

Umbiflow

**Improving Primary-Level Ante-Natal Care Whilst
Reducing Secondary-Level Patient Load**

4th Biennial Conference

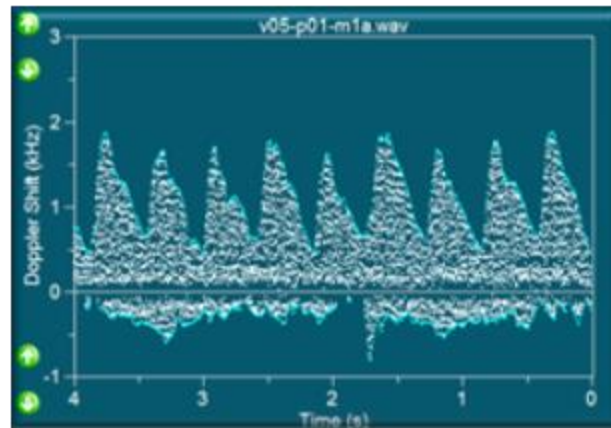


Presented by: Jeremy Wallis, CSIR

Date: 9th October 2012

What is Umbiflow ?

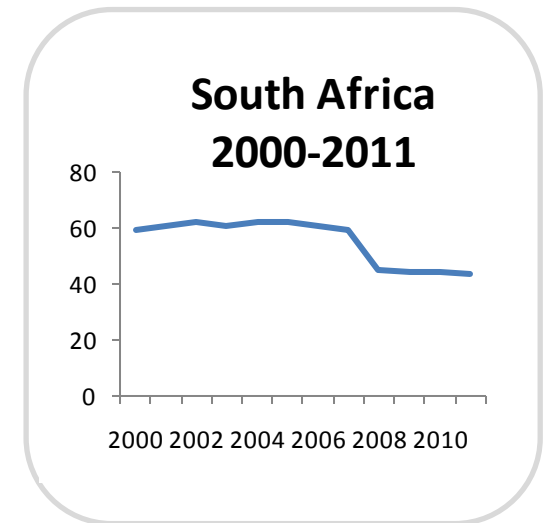
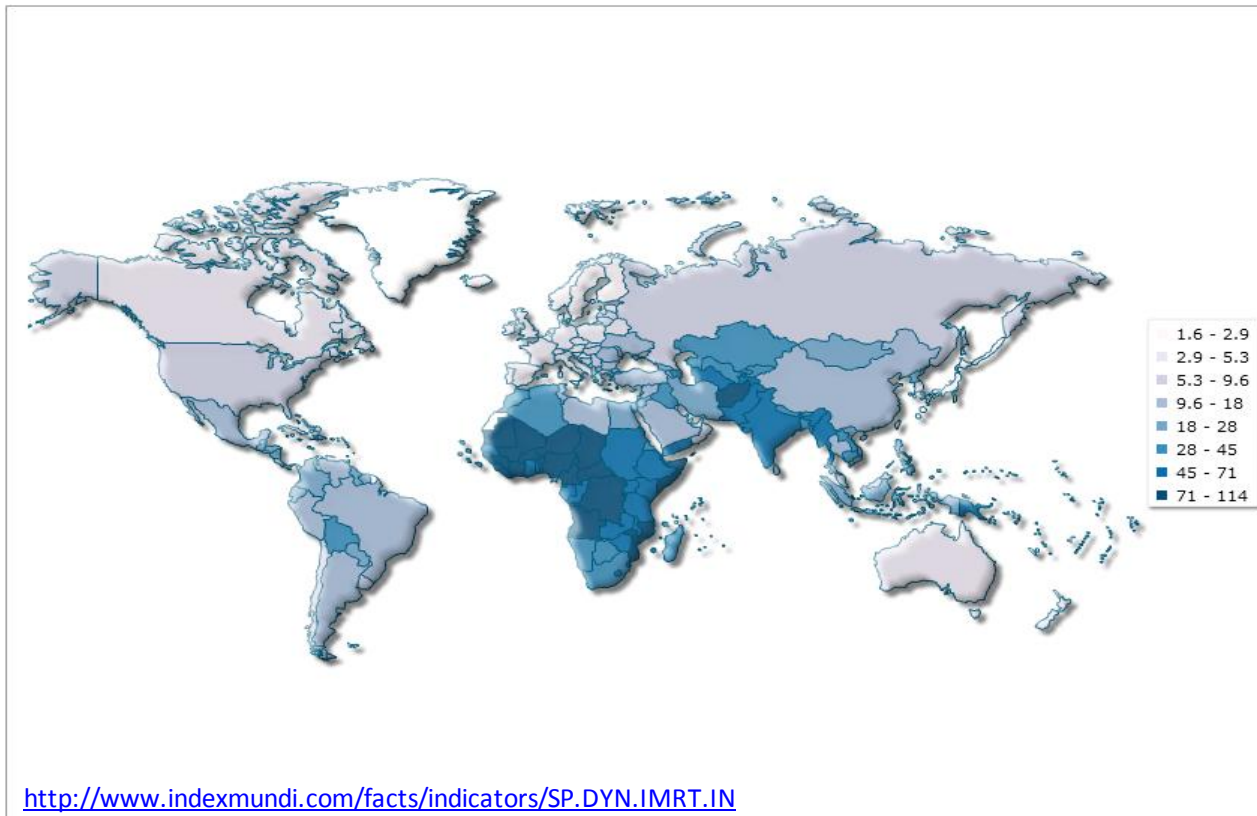
- A low cost, Doppler ultrasound system used to assess blood flow in the umbilical cord
- Targeted at ante-natal clinics for use by nursing sisters / midwives
- Changes the paradigm of ultrasound being used only by specialists at the secondary level
- Tests the proposal : can you shift secondary level diagnostic tests to the primary level and achieve improvements in health care quality & efficiency ?



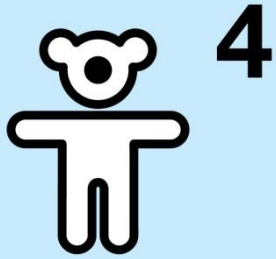
Infant Mortality Rates – World Map



Infant Mortality Rates are a good indicator of a country's Maternal & Child Health status
(infant deaths before age 1 per 1000 live births)



World View – The Millennium Development Goals



**REDUCE
CHILD MORTALITY**

Reduce by two thirds, between 1990 and 2015, the under-five mortality rate

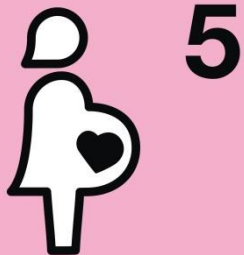
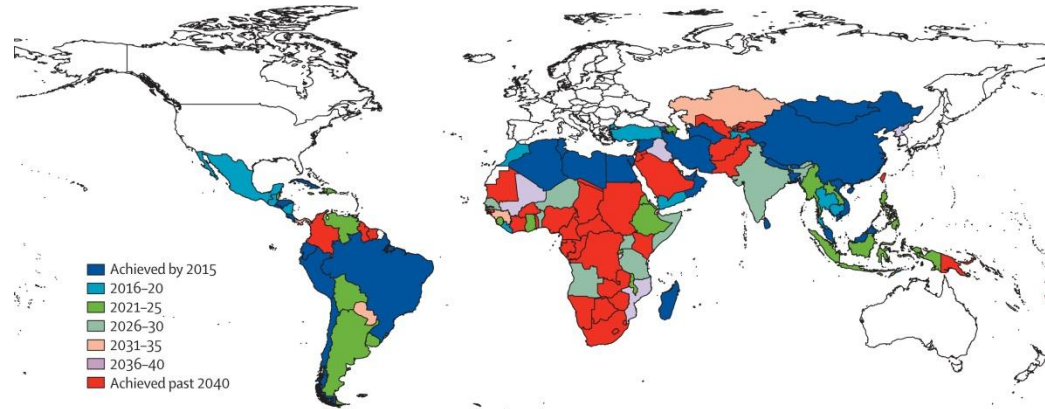


**IMPROVE MATERNAL
HEALTH**

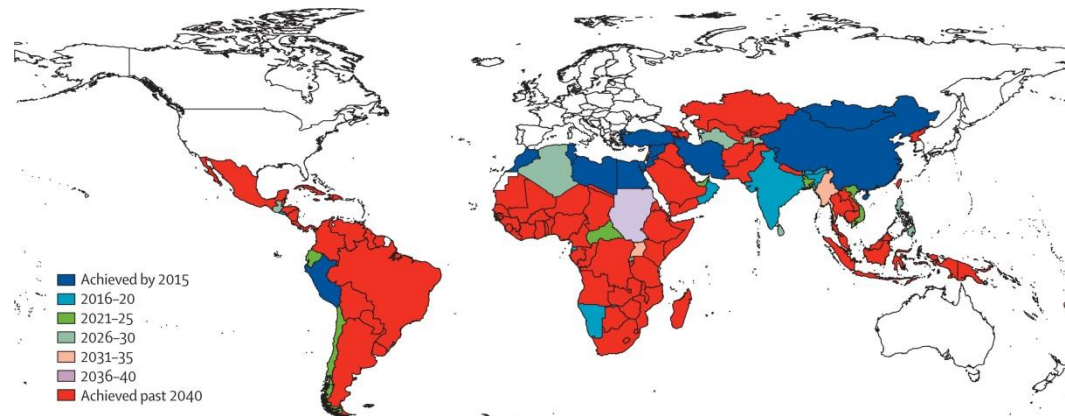
Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio

Achieve universal access to reproductive healthcare

World View – The Millennium Development Goals



IMPROVE MATERNAL HEALTH



Progress towards Millennium Development Goals 4 and 5 on maternal and child mortality: an updated systematic analysis
The Lancet Volume 378, Issue 9797 2011 1139 - 1165
[http://dx.doi.org/10.1016/S0140-6736\(11\)61337-8](http://dx.doi.org/10.1016/S0140-6736(11)61337-8)

South African View : DOH Budget Vote Speech April 2012

DOH Key Outcome (1 of the 12 Outcomes of Government):

- A Long & Healthy Life For All South Africans

Four Outputs :

1. Improve the life expectancy of all South Africans
2. Decreasing maternal & child mortality
3. Dealing with the scourge of HIV & AIDS & TB
4. Improving the efficiency and effectiveness of the healthcare system



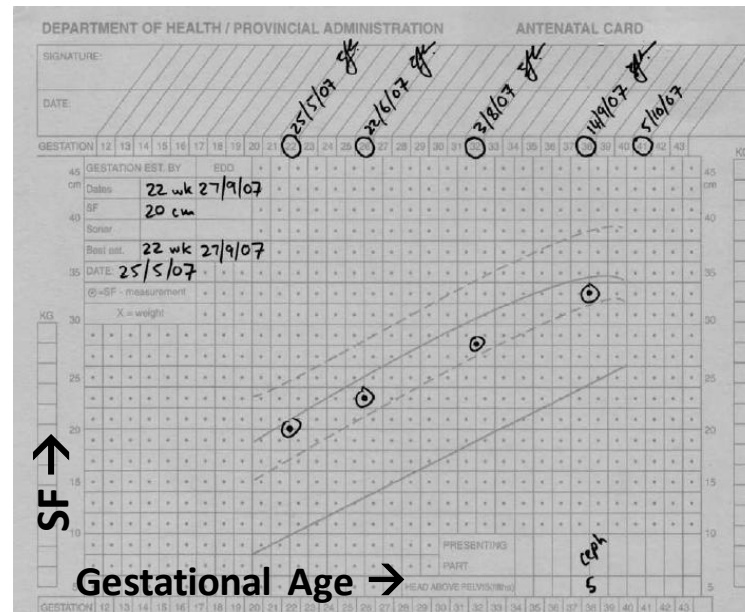
Umbiflow, the subject of this presentation, is a technological intervention in

Doppler Ultrasound for Ante-Natal Health Care that targets :

- Millennium Development Goal 4 – Reducing child mortality
- Millennium Development Goal 5 – Achieve universal access to reproductive health
- DOH Outputs 2 & 4.

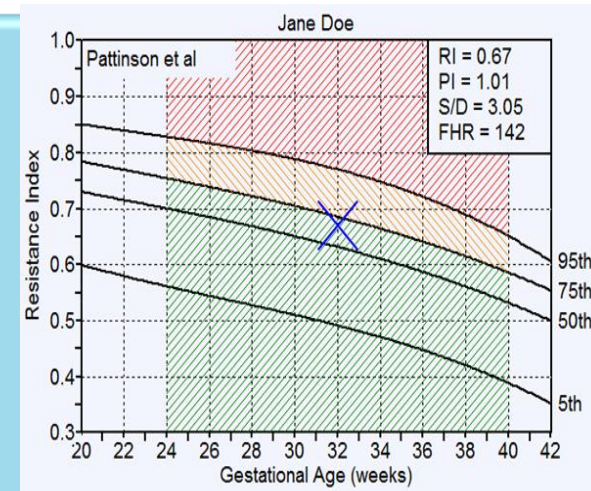
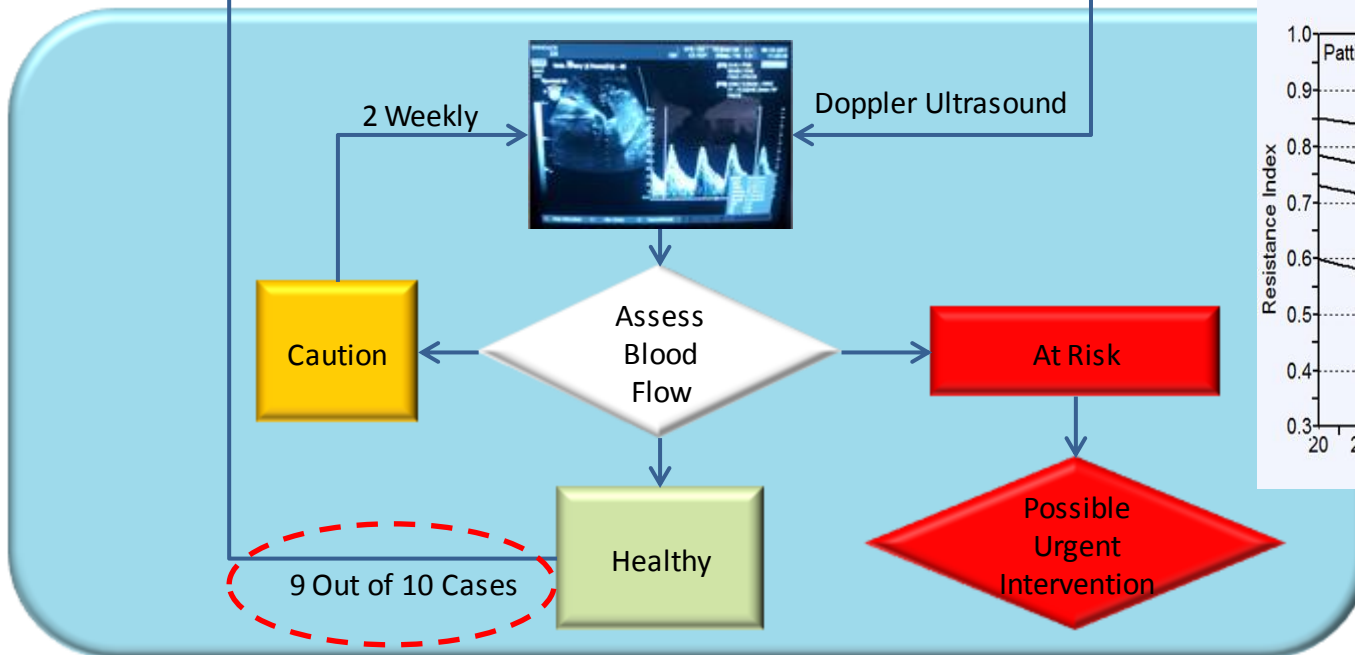
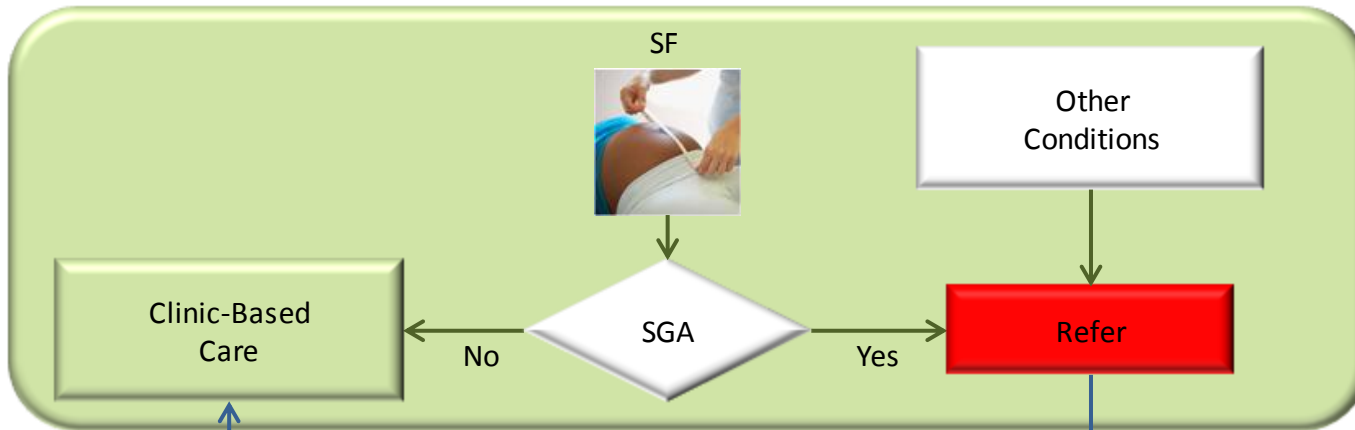
Ante-Natal Care in the Primary Health Care Sector

- Monthly maternal visits to a PHC / Ante-Natal Clinic : track maternal & foetal health
- Accepted practice is to track foetal growth : Symphysis Fundal Measurement (SF)



- Works at a level of aggregation :
 - Irrespective of sickness condition : foetal growth will be restricted
- SF is effective at identifying “Small for Gestational Age” (SGA) foetuses (<10th %)

Ante-Natal Care : 3rd Trimester Referral Process



Umbiflow : Value Proposition

Umbiflow's Value Proposition :

- Position umbilical blood flow assessment at clinics
- Immediate assessment of healthy versus sick SGA
- Greatly reduce referral rate & patient load upwards
- Reduced maternal stress / transport / time off work
- Reduced perinatal mortality rate potential



Primary
Level:
CLINIC

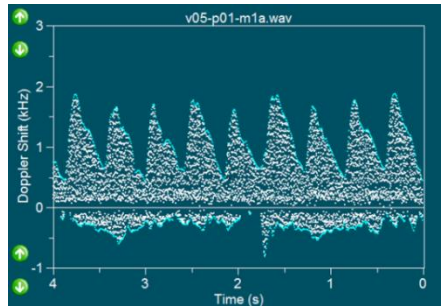


These benefits align with our national priorities :

- Improved maternal access to ante-natal care
- Reduced child mortality rates
- Improved efficiency & effectiveness of the healthcare system

Umbilical Blood Flow Measurement – Clinical Need

- First reported use in 1977



- By 1996 : American Journal of Obstetrics & Gynaecology reported :
 - “There is now compelling evidence that women with high-risk pregnancies, including pre-eclampsia and suspected intrauterine growth retardation should have access to Doppler ultrasonographic study of umbilical artery waveforms”
(*Am. J. Obstet. Gynecol.*, 1996, 172, pp. 1379-87.)
- When Umbiflow development started, available equipment :
 - Used only at secondary level of health care
 - Used only by specialist staff
 - Cost typically R250k each : out of reach of primary health clinics.

Umbiflow : The Challenge



- **Key design challenges :**

- Low cost
- Easy to use by non-specialist medical staff

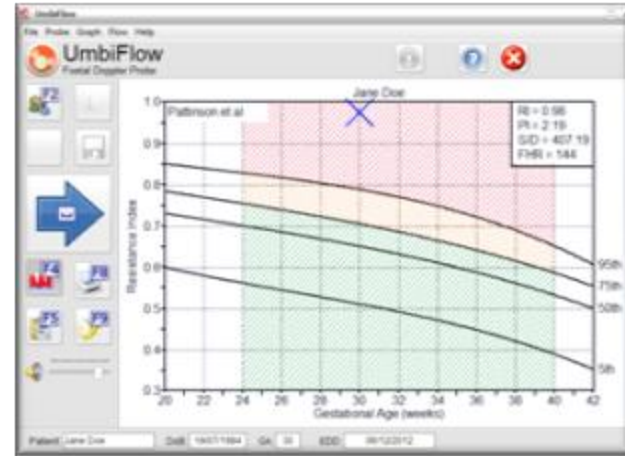
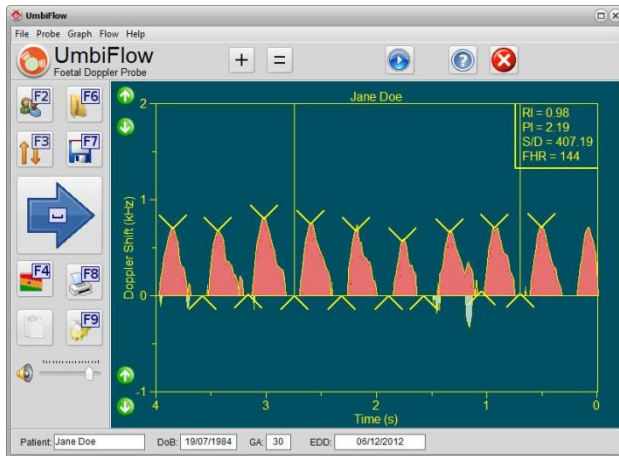
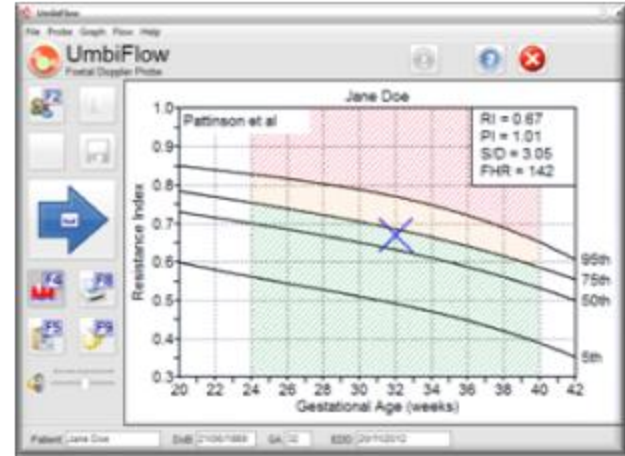
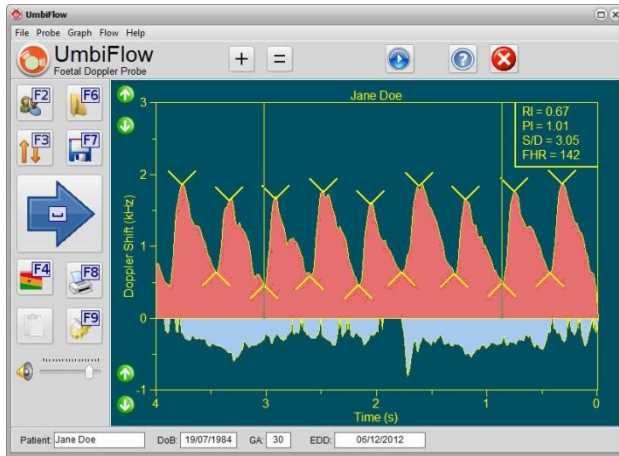
- **The solution :**

- Plug & Play USB Doppler Ultrasound Probe
- PC based software (moving later to Tablet PCs and Smart Phones).

Umbiflow : Hardware Design



Umbiflow : Software Design



Umbiflow : Clinical Progress

- Clinical tests successfully completed to validate Umbiflow's accuracy :

- “Comparison between a newly developed PC-based Doppler umbilical artery waveform analyser and a commercial unit”

(South African Medical Journal, Vol. 95, No. 1, 01/2005)

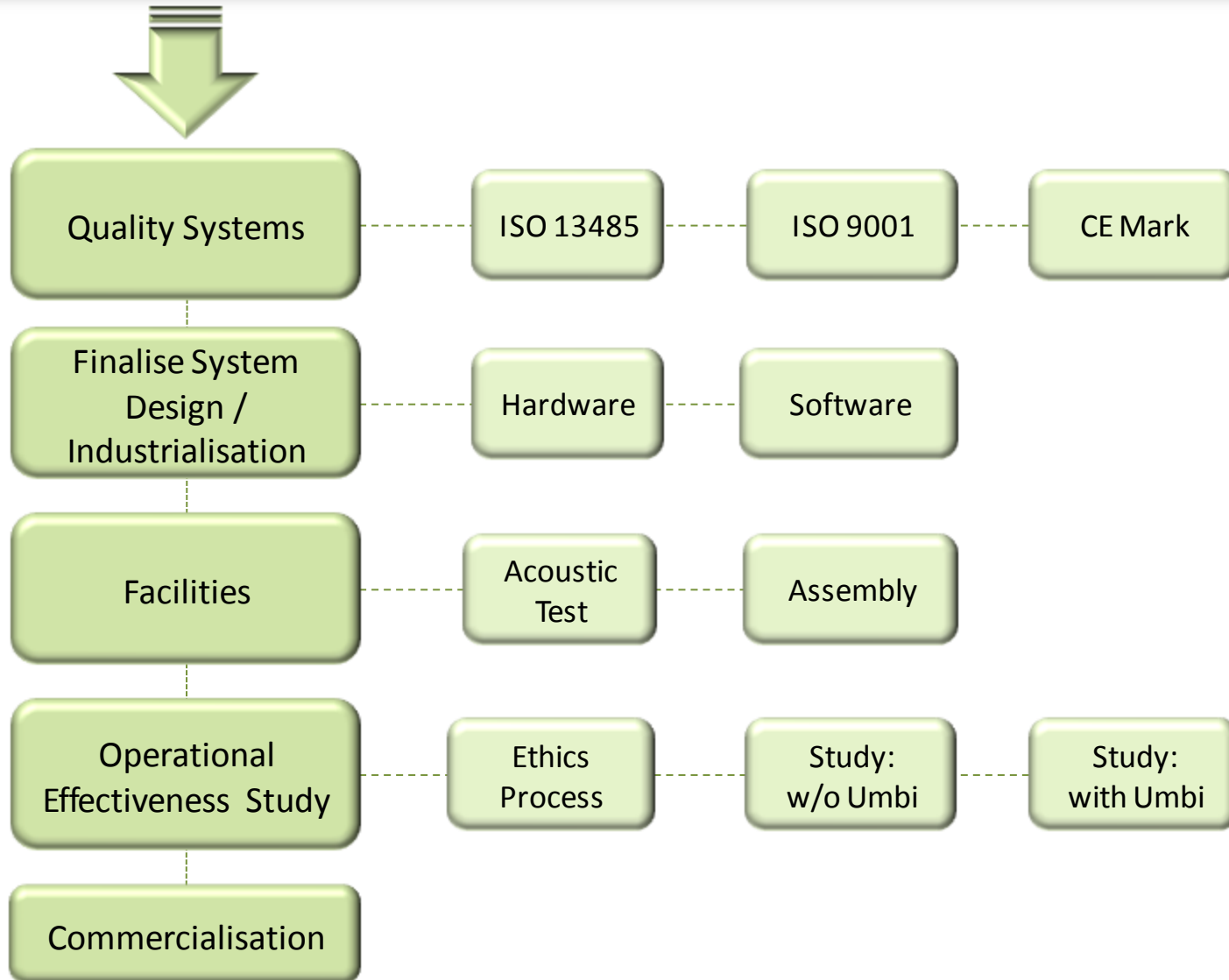
“... comparing Umbiflow to a gold standard, mean difference of RI values ‘very small’ <0.024 ”

- “Evaluation of the use of umbilical artery Doppler flow studies and outcomes of pregnancies at a secondary hospital”

(The Journal of Maternal-Fetal and Neonatal Medicine, 20(3), pp. 233-239, 03/2007)

“... concurs with Alfirevic & Neilson’s meta-analysis finding that demonstrated that the odds for perinatal death are reduced by 38% with the use of Doppler studies in the high-risk pregnancy population”

Umbiflow : Remaining Tasks



Umbiflow : Summary



- Umbiflow is a PC-Based Doppler-Ultrasound system for Umbilical Blood Flow Measurement, targeted at Ante-Natal care at the Primary Level
- Empowers nurses & midwives to provide an improved quality of health care at the Primary Level
- Achieves improved access to ante-natal care for pregnant women outside the major urban areas
- Greatly reduces referral rates to the Secondary Level (by factor ~ 5-10)
 - e.g. ~2,000 less patients per annum at a secondary level hospital such as Tygerberg in Cape Town (in just one department)
 - Cost savings at the more expensive Secondary Level
- Assist with reduced perinatal mortality rates.

Umbiflow : Thanks !

- Thanks to a very special CSIR team who are making this happen :



Absent when picture taken : Kiri Nicolaides, Peet de Wet, Liesl Baben, Louise Nortman, Hein Swart, Dawid Oosthuizen

- **As well as our partners & advisors :**

MRC : Giovanni Milandri, Tony Bunn

WC DOH : Dr Stefan Gebhardt

Kalafong : Dr Petro Mulder

SUN / Tygerberg : Professor Gerhard Theron

UP : Prof. Bob Pattinson

EC : Prof. Justus Hofmeyr

- **Funding : Special thanks to CSIR-Flagship, MSM, MRC & Innovation Fund**



SA Deputy Minister of Health,
Dr Gwen Ramokgopa

*At the Umbiflow stand,
mHealth Summit,
Washington DC,
Dec. 2011.*

www.umbiflow.com

Thank you

