al, 2002). In counseling, consider patient's preferences for pain management for MUA in the ED vs. 6G.

b. Day 1: Serum hCG + uterine aspiration

   i. Float products for identification of pregnancy. No further hCG indicated if both gestational sac + clear villi are identified. Patients are discharged from floater list.

   ii. *In the rare circumstance that formal pathology does not identify clear villi on formal report, request patient to return for hCG. Pathology informs the attending of these findings.*

c. Day 2 (for patients with no sac AND villi on MUA): Repeat hCG in 24 hours after aspiration

   i. A drop of 50% or more in 24 hours after aspiration is consistent with removal of the pregnancy (Rivera et al., 2009). Patient is discharged from floater list.

   ii. Drop of <50% in 24 hours or hCG plateau or increase: consider repeat ultrasound (if not aspiration not performed undersound guidance) to ensure we did not miss the gestational sac with uterine aspiration.

1. Recommend methotrexate therapy.
2. Can consider observation repeat serum hCG at 48 hours if 24 hour drop was 15% - 50% (ACOG Practice Bulletin 193)

Table 2: Medication Abortion for PUL Protocol

Criteria	**1. Patient willing to participate in follow-up** 2. Normal vital signs 3. No pelvic pain on exam 4. **Serum hCG <3500** if no visible sac on sono 5. No evidence of extra-uterine pregnancy on ultrasound 6. No significant free fluid beyond cul-de-sac
Counseling Topics	Importance of follow-up, possible need for uterine aspiration or diagnostic LSC, ectopic precautions, slight increase risk of needing additional medication or aspiration if no gestational sac visualized **(7-15%)***
Day 1	1. Complete Danco consent for Mifepristone 2. Mifepristone 200 mg administered in person 3. 800 mcg misoprostol ordered and dispensed to patient for self-administration at home (buccal or vaginal) at 24 hours 4. Prescription for antiemetic and analgesic sent to patient's pharmacy 5. Provide written instructions & emergency contact # provided (provider ensures # in EPIC is up to date)
Day 2 or 3	Patient self-administers 800 mcg misoprostol (buccal or vaginal)
Day 3	Phone Follow-up: Call patient to ensure misoprostol administration, review diagnosis and symptoms, return precautions, and follow up plan, per protocol
Day 4 or 5	Repeat hCG 48-72 hours from misoprostol. • hCG drop **> 50%: likely complete abortion.** Continue to trend serum hCG weekly until negative • hCG **<50%** at **72** hours or **hCG <80% at 7 days,** recommend uterine aspiration. ○ *If patient highly desires to avoid procedure, can consider repeat hCG in 48 hours (if patient has no concerning symptoms). In one study, 26% of patients with PUL, hCG <2000, and no gestational sac on sono had spontaneous resolution of pregnancy without intervention (Goldberg et al, 2022).*
Day 7 or 8	Patients with low-risk, probable IUP (likely gestational sac on sono) may opt for in-clinic repeat ultrasound intead of serum hCG as follow-up

*source: (Goldberg et al., 2022; Goldstone et al., 2013)

MANAGEMENT OF MODERATE-CONCERN PUL

Moderate concern: Could be nonviable pregnancy, early IUP or unruptured ectopic
Ultrasound findings: • Empty uterus –OR-- fluid in the uterus without multiple characteristics of an IUP: • No significant free fluid in pelvis
-**and** -- combination of: • Serum hCG <3500 • Unknown LMP/pregnancy duration • Symptoms of vaginal bleeding or abdominal pain • NO high-concern risk factors for ectopic (prior ectopic pregnancy, adnexal surgery, IUD in situ)
-**or**- Likely early pregnancy loss: • Low chance of ectopic pregnancy by history/risk factors • Cresendo-decrescendo bleed • Pain consistent with midline cramping • Possibly pregnancy symptoms that resolved --or-- an open cervical os *(None of these eliminates the chance of ectopic)*

⇨ **ALL PATIENTS**: Patients in this category should have serum hCG and an ultrasound, including evaluation of the adnexae. Obtain a formal ultrasound if there are any concerns or limitations with a clinic sono (if performed).

Management of PUL with moderate concern must respect patients' desires for pregancy & management while also mitigating the risks of potential ruptured ectopic.

⇨ **IF UNDESIRED PREGNANCY**:

A. Recommend uterine aspiration:
   a. Day 1: Serum hCG + uterine aspiration
      i. Float products: If a gestational sac AND clear villi are identified, no further hCG indicated. Discharge from floater list.
      ii. *In the rare circumstance that formal pathology does not identify clear villi on formal report, request patient to return for hCG. Pathology informs the attending of these abnormal findings.*
   b. Day 2 (if no sac AND villi are seen): Repeat hCG in 24 hours after aspiration
      i. A drop of 50% or more in 24 hours after aspiration is consistent with removal of the pregnancy (Rivera et al., 2009). Discharge from floater list.
      ii. Plateau, Rise, or drop of <50% in 24 hours: recommend methotrexate therapy. Can consider deferring methotrexate treatment until pathology from aspirate confirms no intrauterine pregnancy in stable patient with low suspicion for ectopic.
B. Consider MAB in patients who highly desire to avoid procedure AND meet criteria for MAB (See Table 2)

⇨ **IF DESIRED PREGNANCY**: If pateint stable, repeat serum hCG at 48 hours.

A. hCG rising appropriately: this is a likely IUP. Observation of a "normal" rise in hCG (see (Table 1) does not eliminate the possibility of miscarriage or ectopic pregnancy.

a. Consider at least one additional 48 hour serum hCG to ensure contiued appropriate rise. Repeat clinic ultrasound when serum hCG is (or anticipated to be) > 2000.
b. If an IUP is not seen at hCG >2000, repeat hCG and reschedule ultrasound when hCG is (or anticipated to be) > 3,500. Consider formal ultrasound at this time for adnexal evaluation.
c. At any point, repeat ultrasound sooner if there are new symptoms suggestive of ectopic pregnancy.

Initial serum hCG	Minimum rate of rise in 48h
<1,500	49%
1,500-3000	40%
>3,000	33%

B. hCG dropping: Counsel patient that this is NOT a normal IUP. Management depends on degree of drop in hCG. Differential diagnosis includes EPL and ectopic.

a. **Drop > 50%:** This indicates pregnancy is likely resolving. If serum hCG has dropped >50% or > 80% in 4 days, and symptoms are reassuring (minimal pain and bleeding), patients can be monitored with weekly serum hCG.
    I. If above criteria is met and serum hCG is <50, discharge patient from floater list and instruct patient to perform home urine pregnancy test (UPT) in one week from last serum hCG:
        1. If UPT negative: no futher action
        2. If UPT positive: patient calls team (and gyn team orders repeat serum hCG)
    II. If serum hCG has dropped > 95% in 7 days, can discharge from PUL floater list
    III. Can consider additional interventions (misoprostol or uterine aspiration) if clinical symptoms and ultrasound are concerning for continued intrauterine products of conception.
b. **Drop 15-50%:** We remain unsure if this is resolving EPL vs. ectopic.
    I. If serum hCG has dropped <50% but greater than 15% in 2 days, can offer uterine aspiration for definitive diagnosis.
    II. Consider MAB in patients who highly desire to avoid procedure AND meet criteria for MAB (See Table 2)
    III. If patient desires to avoid procedure, can repeat hCG every 48 hours for 3 total serum hCG values.
        1. If drop remains >15% after 48 hours for 3 consecutive values, can space monitoring to weekly until negative serum hCG.

2. If drop less <15% on any repeat value, recommend uterine aspiration

c. **Drop <15%:** More concerning for ectopic pregnancy.
   I. If serum hCG has dropped less than 15% over 48 hours, recommend diagnostic uterine aspiration.
   II. For patients who desires definitive diagnosis and want to avoid procedure, consider MAB in patients without high risk history or symptoms concerning for ectopic.

C. hCG plateau or rising inappropriately: Differential diagnosis includes ectopic vs.early prengancy failure vs. normal IUP (much less likely). Some data suggest 3 hCG measurements are more reliable than 2 values to rule out the possibility of normal IUP as as normal IUP's have rarely occurred with hCG plateaus. (Zee et al., 2014)

a. Evaluate patient's values in care. Discuss risks and benefits of active vs. expectant management.
b. If patient values to mimize risk of ruptured ectopic:
   I. Recommend diagnostic uterine aspiration
   II. Can consider MAB if patient meets criteria and highly desires to avoid procedure (See Table 2)
c. If patient values to preserve potential IUP above all else (including risk of ruptured ectopic), continue expectant management until at least 3 hCG measurements have been obtained, then manage as above based on hCG trend. Reassess plan at every data point.
   I. Repeat ultrasound in one week from prior to assess for adnexal mass.

MANAGEMENT OF HIGH-CONCERN PUL (LIKELY ECTOPIC)

High Concern or Likely Ectopic

• Concern for ruptured ectopic (moderate or large free fluid in the pelvis) -**or-**
• Adnexal mass concerning for ectopic -**or-**
• Empty uterus and hCG > 3500 and no history consistent with SAB -**or-**
• A significant risk factor for ectopic with any hCG level (prior to ultrasound):
  ▪ Current IUD (up to 53% risk)
  ▪ Prior ectopic (10% for 1, >25% for 2 or more)
  ▪ Tubal surgery or pathology

⇨ **ALL:** If there is concern for rupture with hemodynamic instability, patient should go directly to the ED then the OR if initial ultrasound confirms this concern. Otherwise, evaluation should occur that day. These patients should have a formal ultrasound (may occur after uterine

aspiration for undesired pregnancies if pre-procedure deck ultrasound performed by trained provider).

Patients with a definite ectopic on formal ultrasound (yolk sac and/or embryo seen in adnexa) who will go to the OR may have an MUA in the OR or skip MUA. Consider (1) tiny chance of heterotopic (2) possible subsequent passage of decidual cast and (3) need for diagnosis if ultrasound is wrong or can't see ectopic surgically.

⇨ **DESIRED PREGNANCY** (and no concern for acute rupture): After formal ultrasound, determine whether the patient should be followed with serial hCG as described under managmenet of "moderate concern" desired PUL or undergo immediate management with laparoscopy (can offer without uterine aspiration) vs. diagnostic aspiration vs. MTX based on index of suspicion for ectopic

⇨ **UNDESIRED PREGNANCY** (and no concern for acute rupture): If pregnancy is undesired, proceed with active management:

A. Recommend diagnostic uterine aspiration (preferred treatment) followed by methotrexate or diagnostic LSC if:
    a. No chorionic villi and gestational sac seen on uterine aspirate -**and-**
    b. hCG does not fall >50% 24 hours after uterine aspiration.
B. Consider empiric 2-dose methotrexate (without aspiration), See Table 4 *adapted from U. Penn protocol:*

Table 3: Empiric 2-dose Methotrexate Treatment Criteria	
Patient considerations	1. Strongly wants to avoid procedure 2. Desires expedient management of possible ectopic pregnancy
Clinical Criteria	1. Normal VS 2. No pain on abdominal exam 3. hCG <5,000 4. Has formal utlrasound demonstrating: - adnexal mass strongly consistent with unruptured ectopic pregnancy, measuring <4mm - No evidence of intrauterine pregnancy - No free fluid beyond pelvis on ultrasound

C. Can also offer diagnostic laparoscopic with uterine aspiration if there is a mass concerning for ectopic pregnancy on ultrasound

MANAGEMENT WITH METHOTREXATE

Planned two-dose methotrexate regimen should be offered to all patients with a stable, unruptured ectopic.

Rationale: In a meta-analysis of four RCT's, two-dose compared to one-dose methotrexate increases time to resolution of ectopic by 8 days and increases odds of treatment success (87.2% vs. 79%, OR 1.84 times 95% CI: 15.13, 3.00). The success of 2-dose methotrexate w as higher for patients with higher initial hCG (2,000-3,000) or larger ectopic (2-3.5cm). Consider 1-dose MTX for lower hCG (e.g. <200). (Alur-Gupta et al., 2019)

Contraindications:

A. Absolute:

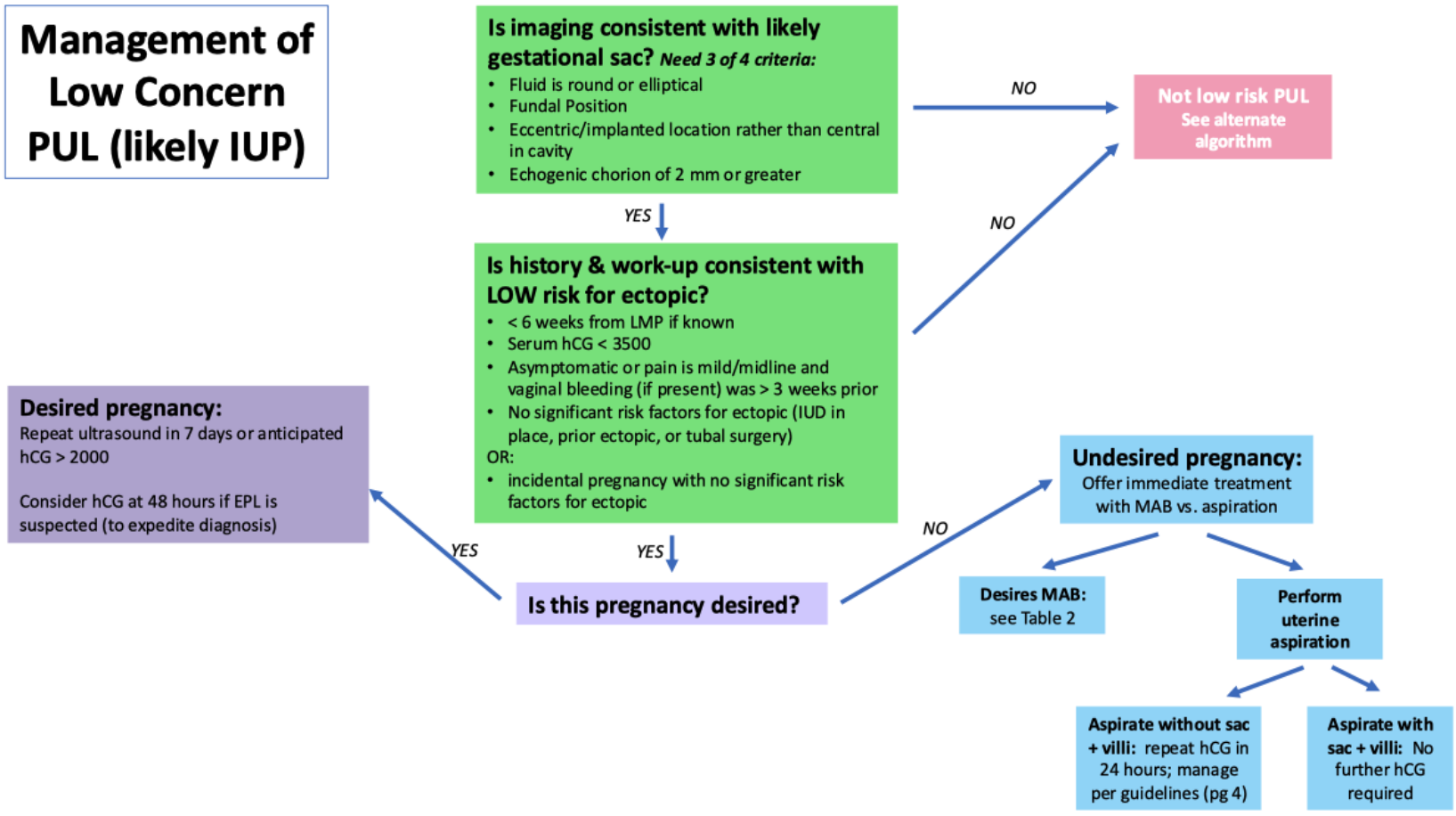
1. Ruptured Ectopic pregnancy
2. Hemodyanmically unstable patient
3. Intrauterine preganncy
4. Evidence of immundoficiency
5. Moderate to severe anemia, leuopenia, or thrombocytopenia
6. Sensitivity to methotrexate
7. Active pulmonary disease
8. Active peptic ulcer disease
9. Clinically important hepatic dysfunction
10. Clinically important renal dysfunction
11. Breastfeeding
12. Unable to participate in follow-up (e.g. patient is travelling)

B. Relative

1. Embryonic cardiac activity detected by Ultrasound
2. High initial hCG concentration (>5000 miU/mL)
3. Ectopic pregnancy greater than 4 cm in size on TVUS
4. Unwilling to accept blood transfusion

Table 4: 2-Dose Methotrexate Protocol	
Day 1	• Obtain hCG, T&S, CBC, CMP, and formal utlrasound if not previously obtained • Administer MTX dose #1: 50 mg/m^2
Day 4	• Repeat hCG • Administer MTX dose #1: 50 mg/m^2
Day 7	• Repeat hCG ○ If 15% or greater drop from day 4 → day 7, check hCG weekly until negative ○ If <15% drop, repeat MTX (50mg/ m^2) Dose#3 and reassess Day 11
Day 11	• Repeat hCG, CBC, and CMP ○ If 15% or greater from day 7 → day 11, check hCG weekly until negative ○ If <15% drop, repeat MTX (50mg/ m^2) Dose#4 and reassess Day 14
Day 14	• Repeat hCG ○ If 15% drop from day 11 to day 14, check hCG weekly until negative ○ If decrease <15% from day 11, recommend surgical management

Management of Low Concern PUL (likely IUP)



Management of Moderate Concern PUL

Is imaging consistent with PUL?
- Empty uterus or fluid in uterus without characteristics of gestational sac
- No suspicious adnexal mass and No significant free fluid

NO → **Moderate risk algorithm may not apply**

YES ↓

Does the patient meet the following criteria?
- hemodynamically stable, non-peritoneal abdominal exam
- Serum hCG < 3500
- No significant risk factors for ectopic (IUD in place, prior ectopic, or tubal surgery)
- –OR– History/symptoms suggest early pregnancy loss

NO → **Moderate risk algorithm may not apply**

YES ↓

Is this pregnancy desired?

YES → **Desired pregnancy:** repeat hCG in 48 hrs

- **Appropriate* Rise in hCG?**: -repeat hCG in 48 hours -repeat sono when hCG > 2000
- **Dropping hCG?**
  - **Drop <15%:** recommend diagnostic MUA
  - **Drop 15-50%:** Offer MUA. Can consider MAB vs. repeat hCG @ 48 hours if strong desire to avoid intervention. (pg 7)
  - **Drop > 50%:** likely early pregnancy loss, continue weekly hCG
- **Plateau or abnormal rise in hCG?** Consider a third hCG[1] at 48 hours if stable vs. diagnostic MUA

NO → **Undesired pregnancy:** Recommend diagnostic aspiration. Consider MAB vs. expectant management if strongly desires to avoid procedure

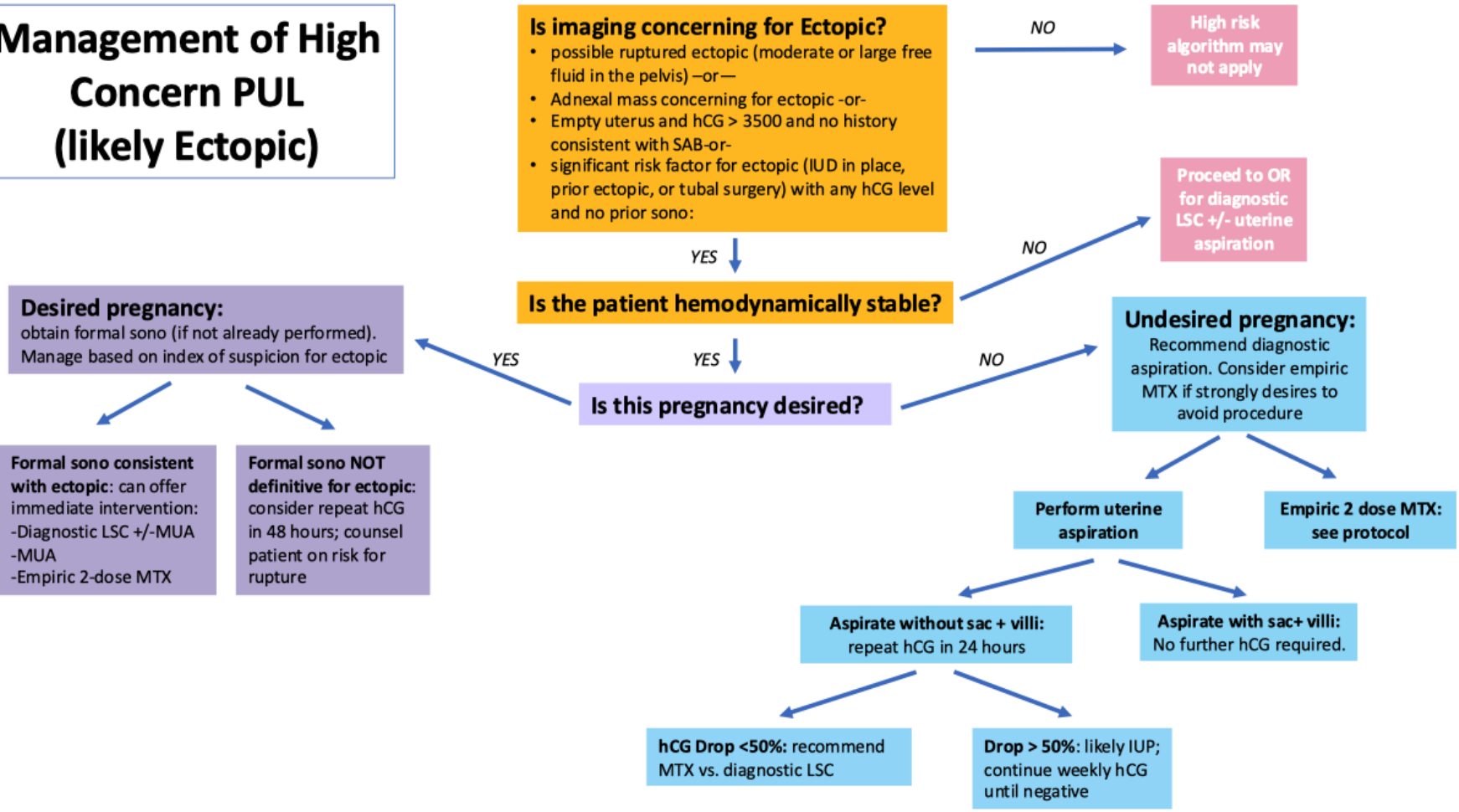
- **Perform uterine aspiration**
  - **Aspirate without sac + villi:** repeat hCG in 24 hours; manage per guidelines (pg 6)
  - **Aspirate with sac + villi:** No further hCG required.
- **Patient highly desires to avoid procedure**
  - **Consider MAB** (Table 2)
  - **Consider surveillance** with repeat hCG in 48 hours

***Appropriate rise in hCG based on initial serum level:**

Initial serum hCG	Minimum rate of rise in 48h
<1,500	49%
1,500-3000	40%
>3,000	33%

[1]Some data suggest 3 hCG measurements are more reliable than 2 before making a diagnosis of nonviable PUL as viable pregnancies have rarely occurred with hCG plateaus. (Zee et al., 2014)

Management of High Concern PUL (likely Ectopic)



REFERENCES

Alur-Gupta, S., Cooney, L. G., Senapati, S., Sammel, M. D., & Barnhart, K. T. (2019). Two-dose versus single-dose methotrexate for treatment of ectopic pregnancy: a meta-analysis. *American Journal of Obstetrics and Gynecology*, *221*(2), 95-108.e2. https://doi.org/10.1016/j.ajog.2019.01.002

Barnhart, K. T., Guo, W., Cary, M. S., Morse, C. B., Chung, K., Takacs, P., Senapati, S., & Sammel, M. D. (2016). Differences in Serum Human Chorionic Gonadotropin Rise in Early Pregnancy by Race and Value at Presentation. *Obstetrics and Gynecology*, *128*(3), 504–511. https://doi.org/10.1097/AOG.0000000000001568

Cameron, K. E., Senapati, S., Sammel, M. D., Chung, K., Takacs, P., Molinaro, T., & Barnhart, K. T. (2016). Following declining human chorionic gonadotropin values in pregnancies of unknown location: when is it safe to stop? *Fertility and Sterility*, *105*(4), 953–957. https://doi.org/10.1016/J.FERTNSTERT.2015.11.050

Doubilet, P. M., & Benson, C. B. (2011). Further evidence against the reliability of the human chorionic gonadotropin discriminatory level. *Journal of Ultrasound in Medicine : Official Journal of the American Institute of Ultrasound in Medicine*, *30*(12), 1637–1642. https://doi.org/10.7863/JUM.2011.30.12.1637

Flynn, A. N., Schreiber, C. A., Roe, A., Shorter, J. M., Frarey, A., Barnhart, K., & Sonalkar, S. (2020). Prioritizing Desiredness in Pregnancy of Unknown Location: An Algorithm for Patient-Centered Care. *Obstetrics and Gynecology*, *136*(5), 1001–1005. https://doi.org/10.1097/AOG.0000000000004124

Goldberg, A. B., Fulcher, I. R., Fortin, J., Hofer, R. K., Cottrill, A., Dethier, D., Gilbert, A., Janiak, E., & Roncari, D. (2022). Mifepristone and Misoprostol for Undesired Pregnancy of Unknown Location. *Obstetrics and Gynecology*, *139*(5), 771–780. https://doi.org/10.1097/AOG.0000000000004756

Goldstone, P., Michelson, J., & Williamson, E. (2013). Effectiveness of early medical abortion using low-dose mifepristone and buccal misoprostol in women with no defined intrauterine gestational sac. *Contraception*, *87*(6), 855–858. https://doi.org/10.1016/j.contraception.2012.10.013

Pocius, K. D., Bartz, D., Maurer, R., Stenquist, A., Fortin, J., & Goldberg, A. B. (2017). Serum human chorionic gonadotropin (hCG) trend within the first few days after medical abortion: a prospective study. *Contraception*, *95*(3), 263–268. https://doi.org/10.1016/J.CONTRACEPTION.2016.09.007

Rivera, V., Nguyen, P. H., & Sit, A. (2009). Change in quantitative human chorionic gonadotropin after manual vacuum aspiration in women with pregnancy of unknown location. *American Journal of Obstetrics and Gynecology*, *200*(5). https://doi.org/10.1016/J.AJOG.2008.10.013

Zee, J., Sammel, M. D., Chung, K., Takacs, P., Bourne, T., & Barnhart, K. T. (2014). Ectopic pregnancy prediction in women with a pregnancy of unknown location: data beyond 48 h are necessary. *Human Reproduction (Oxford, England)*, *29*(3), 441–447. https://doi.org/10.1093/HUMREP/DET450