CARDIAC OUTPUT AND RELATED HAEMODYNAMICS DURING PREGNANCY: A SERIES OF META-ANALYSES

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SUPPLEMENTARY MATERIAL

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Table S1. Details of methodology in included studies. MRI is a non-invasive modality of providing images of the heart and its vessels through ionising radiation. Left ventricular volumes are calculated from endocardial tracing of multi-slice two-dimensional cine images, which allows for calculation of $\dot{Q}$[1]. Echocardiography refers to an established technique of non-invasive ultrasound imaging of the structure and function of the heart and its great vessels. From the analyses of cardiac images collected from the suprasternal notch, parasternal and apical window, $\dot{Q}$ can be determined through a number of equations specific to the images analysed. Impedance cardiography involves the attachment of electrodes to the chest that are connected to specialised equipment. This method derives stroke volume (SV) on the basis that impedance of the chest is inversely proportional to the speed and volume of blood circulating within the thorax[2]. Inert gas re-breathing is also a non-invasive method involving the rebreathe of two inert gases (one blood soluble and one insoluble component) and measurement of their relative levels to calculate $\dot{Q}$ by the Fick principle[3].

Study	Method and calculation of stroke volume
Armstrong *et al.,* 2011[18]	Suprasternal Doppler; Supra Q®
Bamfo *et al.,* 2007[39]	Echocardiography; 2D; LVOT diameter and TVI of aortic flow
Borghi *et al*., 2000[24]	Echocardiography; 2D; LVOT diameter and TVI of aortic flow
Clapp and Capeless, 1997[4]	Echocardiography; 2D, Teichholtz
Cornette *et al.,* 2011[19]	Echocardiography; 2D; LVOT diameter and TVI of aortic flow
Desai *et al.,* 2004[1]	Echocardiography; 2D; LVOT diameter and TVI of aortic flow
D'Silva *et al*., 2014[21]	Impedance cardiography; Task Force Haemodynamic monitor
Estensen *et al.,* 2012[40]	Echocardiography; 2D; LVOT diameter and TVI of aortic flow
Geva *et al.,* 1997[14]	Echocardiography; 2D; LVOT diameter and TVI of suprasternal aortic flow
Gilson *et al.,* 1997[41]	Echocardiography; 2D; Simpson's biplane
Gyselaers *et al.,* 2014[20]	Impedance cardiography, NICCOMO©
Hennessy *et al*., 1996[42]	Echocardiography; 2D; LVOT diameter and TVI of suprasternal aortic flow
Jia *et al.,* 2010[43]	Impedance cardiography; BioZ DX system
Kuleva *et al*., 2011[44]	Echocardiography; 2D; LVOT diameter and TVI of aortic flow
Lof *et al*., 2005[25]	Echocardiography; 2D; LVOT diameter and TVI of suprasternal aortic flow
Mahendru *et al.,* 2014[26]	Inert gas re-breathing; Innocor
Mesa *et al*., 1999[12]	Echocardiography; 2D; LVOT diameter and TVI of aortic flow
Moertl *et al*., 2012[23]	Impedance cardiography; Task Force Haemodynamic monitor
Mone *et al*., 2006[6]	Echocardiography; 2D; LVOT diameter and TVI of suprasternal aortic flow
Novelli *et al.,* 2012[45]	Echocardiography; 2D; LVOT diameter and TVI of aortic flow
Ogueh *et al.,* 2009[9]	Echocardiography; 2D; LVOT diameter and TVI of aortic flow
Pandey *et al.,* 2010[46]	Echocardiography; 2D, Teichholtz
Poppas *et al*., 2007[47]	Echocardiography; 2D; LVOT diameter and TVI of aortic flow
Rang *et al*., 2007[48]	Echocardiography; 2D; LVOT diameter and TVI of aortic flow
San-Frutos *et al.,* 2005[49]	Impedance cardiography; NCCOM3
Savu *et al.,* 2012[5]	Echocardiography; 2D; LVOT diameter and TVI of aortic flow
Schannwell *et al*., 2002[27]	Echocardiography; 2D, Quinones
Tamas *et al.,* 2007[17]	Impedance cardiography; ASKIT 400
Tyldum *et al.,* 2012[50]	Echocardiography; 2D; LVOT diameter and TVI of aortic flow and Simpsons biplane
Valensise *et al*., 2000[51]	Echocardiography; 2D; Teichholz
Valensise *et al*., 2001[52]	Echocardiography; 2D; Teichholz
Valensise *et al.,* 2006[53]	Echocardiography; 2D; LVOT diameter and TVI of aortic flow
Van der Graaf *et al*., 2013[54]	Suprasternal Doppler; USCOM
Vartun *et al*., 2014[22]	Impedance cardiography; Phillips Medical Systems

Vasapollo *et al*., 2002[55]	Echocardiography; 2D; Teichholz
Vlahovic-Spipac *et al.*, 2010[56]	Echocardiography; 2D; Simpson's biplane
Wolfe *et al*., 1999[57]	Echocardiography; 2D
Yosefy *et al*., 2012[28]	Echocardiography; 3D
Yuan *et al.*, 2006[58]	Echocardiography; 2D; LVOT diameter and TVI of aortic flow

2D, two-dimensional; *LVOT,* left ventricular outflow tract; *TVI*, time velocity integral; *3D*, three-dimensional.

References:

1 Cawley PJ, Maki JH, Otto CM. Cardiovascular magnetic resonance imaging for valvular heart disease: technique and validation. *Circulation* 2009;119:468-78.

2 Tamas P, Szilagyi A, Jeges S, et al. Effects of maternal central hemodynamics on fetal heart rate patterns. *Acta Obstet Gynecol Scand* 2007;86:711-4.

3 Lang CC, Karlin P, Haythe J, et al. Ease of noninvasive measurement of cardiac output coupled with peak VO2 determination at rest and during exercise in patients with heart failure. *Am J Cardiol* 2007;99:404-5.

Table S2. Total sample size of all meta-analyses.

		Non-pregnant	First trimester	Early second trimester	Late second trimester	Early third trimester	Late third trimester	Immediate postpartum	Late postpartum
Cardiac Output	*n*	259	446	339	748	606	684	265	273
HR	*n*	259	294	339	686	563	684	265	273
SV	*n*	216	446	327	736	551	635	236	258
MAP	*n*	185	446	320	609	586	615	216	220
SVR	*n*	239	365	222	602	489	479	246	175
LV mass	*n*	79	205	259	384	406	260	200	157

n, sample size; *HR*, heart rate; *SV*, stroke volume; *MAP*, mean arterial pressure; *SVR*, total vascular resistance; *LV,* left ventricular.