

Impact of introduction of the Growth Assessment Protocol (GAP) in a South Indian tertiary hospital on SGA detection rate and perinatal outcome

Dr Pallavi Chandra Ravula, Dr Sridevi Veluganti, Mr Murali Mohan Reddy Gopireddy and Dr Nuzhat Aziz

Introduction

- India has a high rate of stillbirths, and many deaths are due to fetal growth restriction and potentially preventable.
- Screening and identification of the small for gestational age (SGA) fetus during the antenatal period has been shown to reduce stillbirths.

Aim and Objective

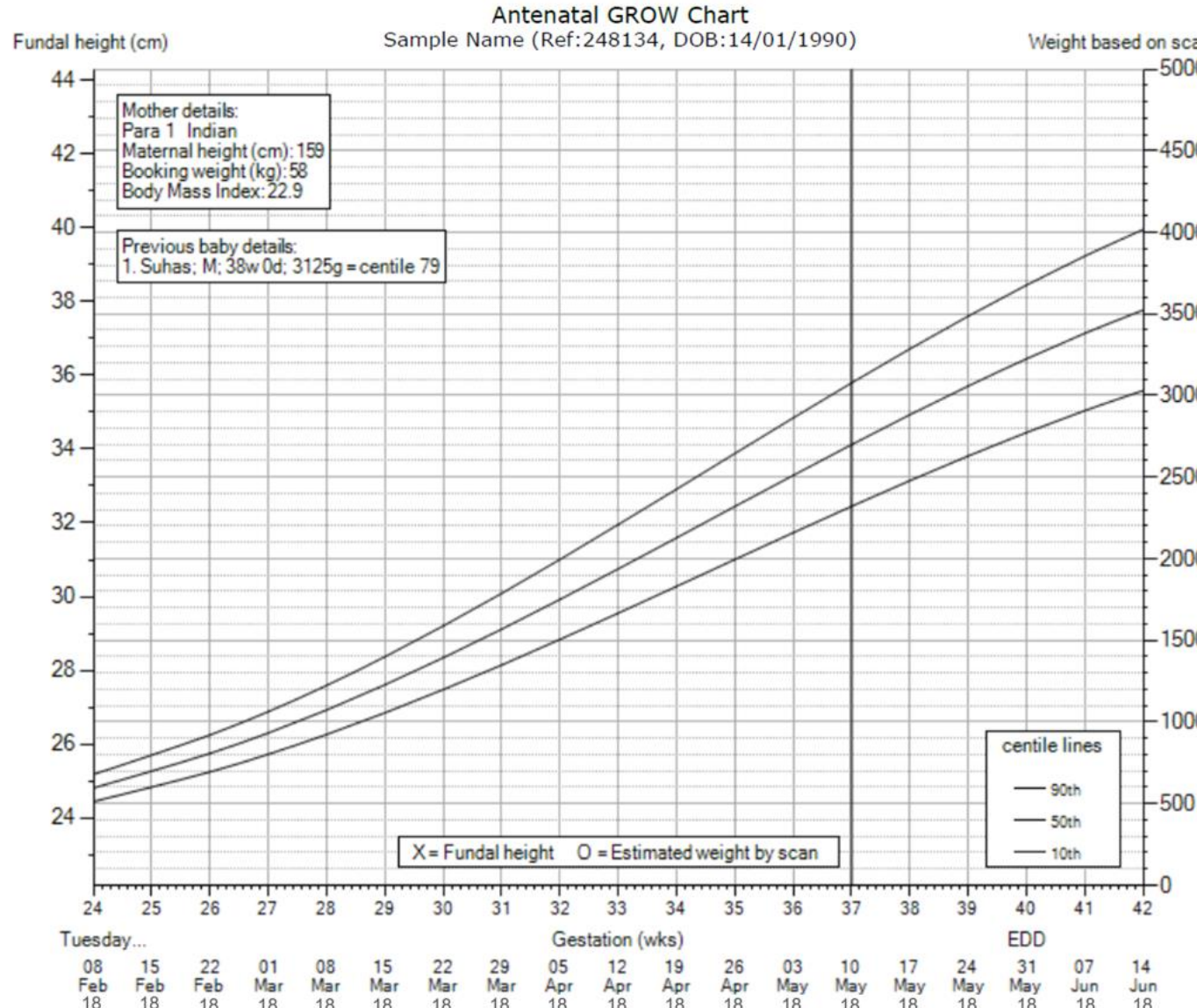
- To evaluate implementation of the Growth Assessment Protocol (GAP), a programme designed for screening for SGA
- To assess the impact of GAP on SGA detection rate, stillbirth rate and neonatal outcome

Methodology

- The evaluation included a longitudinal observational study comparing two time epochs; before (years 2011- 2014) and after (2015 - 2018) introduction of GAP.
- All singleton pregnancies booked before 24 weeks were included. Multifetal pregnancies, fetal anomalies, and referrals for emergency care were excluded.
- The programme includes identification of risk factors, risk categorization, serial fundal height measurement, customised fetal growth charts (**Figure 1**) and appropriate referral protocols.
- The protocol was introduced following training of obstetric and midwifery care providers in 2015
- We evaluated SGA detection rates, stillbirth rates (from 28 weeks) and neonatal morbidity at term

Figure 1: Customised GROW chart

- Customised antenatal charts and birth centiles were generated based on the hospital database of normal outcome pregnancies.
- The charts were customised to women's ethnicity, parity, maternal height and weight in early pregnancy
- Symphysio-fundal height and ultrasound estimated fetal weight measurements were plotted on the charts



Results

- There were 26,295 and 31,624 births, with 162 and 147 stillbirths in the pre and post GAP implementation periods, respectively.
- The maternal and fetal characteristics were comparable in both the time periods as shown in **Table 1**.
- SGA detection rates increased from 51.1% to 67.1%, representing a 31% improvement ($p < 0.001$) as shown in **Figure 2**
- Overall stillbirth rates declined from 4.4 to 3.4 per 1000 births (RR 0.78 CI 95% 0.60 – 1.02) and at term from 1.5 to 0.6 (RR 0.37 CI 95% 0.20- 0.66), gestational age specific stillbirth rates are as shown in **Table 2**.
- Neonatal intensive care admission and neonatal encephalopathy in term neonates also decreased significantly – see **Table 3**.

Figure 2: Quarterly antenatal SGA detection rates 2014-2018

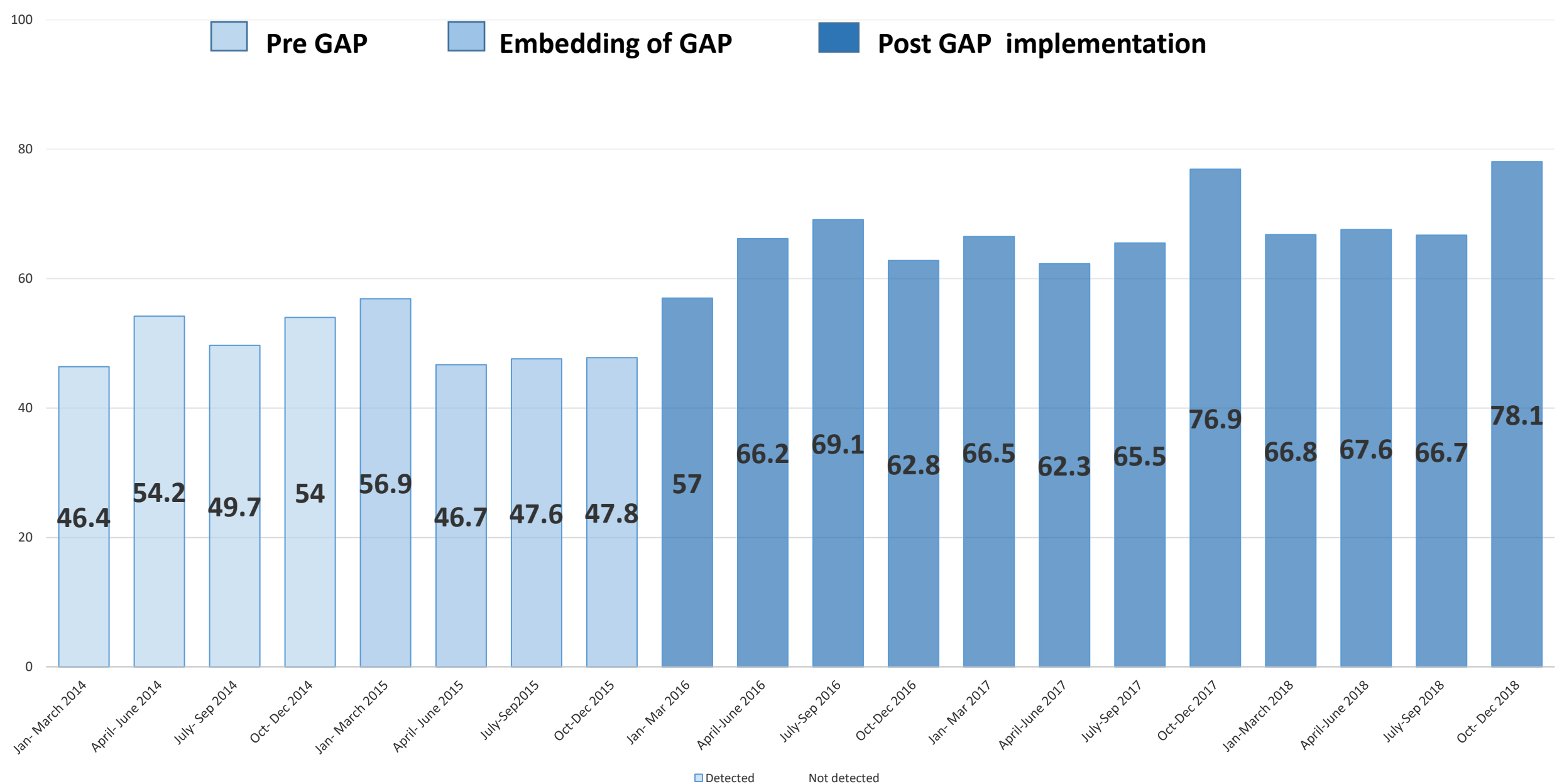


Table 1: Maternal and fetal characteristics in the pre and post GAP epochs

	Pre GAP (2011- 2014) (n=26295)	Post GAP (2015- 2018) (n=31624)
Maternal Age		
<=35 years	25377 (96.5%)	30144 (95.3%)
>35 years	918 (3.5%)	1480 (4.7%)
Maternal height, cm - median (IQR)	157 (155,162)	157 (155,162)
Maternal weight, kg - median (IQR)	64.1 (56.6,72.8)	64.6 (57.1,73.3)
Parity		
0	15193 (57.8%)	17592 (55.6%)
1	7778 (29.6%)	9948 (31.5%)
2	2263 (8.6%)	2843 (9.0%)
3+	1061 (4.0%)	1241 (3.9%)
Gestational age at birth, days - median (IQR)	269 (262, 276)	269 (262, 276)
Preterm delivery (<37 weeks) %	12.8 %	12.3 %
Average birth weight, kg (±SD)	2.98 (±0.53)	2.93 (±0.53)

Table 2: Gestational age specific still birth rates during pre-GAP and post-GAP period

Gestational Age (Weeks)	Stillbirths before GAP 2011- 2014		Stillbirths post GAP 2015- 2018		RR (95% CI)	P-value
	No. of stillbirths / total births	Rate per 1000 births	No. of stillbirths / total births	Rate per 1000 births		
28 to 31	36/ 272	132.4	50 / 363	137.7	1.04 (0.68-1.60)	0.855
32 to 36	43 / 2652	16.2	42 / 2970	14.1	0.87 (0.57-1.33)	0.528
>=37	36 / 23275	1.5	16 / 28165	0.6	0.37 (0.20-0.66)	0.001
Overall	115/26199	4.4	108/31498	3.4	0.78 (0.60-1.02)	0.065

Table 3: Neonatal outcomes in term babies in the Pre and Post GAP period

Outcomes	Pre GAP, 2011-2014	Post GAP, 2015-2018	RR (95%CI)	P value
	n=23275	n=28165		
	n (%)	n (%)		
APGAR score <7	78 (0.34)	109 (0.39)	1.15 (0.86-1.54)	0.331
Admission to NICU	836 (3.59)	608 (2.16)	0.60(0.54-0.67)	< 0.001
Meconium aspiration	57 (0.24)	53 (0.19)	0.77(0.53-1.12)	0.166
Neonatal encephalopathy	39 (0.17)	26 (0.09)	0.55(0.34-0.90)	0.017
Neonatal death (/1000)	19 (0.82)	24 (0.85)	1.04(0.57-1.91)	0.889

Conclusion

- The GAP program proved a simple, inexpensive care bundle that has increased identification of SGA and reduced term stillbirth rates and adverse neonatal outcomes.
- This protocol has scope to improve maternity services and perinatal outcomes in a country like India where resources need to be utilized in a most optimal manner.