

KK Women's and Children's Hospital

- Founded in 1858
- National leader in Obstetrics, Gynaecology, Paediatrics and Neonatology.
- 830-bed hospital is a referral centre providing tertiary services to manage high-risk conditions in women and children in Singapore





VLBW Follow Up Program in KKH



- Ongoing since 1990
- Structured program of neurodevelopmental and medical follow up of VLBW babies
- Data collection & entry up to 8 years of life
- Psychometric assessment 2, 5 % & 8 years
- Academic performance
- Learning disability





Tests	9 & 12 months	18 months	24 months	5 years	8 years	Personnel
Medical History & Physical Examination	4	V	1	~	V	Doctor
Developmental Screening	ASQ 3	ASQ 3	ASQ 3	ASQ 3	-	Doctor & parents
Socio emotional	ASQ, SE	ASQ, SE	ASQ, SE	ASQ, SE	ASQ, SE	Doctor & parents
Motor / Visuo Motor	PDMS	PDMS	-	VMI*	VMI*	PT / OT Psychologist
Behavior		CHAT	VABS	ADHD*		OT / Psychologist
Psychometric / Cognitive	-	-	BSID III	WPPSI – III PPVT - *	WISC IV WRAT - III	Psychologist



Concurrent Validity of Ages & Stages Questionnaires[®], Third Edition (ASQ[®]-3) With Bayley Scales of Infant & Toddler Development III (BSID-III) In Preterm Very Low Birth Weight Infants

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Introduction

- Preterm infants are at significantly increased risk of developmental delay
- They require close neurodevelopmental surveillance and early intervention which aid in optimizing outcomes in development, education and functional attainment
- However, standard professionally administered psychometric tools like the Bayley Scales of Infant & Toddler Development (BSID-III) are expensive, time consuming and need increased resource utilization
- A valid, effective and low cost parent-filled screening tools such as the Ages & Stages Questionnaires[®], Third Edition (ASQ[®]-3) may be very important to aid in early identification, enable early intervention and enhance parental involvement in care processes of their child

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Primary Aim

The primary aim of our study was to evaluate if the ASQ-3 could be used as a valid tool for monitoring development of preterm very-low-birth weight (PT/VLBW) infants, by evaluating the concurrent diagnostic agreement of the ASQ-3 with the Bayley-III at 24 months corrected age.

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Secondary Aims Our secondary aims were to: 1. Provide references for clinical practice on optimal referral cut-offs of the ASQ-3 total score using the receiver operating characteristic (ROC) curves at 24 months corrected age for suspect (Bayley-III score <85) and significant (Bayley score <70) delay. Evaluate the predictive values of the ASQ-3 at 9, 12, and 18 months with Bayley-III at 24 months to find out how early and reliably the ASQ-3 could identify developmental delay if used in a longitudinal follow-up service for high-risk infants 2. 0

Study Population

- · A prospective cohort study Preterm VLBW survivors with birth weight at or below 1250g without major congenital malformations
- Study period/site: Infants born between January 2010 and December 2011 at KK Women's and Children's Hospital (KKH)
- 140 subjects who completed both ASQ-3 & BSID-III at 24 months CGA

Follow Up Protocol

- The cohort was followed up longitudinally by a multidisciplinary team comprising a neonatologist, physiotherapist and occupational therapist at 9, 12, and 18 months.
- At 24 months, the Clinic visit comprised:
- 1. A family interview: socio-economic status, parental education
- Neonatologist review: Child's medical history, growth, neurological and 2. physical examination
- Psychometric assessment by a psychologist blinded to the ASQ-3 results administered the Bayley-III on the same day or within 4 weeks of the neonatologist's visit
- The ASQ-3 questionnaires were completed by parents at 9, 12, 18, and 24 months at home just before/at the consultation.

Outcome Measures

ASQ-3

- Parent-completed questionnaires covering 5 domains (communication, gross motor, fine motor, problem solving & personal social)
- Screening scores below 2SD of mean area score were defined as positive
- BSID-III
 - Assessments by psychologist for children aged 1-42 months with 3 subscales (cognitive, language & motor)
 - The positive areas were defined by composite scores below 70
- Data on socio-demographic & neonatal morbidities

Statistical Analysis Methods

- 5 domains of ASQ-3 were grouped into 3 broader categories to match with the 3 domains of BSID-III
- Concurrent diagnostic agreement between ASQ-3 & BSID-III were estimated by Kappa, & Fisher Exact Tests were performed for statistical significance
- Sensitivity, specificity, positive & negative predictive values were calculated for all 3 domain areas based on ASQ-3 classifications by using BSID-III assessments as gold standard

Challenges



- Parents did not fill out the ASQ at home:

 Time constraints
 - Constraints of language and literacy did not understand the language or the question
 - Unfamiliarity with the activities
 - Misplaced the form / forgot about it



Modifications

- A research coordinator assisted those who had difficulties completing the questionnaire in the clinic
- Responses were reviewed by the neonatologist and reassessed
- If there was any discrepancy between the clinic observations and parents' reports
- Any unanswered question was reviewed and an appropriate response selected

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	Resu	ults			
			No.	%	
	Gender	Male	66	47%	
		Chinese	73	52%	
		Malay	38	27%	
Domographic		Indian	21	15%	
Demographic		Others	8	6%	
characteristics	Gestational Age (weeks)	<26	31	22%	
		26-28	40	29%	
(N=140)		>28	69	49%	
	Birth Weight (grams)	<750	22	16%	
		750-1000	54	39%	
		>1000	64	46%	
	GA Status	SGA	51	36%	
		<high school<="" td=""><td>44</td><td>31%</td><td></td></high>	44	31%	
	Maternal Education	≥High School	76	54%	c and
		Unkn	20	14%	lospital
			PATIENTS	AT THE HE WRT OF	ALL WE DO."

SO-3 Results at 7	4 months CGA (N=140)		No.	%
50 5 110 5 01 5 01 2	4 montais COA (14-140)	Communication		
	Mean Scores (SD)	Normal	85	61%
		1-2SD	26	19%
Communication	40.4 (15.8)	<25D	29	21%
	17 0 (11 0)	Normal	99	71%
aross Motor	47.8(14.8)	1-250	18	13%
Fine Motor	45.7(11.2)	<2SD	23	16%
		Fine Motor		
Problem Solving	41.6(13.0)	Normal	97	69%
	10.1/10.1	1-2SD	19	14%
Personal Social	40.4 (13.4)	<2SD	24	17%
		Problem Solving		
		Normal	98	70%
		1-2SD	26	19%
		<2SU	16	11%
		Personal Social	70	FOW
		Normal	22	24%
		1-250	33	24%

Mean Composite Scores (SD) No. (%) of Cases in Each Cut-off Range 4.10 Composite Scores (SD) -70 70-84 >=85 Total Language 86.1 (17.7) 24 (19%) 31 (24%) 73 (57%) 128 Motor 93.7 (14.4) 7 (5%) 13 (10%) 108 (64%) 128 Cognitive 95.3 (14.7) 7 (5%) 15 (11%) 118 (84%) 140	• BSID	-III Results	Resul s at 24 m	ts nonths C	GA (N=1	L40)	
Scores (SD) <70		Mean Composite	No. (%)	of Cases in Ea	ch Cut-off Rar	nge	
Language 86.1 (17.7) 24 (19%) 31 (24%) 73 (57%) 128 Motor 93.7 (14.4) 7 (5%) 13 (10%) 108 (84%) 128 Cognitive 95.3 (14.7) 7 (5%) 15 (11%) 118 (84%) 140		Scores (SD)	<70	70-84	>=85	Total	
Motor 93.7 (14.4) 7 (5%) 13 (10%) 108 (84%) 128 Cognitive 95.3 (14.7) 7 (5%) 15 (11%) 118 (84%) 140	Language	86.1 (17.7)	24 (19%)	31 (24%)	73 (57%)	128	
Cognitive 95.3 (14.7) 7 (5%) 15 (11%) 118 (84%) 140	Motor	93.7 (14.4)	7 (5%)	13 (10%)	108 (84%)	128	
	Cognitive	95.3 (14.7)	7 (5%)	15 (11%)	118 (84%)	140	
	Cognitive	95.3 (14.7)	7 (5%)	15 (11%)	118 (84%)	140	l
						PATIENTS, AT 1	THE HE ♥ RT OF ALL WE DO."

Results								
 Diagnostic agreement - ASQ-3 & BSID-III 								
	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value	Карра			
Communication	63%	88%	56%	91%	0.486*			
Motor	86%	80%	20%	99%	0.259*			
Cognitive	86%	74%	15%	99%	0.186*			
*P<0.05 Landis and Koch (1977) gui 0.0 – 0.2 slight agreement 0.21 – 0.4 fair agreement 0.41 – 0.6 moderate agree 0.61 – 0.8 substantial agree 0.81 – 1.0 perfect agreeme	deline on Kappa: ment ement ent				•			









First birth cohort in Singapore - GUSTO

- Few birth cohort studies in Asia
- Singapore is a multi-ethnic society and is optimal for the comparison of Chinese, Malays and Indians

nation-wide databases



 Well-established research infrastructure for large cohort studies
 Unique ID eg NRIC number allows linkages to all

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Overview Recruit a cohort of 1,200 children and their families in the early antenatal period from KKH and NUH from July 2009 onwards [1,200 mothers – 200 Indians, 200 Malays, 800 Chinese] Cohort will capture the ethnic diversity of Singapore Measure fetal growth over time, and influences of epigenetic factors Measure children's development over time, and influence of epigenetic factors, to understand pathways of development Understand better the multi-level influences on their life long development to provide a robust evidence base to inform

Mother and Fetus Birth Birth Childhood Maternal • Smoking, alcohol • Physical activity • Diet • Weight • Infection • Metabolism • Circulation • Epigenetic effects • Birth tissue • Dishit tissue

Significance GUSTO will translate discoveries into national public health policy in relation to metabolic, cardiovascular diseases, cognitive and other Asian diseases. GUSTO is a platform for nutritional interventions and

- screening strategies.
- GUSTO will inform Singaporeans on the early predictors of disease and educate the public on preventive modalities.

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Aims

- 1. The primary aim of the present study was to evaluate the reliability and validity of the ASQ-3 in a longitudinal cohort of low-risk Singapore children at 9, 18 and 24 months and compare it with scores from the US and Korea.
- 2. Secondary aim was to determine risk factors for Positive Screen results i.e. children needing further evaluation

Rationale:

- The ASQ-3 has not been evaluated in Singapore except in a high risk preterm cohort.
- Evaluating its psychometric properties in the local context is important due to Singapore's unique multiethnic setting.

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Collection of ASQ-3 Data at 9, 18 and 24 months of Age

- The longitudinal study scheduled three age points for participating children and families for data collection, with ASQ-3 questionnaires being filled at 9, 18 and 24 months of age.
- An age-appropriate ASQ-3 questionnaire was either mailed or handed to the mothers prior to the 9-, 18- and 24-month visits
- Questionnaires were collected or mailed back after completion.
- A cover letter with an explanatory note regarding the questionnaire with instructions on filling in and returning the questionnaires was also provided.

Study Population

- Of the 649 child participants,
 - @ 9 months (9 m <u>+</u>0 d 9 m <u>+</u>30 d); n=513
 - @18 months (17 m ± 0 d 18 m ± 30 d); n=351
 - @ 24 months(23 m ± 0 d 25 m ± 15 d); n= 377
- All children had least one ASQ form completed.
- Socio-demographic data Ethnicity, parental educational level, family Income

Child

Statistics

- ASQ3 data were analyzed using SPSSv24. Reliability, validity, mean ASQ and cut-off scores were computed
- Correlations between each ASQ-3 domain were computed using Pearson correlation coefficients.
- Internal consistency of the ASQ-3 items within each domain was analyzed using $\it Cronbach's \ \alpha$
- The comparison of domain total scores with the US and Korean normative data was conducted using independent t-test followed with a computation of *Cohen's d* for the effect size of difference between the scores
- Cutoff scores and the consistency of screening categorization (i.e., "typical development", "needs monitoring", and "needs further evaluation - Screen positive") were computed using descriptive statistics
- A logistic regression model was used to explore risk factors associated with a screen positive result in our cohort

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Characteristics	Cohort -n (%)	Singapore(%)	Significance
Child gender			
Male	326 (50.2)	49.3%	ns
Female	323 (49.8)	50.7%	
Monthly Household Income - SGD			
<2000	88 (13.6)	14.5%	p<0.001
2000-3999	183 (28.2)	21.2%	\sim
>=4000	334 (51.5)	64.3%	
Ethnicity			
Chinese	378 (58.2)	74.3%	(p<0.001)
Malay	166 (25.6)	13.4%	\sim
Indian	104 (16.0)	9.0%	
Others	1 (0.1)	3.2%	
Mother's education			
<=high school	177 (27.3)	57.6%	(p<0.001)
College and above	465 (71.6)	42.4%	\sim

			Communication	Gross Motor	Fine Motor	Problem Solving	Personal Social
		n	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
			Cohen's d	Cohen's d	Cohen's d	Cohen's d	Cohen's d
9m	SG	513	40.41 (13.84)	39.02 (16.62)	46.41 (13.56)	42.39 (13.50)	31.00 (13.90)
	US		38.55 (12.29)*	46.72 (14.45) *	52.31 (10.49) *	49.51 (10.39) *	42.47 (11.78) *
						Cohen's d: 0.59	Cohen's d: 0.89
	Korean	82	43.66 (10.50)**	48.35 (12.65) **	NS	47.50 (10.50) **	47.56 (11.15) **
				Cohen's d: 0.63			Cohen's d: 1.31
L8m	SG	351	36.40 (13.56)	56.02 (7.26)	44.94 (12.39)	40.33 (12.04)	44.47 (9.64)
	US		42.30 (14.62)*	NS	52.44 (9.06) *	45.99 (10.13) *	47.90 (10.35) *
					Cohen's d: 0.69	Cohen's d: 0.51	
	Korean	82	NS	NS	NS	NS	NS
24m	SG	377	47.12 (14.68)	53.82 (8.72)	45.32 (9.08)	43.35 (12.46)	43.10 (11.53)
	US		51.23 (13.03)*	NS	51.70 (8.27) *	49.40 (9.81) *	51.14 (9.80) *
		1			Cohen's d: 0.73	Cohen's d: 0.54	Cohen's d: 0.75
	Korean	82	NS	NS	48 33 (10 45) **	48 75 (11 95) **	48 54 (11 26) **

	M (SD)	Above cutoff ("typical develop	ment")	Between one and ("needs monitor	d two SDs below the M ing")	Below ("needs further e pos	vcutoff valuation"/screer itive)
		n (%) of children	Range of score	n (%) of children	Range of score	n (%) of children	Range of score
Communicatio	n						
9-month (n = 506)	40.41 (13.84)	415 (82.0)	≥ 26.57	76 (15.0)	<26.57,≥12.73	15 (3.0)	< 12.73
18-month (n = 350)	36.40 (13.56)	296 (84.6)	≥ 22.84	51 (14.6)	<22.84,≥9.28	3 (0.9)	< 9.28
24-month (n = 375)	47.12 (14.68)	313 (83.5)	≥ 32.44	37 (9.9)	<32.44,≥17.76	25 (6.7)	< 17.76
Gross Motor						\sim	
9-month (n = 511)	39.02 (16.62)	409 (80.0)	≥ 22.40	85 (16.6)	<22.40,≥5.79	17 (3.3)	< 5.79
18-month (n = 351)	56.02 (7.26)	316 (90.0)	≥ 48.75	19 (5.4)	<48.75,≥41.49	16 (4.6)	< 41.49
24-month (n = 377)	53.82 (8.72)	314 (83.3)	≥ 45.11	42 (11.1)	<45.11,≥36.39	21 (5.6)	< 36.39
Fine Motor						- \	
9-month (n = 508)	46.41 (13.56)	420 2	≥ 32.84	69 (13.6)	<32.84,≥19.28	19	< 19.28
18-month (n = 349)	44.94 (12.39)	286 (81.9)	≥ 32.55	43 (12.3)	<32.55,≥20.16	20 (5.7)	< 20.16
24-month	45.32 (9.08)	313 (83.2)	≥ 36.24	48 (12.8)	<36.24,≥27.16	15 (4.0)	< 27.16

ble 3. ASQ-3 Eac	Domain Scor h Screening	e M Cate	eans, Sta gory in	andard Deviati the 9, 18 and 2	ions, Cutoff 24 month In	Scores, and Number a tervals in the Singapor	nd I re Si	Percer	ntage ((N = 6	of Participant 549)
	Above cutoff M (SD)		opment")	Between on ("needs mor	etween one and two SDs below the M "needs monitoring")		Below cutoff ("needs further evaluation"/scree positive)			
		n (%) of childre	n Range of score	n (%) of children	Range of score	n (%	5) of chi	ldren	Range of score
Problem Solving										
9-month (n = 507)	42.39 (13.50)	434	(85.6)	≥ 28.89	49 (9.7)	<28.89, ≥ 15.40	24	(4.7)		< 15.40
18-month (n = 345)	40.33 (12.04)	291	(84.3)	≥ 28.29	41 (11.9)	<28.29, ≥ 16.24	13	(3.8)		< 16.24
24-month (n = 373)	43.35 (12.46)	291	(78.0)	≥ 30.89	72 (19.3)	<30.89, ≥ 18.42	10	(2.7)		< 18.42
Personal-Social			~					÷		
9-month (n = 504)	31.00 (13.90)	415	(82.3)	≥ 17.10	84 (16.7)	<17.10, ≥ 3.20	5	(1.0)		< 3.20
18-month (n = 348)	44.47 (9.64)	310	(89.1)	≥ 34.83	20 (5.7)	<34.83, ≥ 25.19	18	(5.2)		< 25.19
24-month (n = 376)	43.10 (11.53)	303	(80.6)	≥ 31.57	54 (14.4)	<31.57, ≥ 20.04	19	(5.1)		< 20.04

		Dif	ferent
	Same categorization	Improved categorization	More concerning categorization
	n (%)	n (%)	n (%)
Communication			
across 9- and 18-month (n = 244)	234 (95.9)	8 (3.3)	2 (0.8)
across 18- and 24-month (n = 280)	259 (92.5)	2 (0.7)	19 (6.8)
across 9- and 24-month (n = 268)	242 (90.3)	8 (3.0)	18 (6.7)
across 9-, 18-, and 24-month (n = 208)	185 (88.9)	23	(8.5)
Gross Motor			
across 9- and 18-month (n = 248)	234 (94.4)	4 (1.6)	10 (4.0)
across 18- and 24-month (n = 282)	267 (94.7)	9 (3.2)	6 (2.1)
across 9- and 24-month (n = 273)	257 (94.1)	3 (1.1)	13 (4.8)
across 9-, 18-, and 24-month (n = 213)	195 (91.5)	18	(8.5)
Fine Motor			
across 9- and 18-month (n = 247)	229 (92.7)	8 (3.2)	10 (4.0)
across 18- and 24-month (n = 280)	257 (91.8)	17 (6.1)	6 (2.1)
across 9- and 24-month (n = 270)	254 (94.1)	8 (3.0)	8 (3.0)
across 9-, 18-, and 24-month (n = 211)	188 (89.1)	23	(10.9)

		Dift	lerent
	Same categorization	Improved categorization	More concerning categorization
	n (%)	n (%)	n (%)
Problem Solving			
across 9- and 18-month (n = 244)	229 (93.9)	12 (4.9)	3 (1.2)
across 18- and 24-month (n = 273)	261 (95.6)	8 (2.9)	4 (1.5)
across 9- and 24-month (n = 265)	248 (93.6)	12 (4.5)	5 (1.9)
across 9-, 18-, and 24-month (n = 204)	189 (92.6)	15	(7.4)
Personal-Social			
across 9- and 18-month (n = 245)	237 (96.7)	2 (0.8)	6 (2.4)
across 18- and 24-month (n = 280)	261 (93.2)	11 (3.9)	8 (2.9)
across 9- and 24-month (n = 268)	250 (93.3)	3 (1.1)	15 (5.6)
across 9-, 18-, and 24-month (n = 209)	193 (92.3)	16	(7.7)

Cronbach's Alpha Alphas ranged from • 0.68 to 0.83 for communication skills,	By Domain	and Ag	e Inte	24-month (n = 377)
 0.63 to 0.82 for gross motor skills, 0.48 to 0.75 for fine motor skills 	Communication	0.704	0.689	0.829
 0.62-0.68 for problem solving domain 0.49 to 0.63 for personal social skills 	Gross Motor	0.821	0.632	0.651
	Fine Motor	0.755	0.649	0.483
	Problem Solving	0.684	0.620	0.624
	Personal Social	0.637	0.492	0.584
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Reliability: Internal Consistency Using

Domains by Age								
	Dimension	Communication	Gross Motor	Fine Motor	Problem Solving			
9-month	Gross Motor	.346						
	FineMotor	.370	.266					
	ProblemSolving	.358	.293	.455				
	PersonalSocial	.419	.373	.401	.404			
18-month	GrossMotor	.216						
	FineMotor	.339	.417					
	ProblemSolving	.256	.269	.478				
	PersonalSocial	.296	.242	.383	.403			
24-month	GrossMotor	.270						
	FineMotor	.348	.420					
	ProblemSolving	.392	.385	.563				
	PersonalSocial	.591	.334	.462	.503			
All cor	relations were signification coefficients ran	cant at $p < .01$ level.			KK Women Children's H			





- @24 months Gross Motor (OR 2.68, CI [1.10-6.51])
- Minority ethnicity Screen positive
- Gross motor skills @ 18months (OR6.40, Cl [1.43-28.60])
 @24months (OR 5.24, Cl [1.52-18.11])

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- Male gender Screen positive
 - Communication (OR 4.14, CI[1.52-11.28]) @ 24 months
 Personal social skills (OR 5.42, CI[1.55-18.94]) @ 24
 - months
 Lower gestational age
 - Communication (OR 1.53, CI [1.01-2.32]) @ 24 months
- Lower birth weight
 - Problem solving skills (OR1.001 CI [1.000-1.002]) @ 9 months.

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Summary Results

- ASQ-3 had good internal consistency and correlation between domains
- Significant differences on the ASQ-3 scores between the data obtained in our cohort and data reported from the US and Korean samples.
- Developing local cutoff scores was necessary for using the ASQ-3 in Singapore
- We demonstrated consistency of the ASQ-3 screening categorization, but presence of a subgroup who received a more concerning categorization result as they grew older highlighted the importance of regular, repeated screening at multiple times.
- Low family income and lower maternal educational level were consistently more predictive of screen positive results in the different domains at all 3 ages.

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Study Conclusions

- ASQ-3 is a useful valid screening tool in a low risk multi ethnic cohort in Singapore
- Identification of well-defined risk factors will enable "Targeted Screening" and "Progressive Universalism"
- Need for further cultural and linguistic adaptations to enhance the cultural sensitivity and applicability of the tool
- Future research on the validity of the ASQ-3 may focus on the sensitivity and specificity in the Singapore population by comparing its concurrent validity with a "gold-standard" psychometric assessment tool

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ASQ – Concerns / Limitations in Singapore Use of ASQ in DCD Relevance to English as Second Language (ESL) patients -'s' 'ed' 'ing' items (48m, 54m, 60m) - Plurals/ tenses Used as a standardized screening tool in the triage clinic for preschool Repeating sentences (60m) - (Challenging to translate to Mandarin and difficult for ESL patients children 4000 children < 7 years of age seen each year @DCD to repeat English sentences) Items that don't make much sense Sources of referrals: "Does your child offer a toy to the mirror?" (16m, 18m) Community primary health care centres Cultural relevance to Singapore context Teachers from the preschools _ "Does your child wear a coat, jacket or shirt" (27m, 20m, 33m, 36m, 42m) - (Different climate, Private pediatricians lack of opportunity to wear coats/jackets) Self referrals by families When you ask, "What is your name?" does your child say <u>both</u> her first and last names? (36m, 42m) - (Children may be more familiar with their nicknames e.g. "meimei" than their actual Subspecialties within KKH Others names as parents often call them by nicknames at home) The ASQ-3 is filled in by the Associate Psychologists in conjunction with Items difficult to administer or clarify parents 3 step instructions (42m, 48m, 54m, 60m) - Parents usually think of routines or 1 step Identify domains of need instructions given separately Children

ASQ – Concerns /Limitations in Singapore

- Accuracy of Communication Skills assessment especially in older children - Higher order language skills
- Local context Use of "Singlish" Grammar Plurals, tenses, sentence formation
- Personal Social Skills- Self help skills are often slower due to the presence of a domestic helper at home.
- · Gross Motor Skills- Navigation of stairs not often attempted
- Strong impact of communication skills on problem solving domain and personal social skills (36 months)

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Summary

- ASQ-3 Valid screening tool for detecting developmental delay in high risk preterm children with high risk preterm children
- The ASQ-3 screening tool had high negative predictive values, specificity & sensitivity in all 3 domains but PPV was relatively low
- Implementing ASQ-3 in the follow up of high risk preterm children would enable early identification of developmental delay and improve healthcare resource utilization
- ASQ-3 is a useful valid screening tool in a low risk multi ethnic cohort in Singapore
- Identification of well-defined risk factors will enable "Targeted Screening" and "Progressive Universalism"
- Need for further cultural and linguistic adaptations to enhance the cultural sensitivity and applicability of the tool





	Resu	ılts			
			No.	%	
	Gender	Male	66	47%	
		Chinese	73	52%	
		Malay	38	27%	
Domographic		Indian	21	15%	
Demographic		Others	8	6%	
characteristics	Gestational Age (weeks)	<26	31	22%	
(NL 4.40)		26-28	40	29%	
(N=140)		>28	69	49%	
	Birth Weight (grams)	<750	22	16%	
		750-1000	54	39%	
		>1000	64	46%	
	GA Status	SGA	51	36%	
	Maternal Education	<high school<="" td=""><td>44</td><td>31%</td><td></td></high>	44	31%	
		≥High School	76	54%	and
		Unkn	20	14%	ispital
			PATIENTS		VE DO

Results (3)										
Perinatal Demographics and Neonatal morbidities (N=140)										
	No.	%								
Chorioamnionitis	57	41%								
AN steroids	104	74%								
Delivery room resuscitation needing intubation	82	59%								
Hypotension ≤ 72 hours needing Inotropes	21	15%								
Grade 3/4 IVH	4	3%								
PVL	6	4%								
Air leaks	12	9%								
NEC	15	11%								
Culture proven sepsis	22	16%								
CLD (O2 at 36 weeks)	31	22%								
Severe ROP ≥ Stage III	16	11%	KK Women's and							
		. w.	SingHealth							
		PATIENTS, AT THE HE	PRT OF ALL WE DO							