The high-risk criteria of a clinical prediction model were specific but not sensitive for predicting ectopic pregnancy

QUESTION

In women with abdominal pain or vaginal bleeding in the first trimester of pregnancy, how accurate is a clinical prediction model for predicting ectopic pregnancy?

DESIGN

2 cohort studies: 1 for derivation and 1 for validation of the clinical prediction model results.

SETTING

The emergency department of a tertiary-care, military, teaching hospital in San Diego, California, USA.

PATIENTS

Women who were hemodynamically stable and had abdominal pain or vaginal bleeding in the first trimester of pregnancy. Exclusion criteria were previous documentation of an intrauterine pregnancy (IUP) on pelvic ultrasonography, enrollment in the prospective clinical data registry on a previous visit to the emergency department, or estimated gestational age and corresponding uterine size of ≥ 13 weeks. 486 women (mean age 25 y, mean gestational age 58 d) formed the derivation cohort, and 429 women (mean age 25 y, mean gestational age 58 d) formed the validation cohort.

DESCRIPTION OF PREDICTION GUIDE

The clinical prediction model classified pregnant women into 3 groups according to risk. High-risk women had signs of peritoneal irritation or definite cervical motion tenderness; intermediate-risk women had no fetal heart tones by hand-held Doppler, no tissue visible at the cervical os, and pain (other than midline suprapubic cramping) or tenderness (any cervical motion, uterine, or adnexal tenderness); and low-risk women did not meet high- or intermediate-risk criteria.

MAIN OUTCOME MEASURE

Diagnosis of an IUP or ectopic pregnancy.

MAIN RESULTS

In the derivation cohort, 58% of women had a viable IUP, 34% had a nonviable IUP, and 8% had an ectopic pregnancy. In the validation cohort, 62% of women had a viable IUP, 30% had a nonviable IUP, and 7.2% had an ectopic pregnancy. Sensitivities, specificities, and likelihood ratios are shown in the Table.

CONCLUSION

In women with abdominal pain or vaginal bleeding in the first trimester of pregnancy, the high-risk criteria of a clinical prediction model had high specificity but low sensitivity and the intermediate-risk criteria had high sensitivity but low specificity for predicting ectopic pregnancy.

Source of funding: No external funding.

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Test characteristics of a clinical prediction model for predicting ectopic pregnancy*

Risk status	Sensitivity (95% CI)	Specificity (CI)	+LR	−LR
High risk	32% (17 to 49)	95% (92 to 97)	6.1	0.7
Intermediate risk	100% (84 to 100)	28% (23 to 32)	1.4	0.0

*Abbreviations defined in Glossary.

COMMENTARY

Buckley and colleagues explored the use of a clinical prediction model in the diagnosis of ectopic pregnancy among women with complicated first-trimester pregnancies. Criteria from the model that were useful (i.e., signs of abdominal or pelvic peritoneal irritation and the presence of either fetal heartbeats or products of conception at the cervical os) only revealed the obvious cases and were seen too infrequently to influence management in most patients.

The authors state that incorporating historical risk factors in the model (e.g., exposure to previous tubal surgery) did not improve its accuracy, although these data were not analyzed in the report. This finding is strange unless these women were underrepresented through selection and received prenatal care elsewhere. They obviously have a higher risk for ectopic pregnancy than unexposed women—a factor that increases the probability of ectopic pregnancy once they are symptomatic (1, 2).

This finding probably does not affect the generalizability of the model to other emergency departments. A previous study of patients in an obstetrics and gynecology setting confirmed the limitations of physical findings in diagnosing ectopic pregnancy (3). The study by Buckley and colleagues underlines the need for diagnostic expertise and equipment (i.e., transvaginal ultrasonography and serum human chorionic gonadotropin testing) for any unit responsible for managing women with complicated first-trimester pregnancies.

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