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Taku Endo, Trisha Johnston, Joanne Ellerington, Tim Donovan

For further information contact:

Health Statistics Unit
Queensland Health
GPO Box 48
Brisbane Queensland 4001 Australia
tel (+61) (07) 3234 1875
hlthstat@health.qld.gov.au
www.health.qld.gov.au

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Taku Endo^a, Trisha Johnston^a, Joanne Ellerington^a, Tim Donovan^b

^aHealth Statistics Unit, Queensland Health

^bGrantley Stable Neonatal Unit, Royal Brisbane and Women's Hospital

Gastroschisis is a form of congenital anomaly which is characterised by an uncovered visceral herniation through a (typically) right side abdominal wall defect with an intact umbilical cord¹⁻³. While omphalocele, another common form of abdominal wall defect, is often associated with other structural or chromosomal

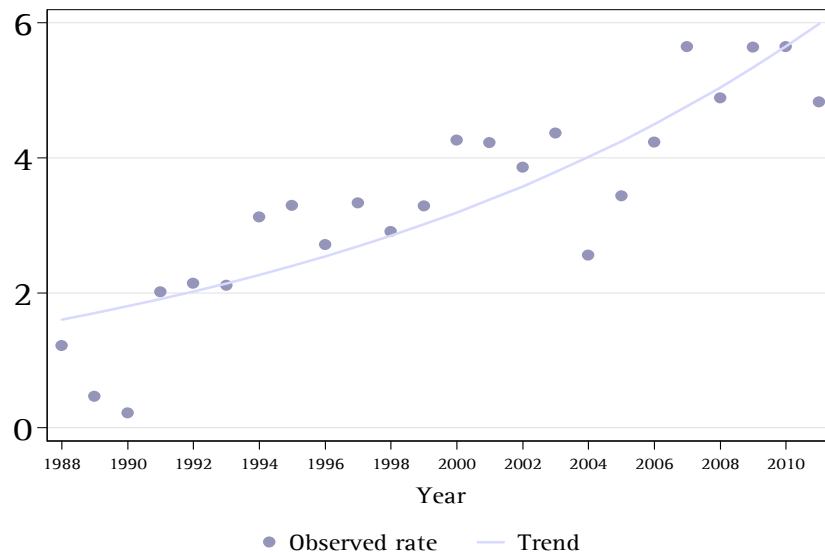
anomalies, such association is not as common for gastroschisis, and long-term outcomes for these babies are often positive⁴. Despite this, the condition is associated with morbidity and mortality, and postnatal medical attention is critical for favourable outcomes. Over the past few decades, an increase in the incidence of gastroschisis has been reported both nationally and internationally^{2,4-7}, with reasons for this increase not well understood⁸. Although the aetiological pathways for this congenital anomaly remain unclear, there is some evidence that young maternal age, malnutrition and drug intake increase the risk⁸⁻¹².

In this report we describe changes over time in rates of babies born with gastroschisis in Queensland, place of birth, mortality and morbidity for babies affected by gastroschisis, and risk factors among women who gave birth to babies with gastroschisis. The data were extracted from the Queensland Perinatal Data Collection for babies born between 1988 and 2011. Any baby records with gastroschisis recorded as a congenital anomaly* were included in the analyses, regardless of whether or not there were other co-existing congenital anomalies.

Trend

In Queensland, there has been a statistically significant increase in the number of babies born with gastroschisis between 1988 and 2011, with an average annual increase of 5.9% (95% CI: 4.4%-7.4%) (Figure 1). In 2011, the rate of gastroschisis was approximately 4.8 per 10,000 births.

Figure 1. Gastroschisis rate per 10,000 births, Queensland, 1988–2011



Source: Queensland Perinatal Data Collection

* 1988 to June 2002: The British Paediatric Association Classification of Disease, Perinatal Supplement: 756.71; July 2002 to 2011: The International Statistical Classification of Diseases and Related Health Problems Tenth Revision, Australian Modification: Q79.3

Place of birth

Although gastroschisis is a severe condition that is life-threatening, it is very frequently detectable on antenatal morphology ultrasound screening and in the majority of infants there is a positive outcome when appropriate antenatal monitoring is conducted and interventions take place immediately after birth^{4 13}. Between 1988 and 2011, approximately 86.5% of babies born with gastroschisis were born at one of the tertiary perinatal centres in Queensland[†]. When only live births were considered, 90.1% were born in a tertiary centre confirming a high rate of antenatal detection and referral for planned tertiary delivery/optimal neonatal management.

Mortality

Between 1988 and 2011, approximately 13.0% of babies born with gastroschisis died during the perinatal period, and 48.2% of these were stillbirths.

Morbidity

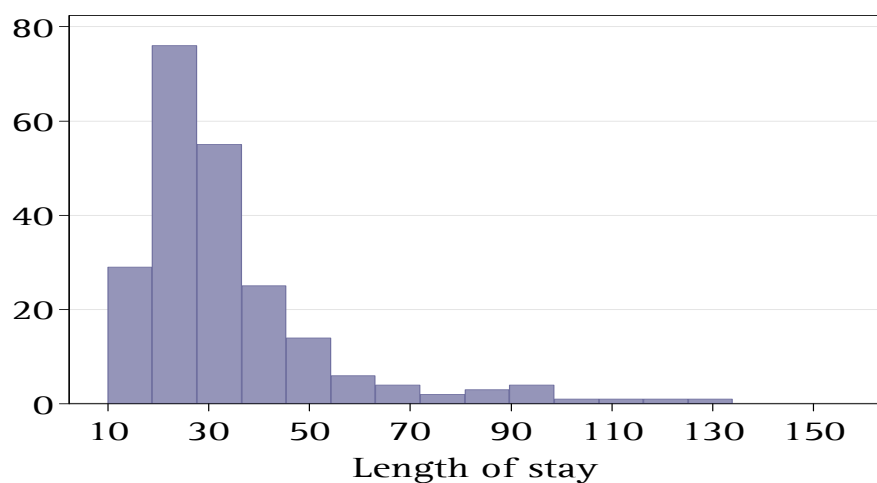
The average length of stay for babies with gastroschisis who were discharged home from the hospital where they were born (ie excluding babies who died or who were transferred to another facility) is approximately 33.9 days, with a maximum of 134 days[‡] (Figure 2). This reduces slightly to 31.1 days if it was restricted to those babies whose only recorded congenital anomaly was gastroschisis.

Risk factors

Maternal characteristics were assessed using multivariate logistic regression analysis to assess the contribution of risk factors, for which data were available, among the mothers who gave birth to babies with gastroschisis in Queensland. The two strongest

associations for giving birth to a baby with gastroschisis were young maternal age or not being married or in a de-facto relationship (Table 1). There was also some indication that mothers who have low Body Mass Index (BMI) range, are smokers or are Indigenous have a higher risk. However, these factors were not significant when adjusted for other factors. It is important to note that it is

Figure 2. Length of stay for babies born with gastroschisis who were discharged home, 1988 - 2011



Source: Queensland Perinatal Data Collection

[†] Tertiary perinatal centres include Royal Brisbane and Women's Hospital (until 2003: Royal Women's Hospital), Mater Mothers' Hospital, Mater Women's & Children's Private Health Services, Mater Misericordiae Women's & Children's Private Health Service (Women's Campus) (until June 2008), and The Townsville Hospital (until 2001: Kirwan Hospital for Women)

[‡] Baby records with gastroschisis recorded, that had length of stay of shorter than 10 days (12 records) were excluded.

possible that address data may be unreliable for this cohort^s which would mean that any effect of factors based on address (SEIFA and ARIA+) may be underestimated. However, the extent of the possible underestimation could not be directly investigated with the data available.

Acknowledgements

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^s It is important to note that the usual residence of the mother recorded in Queensland Perinatal Data Collection is the "last known address" of usual residence. If from an antenatal visit the mothers were advised to give birth at a tertiary hospital, they may temporarily relocate themselves to a place closer to the hospital where they plan to give birth, especially if the usual residence of the mother is in a rural area. This may give scope for possible inconsistency in the recording of the address, as their "new address" may be recorded as their usual residence, resulting in an underestimation of the proportion of mothers who resided in a non-metro and lower socio-economic status location.

Table 1. Frequency and association for selected risk factors**

Risk factors	Frequency			Univariate association			Multivariate association		
	Cases	Total	Cases per 10,000	Odds Ratio	95% CI		Odds Ratio	95% CI	
Smoking^{††}									
No	132	311,583	4.24	-			-		
Yes	62	71,823	8.63	2.04	1.51	2.76	1.16	0.77	1.75
Unknown	4	2,196	18.21	Excluded from univariate model			Excluded from multivariate model		
Indigenous status									
Non-Indigenous/Not stated	385	1,142,706	3.37	-			-		
Indigenous	45	65,016	6.92	2.06	1.51	2.80	1.07	0.56	2.07
Marital status									
Married/De-facto	292	1,052,017	2.78	-			-		
Other	138	155,705	8.86	3.20	2.61	3.91	2.22	1.47	3.35
ARIA^{‡‡}									
Major city - Queensland	100	227,554	4.39	-			-		
Inner Regional - Queensland	37	79,434	4.66	1.06	0.73	1.55	0.86	0.52	1.44
Outer Regional - Queensland	42	62,297	6.74	1.53	1.07	2.20	1.34	0.82	2.20
Remote/Very remote - Queensland	9	12,649	7.12	1.62	0.82	3.20	1.18	0.43	3.22
Interstate	10	3,668	27.26	Excluded from univariate model			Excluded from multivariate model		
SEIFA^{§§}									
Most disadvantaged	42	79,348	5.29	-			-		
Quintile 2	43	80,160	5.36	1.01	0.66	1.55	1.17	0.67	2.05
Quintile 3	47	75,566	6.22	1.18	0.78	1.78	1.72	0.98	3.02
Quintile 4	38	78,797	4.82	0.91	0.59	1.41	1.90	1.05	3.41
Most advantaged	18	68,062	2.64	0.50	0.29	0.87	1.55	0.77	3.12
Interstate	10	3,668	27.26	Excluded from univariate model			Excluded from multivariate model		
Body Mass Index^{***}									
Underweight (<18.5kg/m ²)	16	11,979	13.36	2.15	1.26	3.67	1.55	0.89	2.72
Normal weight (18.5 - <25kg/m ²)	81	130,091	6.23	-			-		
Overweight (≥25kg/m ²)	31	119,509	2.59	0.42	0.28	0.63	0.46	0.30	0.70
Missing/Unknown	22	11,512	19.11	Excluded from univariate model			Excluded from multivariate model		
Maternal age									
<20 years old	124	76,541	16.20	-			-		
20-24 years old	178	234,895	7.58	0.47	0.37	0.59	0.49	0.31	0.78
25-29 years old	81	376,538	2.15	0.13	0.10	0.18	0.19	0.11	0.33
30+ years old	47	519,748	0.90	0.06	0.04	0.08	0.06	0.03	0.12

** Multivariate analyses restricted to July 2007-December 2011 due to availability of BMI in the data

†† Data only collected from July 2005. If the mother indicated that she smoked at any time during the pregnancy she was categorised in the smoker category.

‡‡ Australian Remoteness Index of Area, based on 2006 census results. Only includes births after July 2005.

§§ Socioeconomic Index of Relative Advantage-Disadvantage, based on 2006 census results. Only includes births after July 2005.

*** Body Mass Index based on self-reported weight and self-reported or measured height. Data is only available from July 2007.