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The emerging application of transthoracic echocardiography in obstetric anesthesia and obstetric critical illness

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Introduction: Haemorrhage, preeclampsia, cardiac failure, pulmonary embolism and sepsis remain common causes of severe maternal morbidity and mortality.1 Concerns over the use of invasive devices such as the pulmonary artery catheter, and an increasingly complex patient population have driven the need for simple, non-invasive devices with high diagnostic accuracy.2,3 Transthoracic echocardiography (TTE) offers significant advantages in this setting.4 Previous work by our group has demonstrated high patient satisfaction and acceptability of TTE using a small portable device.4,5 We report our experience of a new TTE exam adapted specifically for pregnancy consisting of two acoustic views and fetal heart rate assessment: the Rapid Obstetric Screening Echocardiographic (ROSE) examination. Preliminary work suggests that the ROSE scan may be of significant value in rapid bedside diagnosis and in assessing the response to therapy in obstetric critical illness.

Methods: Healthy pregnant women, women with gestational hypertension, and women with preeclampsia were enrolled. They underwent a TTE exam-parasternal long axis, parasternal short axis, apical 4- and 5-chamber two-dimensional imaging and continuous, pulse wave and tissue Doppler according to American Society of Echocardiography guidelines.

Results: 380 TTE examinations were performed on 152 pregnant women with a wide range of age (21-47 years), gestation (24–43 weeks) and body mass index (20–56 kg/m2). Doppler cardiac output utilising the two acoustic windows was measured in 149/152 (98%) of women. The average time of the TTE scan was 14 minutes. TTE scans were performed in numerous settings including the operating and birthing suites, ward areas, family birth centre, emergency department and high dependency unit. As an example of TTE in the acute setting, a hypotensive febrile postpartum woman, with a presumed diagnosis of haemorrhage with sepsis was examined using the ROSE scan and was found instead to have cardiac failure. This led to a significant change in management from intravenous fluid and antibiotics, to inotropic support and diuretics with excellent patient outcome.

Conclusions: Further studies and outcome assessments will continue however with appropriate teaching and training in echocardiography it is possible for clinicians managing pregnant women to apply a TTE examination such as the ROSE scan in a wide variety of settings in obstetric anaesthesia and obstetric critical care.4 In situations where echocardiography is further combined with an arterial line, essential information regarding cardiac, respiratory and metabolic status can be obtained enhancing informed clinical decision making.

References
5. ANZCA, 2009.