

Tyler, Jacqueline ORCID: <https://orcid.org/0009-0002-5396-3380> , Miller, Paul K. ORCID: <https://orcid.org/0000-0002-5611-1354> and Donovan, Tim ORCID: <https://orcid.org/0000-0003-4112-861X> (2023) Can miscarriage be accurately predicted in early pregnancy using transvaginal ultrasound parameters? In: UK Imaging and Oncology Congress (UKIO 2023): Synergy and Symbiosis, Breaking Down Barriers in Healthcare, 5-7 June 2023, Liverpool, UK. (Unpublished)

Downloaded from: <https://insight.cumbria.ac.uk/id/eprint/7080/>

Usage of any items from the University of Cumbria's institutional repository 'Insight' must conform to the following fair usage guidelines.

Any item and its associated metadata held in the University of Cumbria's institutional repository Insight (unless stated otherwise on the metadata record) may be copied, displayed or performed, and stored in line with the JISC fair dealing guidelines (available [here](#)) for educational and not-for-profit activities

provided that

- the authors, title and full bibliographic details of the item are cited clearly when any part of the work is referred to verbally or in the written form
- a hyperlink/URL to the original Insight record of that item is included in any citations of the work
- the content is not changed in any way
- all files required for usage of the item are kept together with the main item file.

You may not

- sell any part of an item
- refer to any part of an item without citation
- amend any item or contextualise it in a way that will impugn the creator's reputation
- remove or alter the copyright statement on an item.

The full policy can be found [here](#).

Alternatively contact the University of Cumbria Repository Editor by emailing insight@cumbria.ac.uk.

Can miscarriage be accurately predicted in early pregnancy using transvaginal ultrasound parameters?

Jacqueline Tyler*, Paul K Miller & Tim Donovan

Background

Ultrasound is often the first line of investigation when evaluating early pregnancy. Current NICE guidelines regarding confirmation of miscarriage are restrictive with only two clinically accepted ultrasound markers to definitively diagnose a miscarriage, an empty gestation sac measuring greater than 25mm mean diameter with no evidence of a yolk sac or fetal pole inside, or a fetal pole measuring 7mm or more in length with no visible heart pulsations (NICE 2023). This can often mean that the first ultrasound scan is inconclusive leading to increased stress for patients with further scans and investigations. This research aims to collate the evidence and evaluate the ultrasound parameters that can indicate a failing pregnancy from the first scan, in the hope to reduce uncertainties surrounding miscarriage in the early stages of pregnancy and help better counsel patients with a likely prognosis.

Method

A systematic literature search was undertaken using PubMed and Science Direct including literature published from 2012 to 2022. Inclusion criteria and exclusion criteria were applied (see table) and any literature suitable for inclusion was critically appraised using the CASP framework.

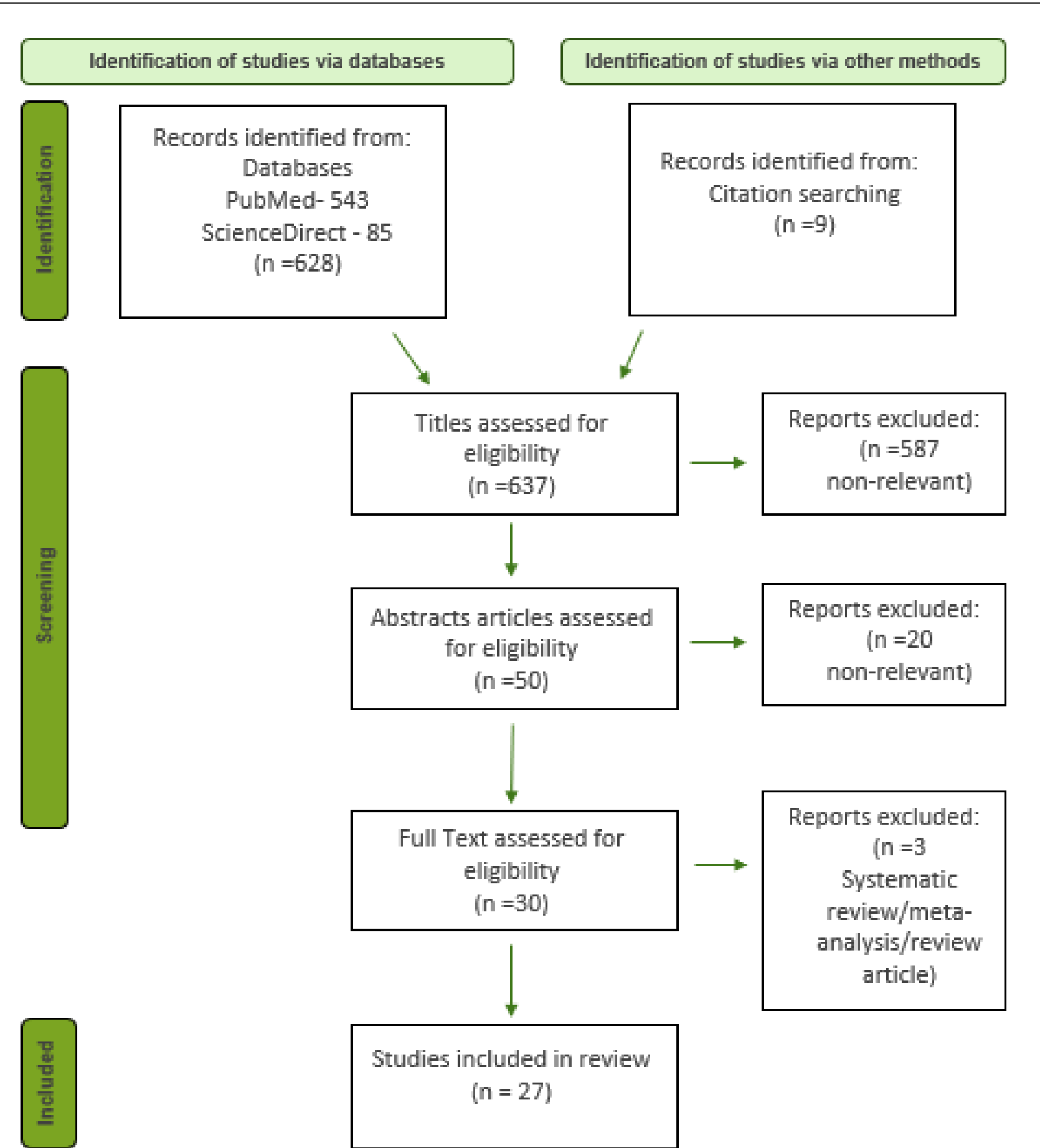
Inclusion/exclusion criteria

| Inclusion criteria | Exclusion Criteria |
|--|---|
| Peer reviewed | Non-peer reviewed |
| Full text available online | Studies only evaluating Pregnancy of unknown Location (PUL) or ectopic pregnancies. |
| Prospective and retrospective cohort studies | Studies using colour Doppler |
| Gestational age 5-13 weeks | |

Results

| Parameter | Results |
|----------------------------------|---|
| Mean Sac Diameter | Smaller MSD than expected for gestational age is a key predictor of pregnancy loss (Datta and Raut 2017). |
| Yolk sac diameter | Literature suggests a large YSD is indicative of miscarriage up to 8 weeks gestation conversely after 8 weeks a YSD >5th centile indicates a higher risk of miscarriage (Detti et al. 2020b). |
| Crown rump length | CRL is more sensitive as a predictor of miscarriage than MSD or YSD however it is highly dependent upon the accurate dating of the last menstrual period (Shaamash et al. 2020). |
| Embryonic/fetal heart rate | Heart rate is demonstrably slower in pregnancies that miscarry, if less than 5th centile for gestational age there is more than 100 times increased risk of miscarriage (Detti et al. 2020a). |
| Uterine artery pulsatility index | No statistical difference between ongoing pregnancy groups vs pregnancy loss groups however only 2 studies included UAPI within their parameters (Idelson et al. 2020). |
| Subchorionic haematoma | No statistical difference between ongoing pregnancy groups vs pregnancy loss groups- thought to be due to the difficulty in accurately measuring the volume of the haematoma due to its complex shape (Heller et al. 2018). |
| Multivariate models | By far the most accurate method to predict miscarriage - varying models working better at different gestational ages (Shaamash et al. 2020) |

Prisma flowchart



Conclusion

No ultrasound parameter can be used in isolation to predict miscarriage with 100% accuracy, however multivariate predictive models using a combination of mean sac diameter, crown-rump length, yolk sac diameter and embryonic/fetal heart rate can predict miscarriage with a good degree of accuracy with the potential to be used in clinical practice to facilitate better counselling of patients.

References

See e-poster for reference list.