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# BEFORE SCHOOL CHECK AUDIT

## COUNTIES MANUKAU DISTRICT HEALTH BOARD

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February 2014

## ACKNOWLEDGEMENTS

I would like to acknowledge the various people who made this report possible by sharing their knowledge and expertise via interviews and emails. They include, from CMDHB, Kathy Casey (B4SC Coordinator), Philippa Anderson (Public Health Physician), Louise Porteous (Development Paediatrician), Donna Neale (Clinical Nurse Manager, Kidz First Module 4, Manukau SuperClinic) and Ailsa Tuck (Paediatric Fellow). Those from other organisations include: Maeve Fleming (Clinical Leader, Plunket), Huriana McRoberts (Service Manager, Ministry of Education) and Bennie van den Berg (Ministry of Education).

Suggested Citation: Gray S (2014) Before School Check Audit. Counties Manukau District Health Board. Auckland: Counties Manukau District Health Board

## EXECUTIVE SUMMARY

The Before School Check (B4SC) constitutes the 8<sup>th</sup> and final Well Child check. The check aims to identify and address any health, behavioural, social or developmental concerns which could affect a child's ability to get the most benefit from school.

This audit was undertaken in response to concerns that have been raised about the quality of the CMDHB B4SC programme delivery and outcomes. In particular questions have been raised about the ability of the check to adequately identify children with problems and about the accessibility of timely and effective interventions for children who are identified with potential issues.

Routinely collected health data has been analysed with the aims of clarifying both the extent to which these concerns are valid and the underlying reasons for any issues that are found. Programme coverage, numbers and percentages of children with problems identified for each component of the check, referral patterns and outcomes are all included.

## COVERAGE

Firstly programme coverage for children who turned 5 years of age 01/01/2013 to 30/06/2013 was assessed. Coverage was 80.9%. This meets Ministry of Health (MoH) targets but children who live in more deprived areas (by quintile of NZ deprivation 2006) were relatively less likely to have a B4SC as were Maaori and Pacific children when compared with Asian and European children. Children that live in low decile neighbourhoods and / or are of Maaori and Pacific ethnicity are, on a population level, considered at higher risk of having problems that may need to be addressed to optimise their readiness for school. A programme that fails to reach these subgroups of the population risks increasing rather than decreasing existing inequalities. The MoH is aware of the difficulties reaching these populations and is actively working with DHB's in the 2013 / 14 financial year to address this issue.

## PEDS

Each component of the B4SC was then analysed separately. Regarding the nurse led components, one finding was that the percentage of children with potential problems identified in the parental evaluation of developmental status (PEDS) was surprisingly low compared with international norms. This raises questions over the validity of this tool in the CMDHB population. Of note this tool is not being administered correctly according to the guidelines as a second check for children identified with a potential issue is not being offered. The advantage of a second check (such as Ages and Stages, ASQ) is that it avoids over referral of children (no need to refer those who pass the second check) as well as providing additional information to secondary services on those who do require referral. This enables secondary services to prioritise those most in need of intervention. Disadvantages are the costs and time involved. A B4SC pilot at CMDHB found that parents were reluctant to return for a second check and therefore ideally this needs to be administered at the time of the initial B4SC.

## SDQ

In contrast to the PEDS component the SDQ component identifies many children with problems however these are not being referred to secondary services in adequate numbers. However if all the children that are identified with concerns were to be referred to parenting programmes (and attended) then the current providers would be overwhelmed. There appears to be a lack of suitable interventions on offer. The Incredible Years parenting programme is of a high standard but requires a substantial time commitment by parents. Although evidence suggests that families need to be fully engaged in a long term course such as Incredible Years to achieve change, it may be that for some families, a shorter more intensive course tailored to our CMDHB population would be a more realistic alternative if there was adequate evidence of effectiveness. This is something that could be explored.

## DENTAL

Dental enrolment rates are high in the B4SC cohort with 92.9% of children that have a B4SC already enrolled with ARDS in 2012/13. It is concerning however that over one third of children requiring referral because of decay evident at 'lift the lip' were not referred or under care.

## GROWTH

Referral rates were also low for children noted as having a weight > than the 97% percentile and BMI over 21. This is a nationwide problem but because children with obesity make up a higher percentage of children living in Counties Manukau than in other DHBs this affects a large number of our children.

## IMMUNISATION

Immunisation rates are high amongst children that have a B4SC. The immunisation rates in children that did not have a B4SC could well be lower as they are likely to be a higher needs group. Anecdotally the B4SC appointment is used to opportunistically immunise children and is therefore likely to be contributing to the high immunisation rate in the CMDHB child population.

## HEARING AND VISION

Regarding the hearing and vision components the main findings are that a high number of rescreens are required, referrals to secondary services are not resulting in assessments for all children and the number of referrals constitutes a high workload for secondary services. Alongside this the cost effectiveness of preschool vision and hearing is being questioned in international literature. A UK systematic review of research on the effectiveness of preschool vision screening concluded that 'in the absence of sound evidence that the target conditions sought in these programmes are disabling and that the interventions available to correct them do more good than harm, the ethical basis for such interventions is very insecure'.<sup>21</sup> One key factor in regards to the value of hearing screening is that the prevalence of children with undiagnosed hearing loss at age four will be reducing as children are now undergoing new born hearing screening.

## REFERRALS

Currently a number of children are being identified with potential problems at their B4SC but are not being referred to secondary services for further assessment. In order to get the best value from the B4SC in terms of outcomes for individuals and for the population this issue needs to be addressed across all components of the B4SC. Until this is resolved much of the effort being put into the B4SC programme goes wasted.

Referral processes are not straightforward and there appear to be several points at which a referral to secondary services from the B4SC can breakdown. Robust systems do not appear to be in place to pick up all B4SC referrals that are misplaced or rejected which can lead to delays in children's assessments, or a failure of children to have a further assessment at all. The most effective way to reduce referral rejections would be to address the proof of eligibility process at a national level. Meanwhile the B4SC referral processes should be reviewed in order that referrals can be tracked to avoid referrals being misplaced and enable rejected referrals to be followed up. In CMDHB this would require dedicated resource.

The Ministry of Health is currently evaluating various aspects of the B4SC to try and improve programme reach and outcomes<sup>12</sup>. The Ministry of Health has to date focused on the numbers of children who are referred to secondary services and recognises that referral rates are suboptimal due in part to the capacity of services to meet the demand generated by the B4SC. The Ministry does not appear to have undertaken any major reviews of whether children actually receive benefit from their referrals. This is crucial when evaluating the B4SC. This report has attempted to investigate referral outcomes but has been hampered by the difficulty of collecting good quality data. Results from the data that was obtained seem to indicate that the numbers of children deriving tangible benefit from their referrals to services are very small.

The cost of the B4SC is significant. Currently the Ministry of Health pays between \$95 and \$120 per child that has a B4SC depending on their area of residence.<sup>29</sup> In addition to the cost of the check itself there is the cost of the B4SC coordinator and clinical leader. There is also the cost to the DHB and other secondary services of providing assessments and treatment for those that are identified with problems. While it has not been attempted calculate all these costs it is likely that the cost of the programme per child benefitted is high.

## RECOMMENDATIONS

If the NHC screening criteria were to be strictly adhered to then the B4SC programme should be disestablished as it does not meet these criteria. An invitation to preschool screening carries with it the implicit assumption that screening is going to benefit the child. However given that disinvestment in an existing programme will always be contentious, restructuring the B4SC programme in order to maximise the benefits of the programme in terms of health outcomes whilst still keeping costs from escalating out of control may be the preferred option.

Changes to referral processes particularly regarding 'proof of eligibility' would improve the numbers of children being offered an appointment after their referral. This would also free up B4SC coordinator time to focus on other aspects of the programme. Splitting the B4SC into two parts separated by time may also improve outcomes. Currently the developmental screening aspect of the programme is being undertaken too late to be able to offer an effective intervention before the child starts school in CMDHB. Moving the nurse led components to 3 years 6 months would possibly increase the likelihood of a child receiving an effective intervention for developmental and / or behavioural issues before they start school. It would also likely result in some dental decay being picked up earlier. However it may have a negative impact on immunisation rates.

Moving the VHT in the opposite direction to school age would almost certainly increase participation rates in the hard to reach and likely reduce rates of rescreens as children will be able to be more cooperative with the tests being one year older and in the school setting.

Another option could be to limit the B4SC to those living in deprived areas as measured by NZdep2006 however the findings of this report do not support this for all components. The numbers of children identified with issues are not significantly higher in children living in more deprived areas for PEDS and vision but are higher for the SDQ and hearing. In CMDHB almost half the child population live in quintile 5.

In conclusion in its current format the B4SC programme appears to be very costly in terms of the effort expended for the impact on health achieved. The B4SC also runs the risks of increasing inequalities in the CMDHB population if changes are not made. Many of the issues identified in this report need to be resolved at a national level and are not unique to CMDHB.

## ABBREVIATIONS

ADHD	Attention Deficit Hyperactivity Disorder
ADHB	Auckland District Health Board
ARDS	Auckland Regional Dental Service
ASD	Autism Spectrum Disorder
ASQ	Ages and Stages Questionnaire
ATWC	The Anglican Trust for Women and Children
B4SC	Before School Check
BMI	Body Mass Index
CAG	Clinical Advisory Group
CMDHB	Counties Manukau District Health Board
CMS	Clinical Management System
DMFT	Decayed, Missing or Filled Teeth
DNA	Did Not Attend
DOB	Date of Birth
ECE	Early Childhood Education
FSA	First Specialist Appointment
F/up	Follow Up
GDD	Global Developmental Delay
GLD	Global Learning Delay
HIPPY	Home Interaction Programme for Parents and Youngsters
iPM	Inpatient Management System
IS	Information System
IY	Incredible Years
MRF	Minimum Requirements Form
MoE	Ministry of Education
MoH	Ministry of Health

N	Number
NHC	National Health Committee
NHI	National Health Index
OME	Otitis Media with Effusion
ORL	Otorhinolaryngology
PEDS	Parent Evaluation of Developmental Status
SDQ-P	Strengths and Difficulties Questionnaire - Parent
SDQ-T	Strengths and Difficulties Questionnaire – Teacher
SES	Special Education Services
SLT	Speech Language Therapy
TD	Total Difficulties
VHT	Vision and Hearing Technician
WCTO	Well Child Tamariki Ora

# CONTENTS

Acknowledgements .....	1
Executive Summary .....	2
Coverage .....	2
PEDS.....	2
SDQ .....	3
Dental .....	3
Growth.....	3
Immunisation.....	3
Hearing and Vision.....	3
Referrals .....	4
Recommendations.....	4
Abbreviations .....	6
List of Tables .....	12
List of Figures.....	13
Background.....	14
The Before School Check (B4SC).....	14
Counties Manukau DHB B4SC Programme.....	14
Context for Undertaking an Audit of the CMDHB B4SC Programme .....	16
The Well Child / Tamariki Ora Quality Improvement Framework.....	17
Aims .....	18
Objectives .....	18
Methods .....	19
Scope .....	19
Data Sources.....	19
Data Analysis .....	21
Programme Coverage for a Six Month Cohort of Children.....	22
Key Points .....	22
Methods .....	22
Results .....	22
Discussion .....	24
Recommendations.....	24
Parents' Evaluation of Developmental Status (PEDS) 2012/13 .....	26

Key Points .....	26
PEDS Overview .....	26
PEDS Shaded Scores and Pathways .....	26
PEDS Outcomes .....	27
PEDS Referrals .....	30
Discussion .....	31
Recommendations.....	32
Strengths and Difficulties Questionnaire (SDQ) 2012/13 .....	34
Key Points .....	34
SDQ Overview.....	34
SDQ Total Difficulties Scores .....	35
SDQ Scales .....	36
SDQ-P and SDQ-T Outcomes .....	39
SDQ Referrals.....	40
Discussion .....	41
Recommendations.....	42
Ministry of Education (MoE) Referrals .....	43
Key Points .....	43
Methods .....	43
Results .....	43
Discussion .....	45
Recommendations.....	46
Incredible years Parenting Programme Referrals.....	46
Key Points .....	46
Methods .....	46
Results .....	47
Discussion .....	47
Recommendations.....	47
Kidz First Developmental Cohort .....	48
Key Points .....	48
Overview.....	48
Methods .....	48
Developmental diagnoses .....	49
PEDS.....	49
SDQ.....	51

Discussion .....	53
Recommendations.....	53
Vision 2012/13.....	56
Key Points .....	56
Vision Overview .....	56
Visual Acuity .....	56
Vision Outcomes.....	56
Vision Referrals.....	57
Discussion .....	57
Recommendations.....	59
Hearing 2012/13.....	60
Key Findings .....	60
Hearing Overview .....	60
Audiometry and Tympanometry .....	60
Hearing Outcomes .....	61
Hearing Referrals .....	61
Audiology Referrals .....	63
Key Points .....	63
Overview.....	63
Results .....	63
Discussion .....	65
Recommendations.....	66
Dental 2012/13.....	68
Key Points .....	68
Dental Overview .....	68
Dental Enrolment Status .....	68
Progression of Decay (Lift The Lip Score) .....	68
Dental Outcomes.....	69
Dental Referrals .....	70
Dental Referrals to The Auckland Regional Dental Service .....	70
Methods .....	70
Results .....	70
Discussion .....	71
Recommendations.....	71
Growth 2012/13 .....	72

Key Points .....	72
Growth Overview .....	72
Weight, BMI and Height Percentiles.....	72
Growth Outcomes .....	72
Growth Referrals .....	73
Discussion .....	73
Recommendations.....	74
Immunisation 2012/13 .....	76
Key Points .....	76
Immunisation Overview .....	76
Immunisation Rates.....	76
Immunisation Outcomes .....	76
Immunisation Referrals .....	77
Discussion .....	77
Recommendations.....	78
Time Trends 2008 - 2013 .....	80
Key Points .....	80
Results .....	80
Discussion .....	81
Discussion .....	86
Key Findings.....	86
Strengths and Limitations.....	86
Recommendations.....	87
Conclusion .....	90
Appendix One: NHC Screening Criteria –a framework to summarise concerns for the CMDHB B4SC programme.....	92
Appendix Two: Referrals and Eligibility Processes .....	96
Appendix Three: Ministry of Health WCTO Quality Improvement Framework B4SC Quality Indicators	98
Appendix Four: Referral Pathways .....	99
Appendix Five: SDQ Supplementary Tables.....	100
Appendix Six: Quintile of NZ Deprivation 2006 Supplementary Tables .....	102
References .....	104

## LIST OF TABLES

Table 1: B4SC status of a six month birth cohort by demographic variables .....	25
Table 2: Shaded scores by PEDS pathway .....	27
Table 3: PEDS outcomes by PEDS pathway .....	28
Table 4: PEDS outcomes by PEDS pathway for children with shaded scores of 2 or more .....	28
Table 5 PEDS referrals to selected providers.....	30
Table 6: SDQ-P and SDQ-T total difficulties score ranges.....	35
Table 7: SDQ-P scale score ranges for all children with an SDQ-P.....	36
Table 8: SDQ-T scale score ranges for all children with a SDQ-T.....	37
Table 9: SDQ-P outcomes, by SDQ-P total difficulties score range .....	39
Table 10: SDQ-T outcomes, by SDQ-T total difficulties score range.....	39
Table 11: SDQ referrals to selected providers.....	41
Table 12: Diagnoses of KIDz First Developmental Clinic Attendees .....	49
Table 13: PEDS pathway by diagnosis for children aged 4 years 3 months to 5 years .....	50
Table 14: PEDS pathway by diagnosis for children aged 5 years to 7 years .....	50
Table 15: SDQ-P total difficulties score range for children aged 4 years 3 months to 5 years.....	52
Table 16: SDQ-P total difficulties score range for children aged 5 years to 7 years.....	52
Table 17: PEDS pathways for all children referred for a developmental assessment .....	54
Table 18: SDQ-P total difficulties score range for all those referred for developmental assessment ...	54
Table 19: Vision outcomes by vision test results.....	57
Table 20: Vision referrals to selected providers.....	57
Table 21: Hearing outcomes by Audiometry and Tympanometry results.....	62
Table 22: Hearing referrals to selected providers .....	62
Table 23: Audiology First Specialist Assessment outcomes .....	64
Table 24: Progression of Decay (Lift the Lip Score) by Enrolment Status.....	69
Table 25: Dental Assessment outcomes by enrolment status .....	69
Table 26: Dental Assessment outcomes by Progression of Decay (Lift the Lip Score) .....	69
Table 27: Outcomes for children referred to ARDS Jul - Dec 2012 with decay levels 5 or 6 .....	71
Table 28: Growth outcomes by height and weight percentiles.....	73
Table 29: Children with immunisations complete Up to 15 months.....	76
Table 30: Children with Immunisations complete up to 4 years .....	77
Table 31: Immunisation outcomes by immunisation status .....	77
Table 32: PEDS pathway results by financial year .....	83
Table 33: SDQ-P total difficulties score range results by financial year .....	83
Table 34: SDQ-T total difficulties score range results by financial year .....	83
Table 35: Vision outcomes by financial year .....	84
Table 36 Hearing outcomes by financial year.....	84
Table 37: grouped Lift the Lip Score results by financial year .....	84
Table 38: Ministry of Health WCTO Quality Improvement Framework B4SC Quality Indicators .....	98
Table 39: SDQ-P Scale score ranges for those with an abnormal SDQ-P total difficulties score .....	100
Table 40: SDQ-P Scale score ranges for those with a borderline SDQ-P total difficulties score.....	100
Table 41: SDQ-P Scale score ranges for those with a normal SDQ-P total difficulties score .....	100
Table 42: SDQ-T Scale score ranges for those with an abnormal SDQ-T total difficulties score .....	101
Table 43: SDQ-T Scale score ranges for those with a borderline SDQ-T total difficulties score .....	101
Table 44: SDQ-T Scale score ranges for those with a normal SDQ-T total difficulties score .....	101
Table 45: PEDS Pathway results by Quintile of NZDep2006.....	102
Table 46: Those with abnormal SDQ-P and SDQ-T total difficulties scores by Quintile of NZDep2006	102
Table 47: Selected vision screening outcomes by Quintile of NZDep2006 .....	102
Table 48: Selected hearing screening outcomes by Quintile of NZDep2006 .....	103

## LIST OF FIGURES

Figure 1: B4SC status of a six month birth cohort, by Quintile of NZDep2006.....	23
Figure 2: B4SC status of a six month birth cohort, by ethnicity .....	24
Figure 3: Percentages of PEDS Pathway A, B and D children with selected outcomes .....	29
Figure 4: Numbers of PEDS Pathway A, B and D children with selected outcomes .....	29
Figure 5: Percentages of children By SDQ-P and SDQ-T total difficulties score ranges for those that completed both .....	36
Figure 6: Percentages with abnormal or borderline SDQ-P scale score ranges .....	37
Figure 7: Percentages with abnormal or borderline SDQ-T scale score ranges .....	38
Figure 8: Percentages with SDQ-P scales in the abnormal range by SDQ-P total difficulties category ..	38
Figure 9: Percentages with SDQ-T scales in the abnormal range by SDQ-T total difficulties category ..	39
Figure 10: Selected outcomes by SDQ-P total difficulties score range.....	40
Figure 11: Selected outcomes by SDQ-T total difficulties score range .....	40
Figure 12: Days between B4SC referral being sent and being received by MoE SES .....	44
Figure 13: MoE SES waiting list times .....	45
Figure 14: PEDS Pathways of all children referred to Kidz First for a developmental assessment .....	51
Figure 15: SDQ-P total difficulties score range for all those referred for developmental assessment ..	53
Figure 16: Numbers with selected hearing outcomes by audiometry and tympanometry results.....	61
Figure 17: Numbers with dental assessment outcomes by 'Lift the Lip' Score .....	69
Figure 18: Numbers of children with selected outcomes for Growth .....	73

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# INTRODUCTION

## BACKGROUND

### THE BEFORE SCHOOL CHECK (B4SC)

In New Zealand all children are eligible for the free Well Child/Tamariki Ora programme which monitors the growth and development of children from shortly after birth until 4 years of age. The Before School Check (B4SC) was introduced in 2008 and constitutes the 8<sup>th</sup> and final Well Child check. The check aims to identify and address any health, behavioural, social or developmental concerns which could affect a child's ability to get the most benefit from school<sup>1</sup>. The Ministry of Health funds the delivery of the programme on a fee for service basis.

The B4SC is a comprehensive assessment and includes the following:

- A child health questionnaire
- Hearing and vision screening through sweep audiometry, tympanometry and distance visual acuity
- Measurement of height and weight
- Behavioural and developmental assessment using the Strengths and Difficulties Questionnaire (SDQ) and Parental Evaluation of Developmental Status (PEDS) tools
- An oral health screen using the Lift the Lip resource and check for enrolment in a school dental clinic
- Health promotion and education – providing information resources, advice and support as appropriate
- Referrals to appropriate health, education or social service where the B4SC has identified the need for such services.

The B4SC programme was piloted from August to November 2007 in Whanganui and Counties Manukau DHBs. A formative evaluation of these pilots informed the planning for the national roll-out of the service in 2008.

Some DHBs use a predominantly primary health care-based service delivery model, while others, including CMDHB, use a more public health or Well Child nursing-based approach.

### COUNTIES MANUKAU DHB B4SC PROGRAMME

Within CMDHB there is a full time B4SC co-ordinator. The B4SC co-ordinator sends out B4SC invitations to children resident in Counties Manukau DHB, in the month the child turns 4 years old. Most components of the B4SC are carried out in a one hour long appointment with a nurse. At Counties Manukau DHB, Plunket is the main provider of the B4SC programme. However there are 3 smaller providers that also deliver the B4SC to children that have generally been under their care for the previous seven core Well Child checks. These include:

- Raukura Hauora o Tainui
- Southseas Health Care Trust
- Tamariki Ora (Papakura Marae)

Nurses work out of Plunket rooms, clinics or make home visits.

The Hearing and Vision components are tested separately by dedicated vision and hearing technicians (VHTs). The VHTs are employed by the CMDHB provider arm. They visit early childhood education (ECE) centres on rotation to undertake the tests. They also run clinics and do home visits for children not attending ECE centres. The hearing and vision components are therefore generally completed on a different day to the nurse led components (can either be before or after).

The nurses complete a 'minimum requirements form' (MRF) for each child and this data is entered into the Before School Check Information System (B4SC IS) by dedicated data entry personnel. Each provider is responsible for entering information pertaining to the checks they complete. The vision and hearing data is generally entered by an administration person but due to high workload the VHT team leader has been completing data entry for the past 12 months.

If issues are identified, referrals are made to secondary services as appropriate by the nurse or VHT. More difficult cases should be discussed first with the provider's clinical leader or the VHT team leader. Clinical leaders and the VHT team leader were until recently able to discuss the more complex cases with the Clinical Advisory Group (CAG) but CAG meetings were disestablished in mid 2013. These were held monthly and were attended by representatives from Developmental Paediatrics, the Ministry of Education and the Whirinaki Child and Adolescent Mental Health Service as well as by the clinical leaders, B4SC co-ordinator, the VHT team leader and a public health physician. The CAG meetings were discontinued due to poor attendance by Well Child providers and other sectors. The clinical B4 school coordinator is now the first point of contact for nurses to access support or assistance when concerns for a child are identified. The Plunket Clinical Leader still has the opportunity to discuss difficult cases with the developmental paediatrician at Kldz First intake meetings.

The Ministry of Health reimburses CMDHB for delivering the B4SC programme once all components of the B4SC have been completed and data has been entered into the B4SC IS. The DHB in turn is responsible for reimbursing the providers of the nurse-led components for their service delivery.

## CONTEXT FOR UNDERTAKING AN AUDIT OF THE CMDHB B4SC PROGRAMME

CMDHB have concerns about the quality of the B4SC programme as it is being delivered currently. There are also concerns about whether children who are identified with potential problems through the B4SC are receiving timely and effective follow up interventions.

The B4SC is effectively a screening programme. In 2003 the National Health Committee (NHC) developed a set of eight criteria which it recommended should be considered when developing a screening programme in New Zealand<sup>2</sup>. The NHC screening criteria can be used as a framework to summarise the various issues regarding the B4SC programme. The framework is worked through in detail in Appendix One but the key concerns are:

1. There are indications that the programme may be failing to screen significant percentages of children who are considered to be at highest risk by virtue of their ethnicity or area of residence. A screening programme that fails to gain participation of the most vulnerable sub groups of the population potentially stands to increase rather than decrease inequalities in healthcare.
2. There are no randomised controlled trials of the B4SC. Two pilot programmes were undertaken (Counties Manukau and Wanganui DHBs) in late 2007. A study of the development and behavioural outcomes of the CMDHB B4SC pilot did not support roll out of the programme<sup>3</sup>. In particular poor parental acceptability of follow up was highlighted as a major issue. The need for a second screen for developmental issues to avoid unnecessary over-referrals was also evident. Secondary service capacity was considered a potential issue and it was felt the pilot had not demonstrated overall benefit<sup>3</sup>.
3. Developmental disorders lie on a spectrum of severity and there are ill-defined cut-off points for what is normal and abnormal. The somewhat subjective nature of diagnosis and the fact that for some developmental conditions there is little evidence for effective interventions makes their suitability for mass screening debatable<sup>3</sup>.
4. The reliability and validity of the PEDS and SDQ tools used in the B4SC are both felt to be questionable with neither of these screening tools validated in the New Zealand population.
5. A large number of children who are referred to audiology and ophthalmology secondary services following B4SC screening are normal on further assessment (false positives). Although it is to be expected that some false positives will occur, the current numbers impact significantly on the workload of the secondary services involved and potentially affecting their capacity to offer appointments to other patients referred to their services.

6. Some secondary service providers note that the information provided to them by the B4SC is insufficient for them to judge whether an assessment by their service is merited.
  
7. Accessibility of interventions to children identified with potential problems as part of the B4SC appears sub optimal. For example:
  - a. The Ministry of Education (MoE) is unable to offer their speech language early intervention programme to many children referred from the B4SC as the children are deemed too old for their service.
  - b. Eligibility issues for children accessing secondary health services have been shown to be a barrier for both truly ineligible and eligible children receiving assessment and treatment by CMDHB secondary services. In 2012 a brief analysis of this issue was undertaken. The report concluded that proving eligibility was a barrier to access for secondary services for some children referred by the B4SC team (16% audiology, 9% vision) whether or not they were truly ineligible<sup>4</sup>. Referral processes and the process for proving eligibility are outlined in Appendix Two.
  - c. There are long waiting lists for all secondary service first specialist appointments.
  - d. There is little evidence for effective programmes targeting obesity for those aged 4 or under and there are therefore no funded programmes for this age group in CMDHB<sup>5</sup>.

## THE WELL CHILD / TAMARIKI ORA QUALITY IMPROVEMENT FRAMEWORK

In July 2013 the Ministry of Health published the Well Child / Tamariki Ora (WCTO) Quality Improvement Framework<sup>6</sup>. The Framework was developed as a response to the realisation that there was significant practice variability, a lack of consistent training and no specific quality assurance or improvement processes across WCTO providers. It has three high-level aims, focusing on individual (family/whānau) experience, population health and best value for the health system resource. The Framework sets quality indicators to audit performance and to enable regular monitoring across all services. The indicators that relate to the B4SC are tabulated in Appendix Three.

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# AIMS AND OBJECTIVES

## AIMS

- To assess the quality of the B4SC programme as it is being delivered in CMDHB.

## OBJECTIVES

To analyse routinely collected health data from multiple sources in order:

- to identify any deficits in processes and or pathways that could be negatively impacting on the overall quality of the B4SC programme delivery at CMDHB
- to explore whether the B4SC is being equitably delivered (by ethnicity, and area of deprivation)
- to examine any trends in percentages of children identified with potential problems through the B4SC over time, by ethnicity and deprivation (quintile of NZDep2006)
- to explore how many children are identified with potential problems during their B4SC
- to explore how many children receive appropriate action after failing a B4SC screening test
- to explore how many children receive a timely intervention after being referred to selected secondary services, by the B4SC
- to explore the sensitivity of the PEDS and SDQ tools by retrospectively analysing B4SC screening results for a cohort of children referred to Kidz First developmental services.

## METHODS

### SCOPE

The Ministry of Health recognises five key dimensions of quality in healthcare. These are:

1. People Centeredness
2. Accessibility and Equity
3. Safety
4. Effectiveness
5. Efficiency

Although this audit aims to assess the quality of the B4SC programme in CMDHB it will focus primarily on the dimensions of accessibility and equity, effectiveness and efficiency. A thorough evaluation of the people centeredness of the programme would require obtaining feedback from participants and providers of the programme which was not possible with the resources available for this audit. There are no particular concerns being voiced regarding the safety of the programme.

A detailed analysis of the vision pathway of the B4SC is 'out of scope' as an evaluation of this component has recently been undertaken by Miriam Langeslag-Smith.<sup>7</sup>

### DATA SOURCES

During this audit the following data sources were used:

1. Before School Check Information System (B4SC IS)
2. Ministry of Education Case Management System (MoE CMS)
3. Auckland Regional Dental Service (ARDS) Report
4. CMDHB Concerto iPM
5. Paediatrics Developmental intake meeting spread sheet
6. Incredible Years database

#### *1. B4SC Information System*

The B4SC Information System (B4SC IS) is a national database that captures and stores data relating to each child including: consent details, demographic details, caregiver and health provider details and any issues identified and referrals made for each component of the B4 school check<sup>8</sup>. The overall purpose of the B4SC IS is to track improved outcomes. The B4SC IS is also used by the Ministry of Health (MoH) to calculate monies reimbursable to each DHB for their delivery of the programme.

The variable quality of data, especially in the early years of the programme, makes it difficult to ascertain how well the programme performed in the early years and limits the validity of comparisons over time. There were some modifications made to the B4SC database at the

beginning of the July 2012 aimed at improving the database. Most of the analyses will therefore be limited to the most recent complete financial year (1<sup>st</sup> July 2012 - 30<sup>th</sup> June 2013).

## *2. Ministry of Education Case Management System*

The Ministry of Education (MoE) Case Management System (CMS) records details of children referred to the Ministry for Special Education Services (SES) and / or speech language therapy (SLT). Information for this report was sought for children referred to the MoE July 2012 – December 2012 inclusive. Fields obtained included:

- Date referral received
- Date intervention started
- Status of case (closed, active)

Information on the actual intervention received by children was requested but was not provided.

## *3. ARDS B4SC Enrolment Report*

A report detailing the names of all children aged 4 to 5 enrolled with the Auckland Regional Dental Service as of September 2013 was accessed. This included the date of first appointment and completion status (active, completed) for each child.

## *4. Concerto iPM*

Concerto is the medical applications portal that provides access to a patient's data at CMDHB. The CMDHB Concerto inpatient Management System (iPM) was used in order to gather information on B4SC referrals to audiology and developmental paediatrics. The database was searched using the child's NHI.

The referrals tab in iPM was accessed to gather information on whether and when a referral had been received whether it was accepted or rejected by the service. The outpatient tab provided information on the date of first specialist appointment (FSA), dates of any follow up appointments and whether appointments had been attended. The clinical documents tab was used to search for clinic letters to obtain information on the outcome of any assessments.

## *5. Paediatrics Developmental Intake Meeting Information*

Paediatric Developmental Intake meetings are held every Wednesday except the third Wednesday of each month. All referrals received by Kidz First for developmental and / or behavioural problems are reviewed at this meeting and either accepted, declined or assessed as requiring more information or being more suitable for another service.

A list of the names, NHIs and dates of birth of all children accepted for developmental assessment was obtained from the intake meeting spread sheets for the time period January 2013 to July 2013 inclusive.

## 6. Incredible Years database

Numbers of families completing an Incredible Years parenting programme were requested for a six month cohort of referrals. The Incredible Years database however only contains the names and contact details of the parents who are currently on the waiting list for this MoE parenting programme. The details of parents who have declined, completed a course or who are attending a parenting programme run by NGOs subcontracted by the MoE are not kept<sup>9</sup>.

### DATA ANALYSIS

Programme coverage 2012/13 was assessed by looking at the number of children seen as part of the B4SC programme, number actively declining the programme and number not responding to the invitation letters at all. Children were also divided into groups according to whether they had completed the whole B4SC or just the VHT components. The demographic variables (ethnicity, gender and area of deprivation) of each group were analysed in order to assess whether there are any particular inequalities with respect to programme coverage / participation rates in CMDHB.

A more detailed analysis was then undertaken for each individual component of the B4SC. The numbers and percentages of children who had problems identified during screening and their screening outcomes, for children seen in the 2012/13 financial year are given.

As the B4SC comprises several components undertaken by at least two different health care professionals (a nurse and a VHT) usually on at least two separate days there is no one date that easily reflects the date of the B4SC for each child. Children were identified as having their B4SC in 2012/13 by using the relevant 'date completed' fields in the B4SC IS for each component. The only exception was that for the SDQ-T the 'SDQ-P date completed' was used.

Referrals to secondary services are also described as are the outcomes of referrals to selected providers. The latter was undertaken in order to assess how many children who are identified with potential issues during their B4SC receive a timely and effective intervention. The providers were:

- The Ministry of Education Special Education Services
- Incredible Years Parenting Programme
- Audiology services CMDHB
- The Auckland Regional Dental Service

In a separate section the PEDS pathways and SDQ scores were retrospectively analysed for a cohort of children diagnosed with a developmental or behavioural issue after referral to Kidz First. The aim of this was to try and establish whether the PEDS and SDQ reliably pick up these children.

Lastly trends in percentages of children with issues identified through the B4SC are presented for each component 2008 to 2013.

Data was analysed and Figures were compiled using Microsoft Excel 2010.

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# PROGRAMME COVERAGE

## PROGRAMME COVERAGE FOR A SIX MONTH COHORT OF CHILDREN

### KEY POINTS

- Programme coverage for children born 01/01/2008 to 30/06/2008 was 80.9%.
- 10.7% of children that have a B4SC only complete the Hearing and Vision components.
- Children who live in more deprived areas (by quintile of NZ deprivation 2006) are relatively less likely to have a B4SC.
- Maaori and Pacific children are less likely to complete the B4SC than Asian and European children.
- Only 74.9% of Pacific children and 78.9% of Maaori children born 01/01/2008 to 30/06/2008 accepted all or part of the B4SC.

### METHODS

In CMDHB there were 4,930 children with a date of birth (DOB) 1<sup>st</sup> January 2008 to 30<sup>th</sup> June 2008 who were invited to have a B4SC. These children turned 5 years old between 1<sup>st</sup> January 2013 and 30<sup>th</sup> June 2013.

These children were divided into those that had all had the B4SC, those that just completed the VHT components and those that had no B4SC. The three groups were analysed separately to see if there were any demographic differences evident. The numbers in this report vary slightly from statistics on programme coverage published by the Ministry of Health (MoH) as in the MoH statistics the B4SC is considered completed if it has been 'offered' (i.e. an informed consent discussion has taken place with the child's parent or caregiver)<sup>10</sup>. This means that the B4SC is recorded as 'complete' if the parent / caregiver actively declines the B4SC. In this analysis children documented as having had a B4SC but who actually had all components declined were not considered to have had the B4SC. Likewise children who had all components ticked but who were documented as actually declined for all the nurse led components were considered to have only completed the VHT part of the check. No children just completed the nurse led components.

### RESULTS

In total 3,986 children (80.9%) had all or part of a B4SC prior to their 5<sup>th</sup> birthday and 944 (19.1%) did not. Of the 3,986 children that did have the B4SC, 427 children (10.7%) only had the hearing and vision components completed and 3,559 (89.3%) had the complete B4SC.

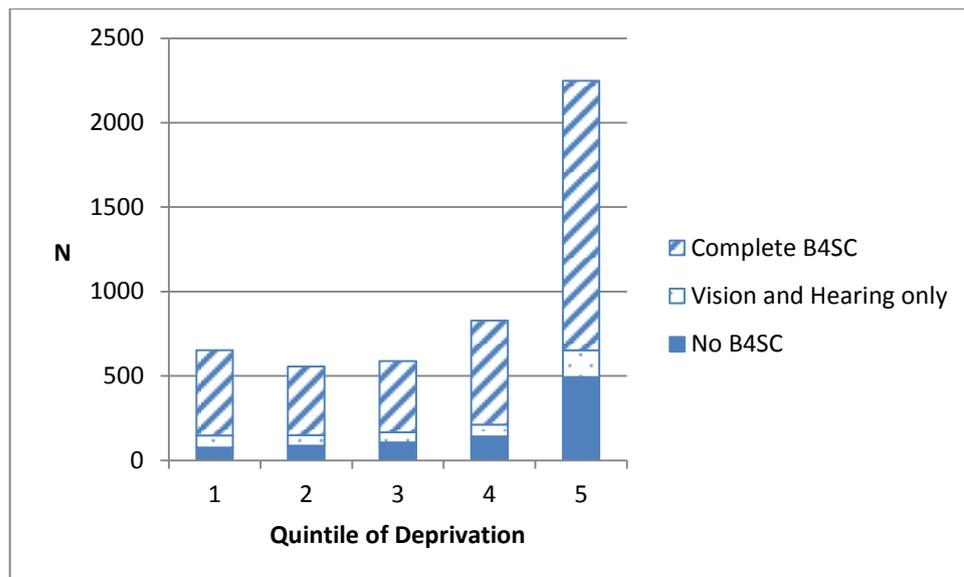
Of the 944 children that did not have the check 31 actively declined (0.6%). Of these, 27 were documented as completed or 'assigned VHT completed' when they had actually

declined all components and 4 had refused consent and were 'closed'. The remaining 913 records were blank with their status field 'assigned'.

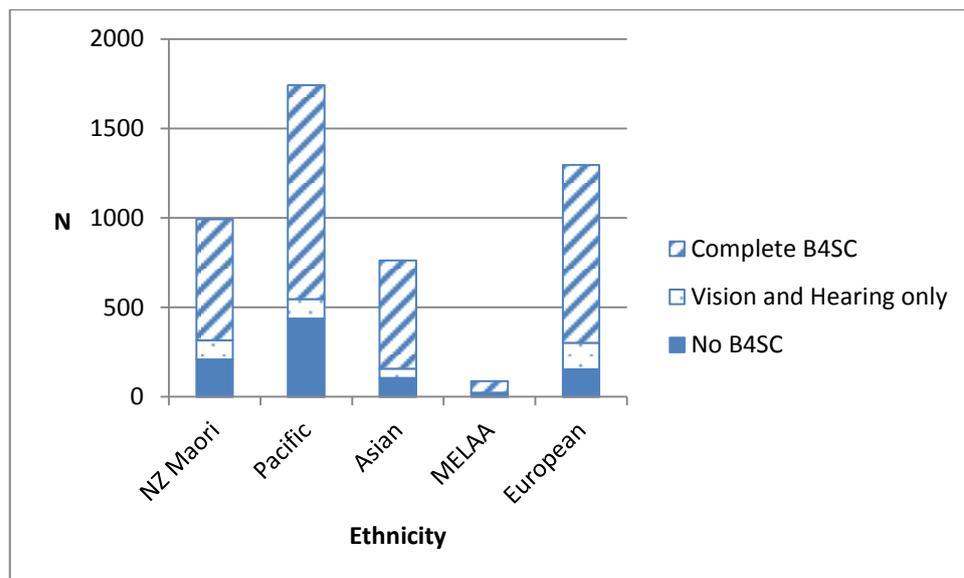
Using quintile of NZ deprivation 2006 as a marker of deprivation, children who lived in more deprived areas were less likely to have a check than those living in better off areas (Table 1, Figure 1). Only 11.5% of those living in quintile 1 failed to have any components of the check compared with 21.9% in quintile 5. In contrast 77.6% of those living in quintile 1 areas had a complete B4SC compared with 71.0% of those in quintile 5 (Table 1).

There were no gender differences between the three groups but there were differences in coverage by ethnicity (Table 1, Figure 2). Statistically higher percentages of Asian and European children (79.3% and 76.7% respectively) had a complete B4SC compared with Pacific and Maaori children (68.6% and 68.2% respectively) (Table 1). Conversely higher percentages of Maaori and Pacific children did not have any component of the B4SC compared with European and Asian children. European and Maaori children were statistically more likely than children of other ethnicities to just complete the VHT components of their check (Table 1).

**FIGURE 1: B4SC STATUS OF A SIX MONTH BIRTH COHORT, BY QUINTILE OF NZDEP2006**



**FIGURE 2: B4SC STATUS OF A SIX MONTH BIRTH COHORT, BY ETHNICITY**



## DISCUSSION

The Ministry of Health (MoH) publish regular statistics on whether DHBs are meeting their target coverage for their total and Maori and Pacific populations. The CMDHB target for 2012/13 was 80%. CMDHB coverage is good according to MoH analyses and the B4SC team have worked hard to achieve this coverage given the complexities of rolling out a B4SC in a large and relatively deprived DHB population such as CMDHB. However the MoH classify offering the check as ‘completed’ in their analyses of coverage. If checks that are declined are omitted then coverage is slightly less. In reality only three quarters of Pacific children actually had a B4SC in 2012/13 and the percentage of Maaori children taking up the invitation to have a B4SC although higher than the percentage of Pacific children, was smaller than the percentages of Asian or European children. In order to reduce inequalities the check needs to not only be offered to families but also taken up so that potential problems in children can be identified and addressed. If some ethnicities are more frequently actively declining a B4SC then this is a concern. The Ministry has recently commissioned a piece of work looking into the influences on uptake of the B4SC.<sup>10</sup> It is likely that the majority of the barriers identified in this evaluation will be relevant to CMDHB and that we are facing the same issues as other DHBs nationwide. For 2013/14 the target for coverage is 90%. The last few children are often the hardest to reach. The Ministry is assisting DHBs to increase their coverage in the coming year.

## RECOMMENDATIONS

1. Maintain a focus on equity of programme delivery by ethnicity and deprivation, to potentially address inequalities in health that are apparent in the CMDHB population.

**TABLE 1: B4SC STATUS OF A SIX MONTH BIRTH COHORT BY DEMOGRAPHIC VARIABLES**

Demographic Variable	Without B4SC		VHT only		Total B4SC		Total in Cohort	
	N	%	N	%	N	%	N	%
<b>Quintile</b>								
1	75	(11.5)	71	(10.9)	506	(77.6)	<b>652</b>	<b>(100.0)</b>
2	86	(15.5)	62	(11.2)	408	(73.4)	<b>556</b>	<b>(100.0)</b>
3	105	(17.9)	60	(10.2)	422	(71.9)	<b>587</b>	<b>(100.0)</b>
4	140	(16.9)	70	(8.5)	618	(74.6)	<b>828</b>	<b>(100.0)</b>
5	492	(21.9)	159	(7.1)	1,596	(71.0)	<b>2,247</b>	<b>(100.0)</b>
<b>Gender</b>								
Female	457	(19.4)	201	(8.5)	1,703	(72.1)	<b>2,361</b>	<b>(100.0)</b>
Male	487	(19.0)	224	(8.7)	1,852	(72.3)	<b>2,563</b>	<b>(100.0)</b>
<b>Ethnicity</b>								
NZ Maaori	210	(21.1)	106	(10.7)	677	(68.2)	<b>993</b>	<b>(100.0)</b>
Pacific	438	(25.1)	109	(6.3)	1,195	(68.6)	<b>1,742</b>	<b>(100.0)</b>
Asian	106	(13.9)	52	(6.8)	604	(79.3)	<b>762</b>	<b>(100.0)</b>
MEELA	21	(23.6)	3	(3.4)	65	(73.0)	<b>89</b>	<b>(100.0)</b>
European	154	(11.9)	148	(11.4)	995	(76.7)	<b>1,297</b>	<b>(100.0)</b>
<b>Total*</b>	<b>944</b>	<b>(19.1)</b>	<b>427</b>	<b>(8.7)</b>	<b>3,559</b>	<b>(72.2)</b>	<b>4,930</b>	<b>(100.0)</b>

\* Numbers may not sum to total as there were a small number of children whose quintile, gender and ethnicity were unknown.

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# PARENTS' EVALUATION OF DEVELOPMENTAL STATUS (PEDS)

## PARENTS' EVALUATION OF DEVELOPMENTAL STATUS (PEDS) 2012/13

### KEY POINTS

- Only 3.4% of children were allocated to PEDS pathway A. This is lower than expected by international standards.
- 53.8% of PEDS A children live in quintile 5 neighbourhoods.
- The documented shaded scores did not always match the PEDS Pathway allocated in the B4SC IS. 15/238 PEDS A children had a shaded score of 1 or 0 and 64 PEDS B – E children had a shaded score of 2 or more.
- Not all PEDS A children had an appropriate outcome. In total 43 PEDS A children (22%) were documented as neither referred or already under care.
- Although the percentages of children either referred or under care are highest for PEDS A children, in terms of numbers, more children that are referred or under care are PEDS B.
- The majority of referrals are for speech language therapy. In 2012/13, 77/238 PEDS A children (32.4%) were referred to the Ministry of Education for their services.

### PEDS OVERVIEW

The Parental Evaluation of Developmental Status (PEDS) is a questionnaire for parents to detect developmental and behavioural problems in children from birth to eight years. The PEDS has 10 general questions about behaviour, development, speech and language, fine and gross motor skills<sup>1</sup>.

Children are allocated to PEDS Pathway A (PEDS A) when parents have identified 2 or more significant concerns (shaded score 2 or more) about their child. The higher the shaded score the more significant concerns the parent has about their child. Pathway B is for children for whom the parent has identified one significant concern (shaded score = 1). Pathway C is where a parent has identified a non-significant concern. Children are allocated to Pathway D when there is a parental communication difficulty and for whom further assessment may therefore be indicated and Pathway E is for children for whom there are no concerns<sup>1</sup>.

### PEDS SHADED SCORES AND PATHWAYS

From 1<sup>st</sup> July 2012 to 30<sup>th</sup> June 2013 7,045 children had a PEDS assessment completed. In total 238 (3.4%) were allocated to Pathway A, 952 (13.5%) to Pathway B and 22 (0.3%) to Pathway D. The remaining children were assessed as either Pathways C or E. Internationally the PEDS tool has been found to identify much higher percentages of potential problems than found in CMDHB. For instance Australian and U.S. data is as follows: Path A/high risk (9% Australia, 11% US), Path B/moderate risk (19% Australia, 23% US); Path C/low risk, (24% Australia versus 20% US) and Path E/ low risk, no concerns (48% Australia, 43% US)<sup>11</sup>.

By quintile of deprivation 53.8% of PEDS A children and 43.1% of PEDS B children live in quintile 5 neighbourhoods (by comparison 43.4% of children who had a PEDS 2012/13 live in quintile 5 areas).

The shaded scores of children allocated to each PEDS Pathway are shown in Table 2. The shaded boxes contain the numbers of children who are allocated to the wrong PEDS Pathway according to their shaded score.

The majority (59.7%) of PEDS A children had a shaded score of 2. The highest shaded score was 7. In total 15 children were allocated to Pathway A although they had a shaded score of 1 or 0. Four PEDS A children with shaded scores <2 were still referred to secondary services.

**TABLE 2: SHADED SCORES BY PEDS PATHWAY**

Shaded Score	PEDS A	PEDS B	PEDS C	PEDS D	PEDS E	Total
0	6	59	720	10	4,951	5,746
1	9	855	103	8	37	1,012
2	142	32	16	1	1	192
3	51	5	3	1	1	61
4	21	1	1			23
5	5			2		7
6	3					3
7	1					1
<b>Total</b>	<b>238</b>	<b>952</b>	<b>843</b>	<b>22</b>	<b>4,990</b>	<b>7,045</b>

Sixty-four children had a shaded score of 2 or more (max 5) but were not allocated to Pathway A. The majority of these children (59%) were instead allocated to Pathway B. Of these, 14/64 had a PEDS referral and 14/64 were documented as under care. The remaining 36 had no referrals secondary to their PEDS assessment although 12/36 had referrals due to other components of the B4SC. A further 148 children should have been allocated to pathway B (shaded score 1) but instead were allocated to Pathways C, D or E.

## PEDS OUTCOMES

The numbers and percentages of children with each different outcome are given by PEDS Pathway in Table 3. Table 4 shows outcomes for the children with a shaded score of 2 or more, by pathway. In general children with a shaded score of 2 or more (particularly those incorrectly allocated to PEDS B or PEDS C) are more likely to be referred or under care than those with a shaded score of 1 or 0.

TABLE 3: PEDS OUTCOMES BY PEDS PATHWAY

Outcome	PEDS A		PEDS B		PEDS C		PEDS D		PEDS E		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Advice Given	42	(17.6)	458	(48.1)	532	(63.1)	13	(59.1)	333	(6.7)	1,378	(19.6)
Not Referred	1	(0.4)	181	(19.0)	185	(21.9)	2	(9.1)	4,635	(92.9)	5,004	(71.0)
Referral Declined	5	(2.1)	25	(2.6)	25	(3.0)	2	(9.1)	3	(0.1)	60	(0.9)
Referred	94	(39.5)	174	(18.3)	71	(8.4)	3	(13.6)	4	(0.1)	346	(4.9)
Under Care	93	(39.1)	113	(11.9)	28	(3.3)	2	(9.1)	15	(0.3)	251	(3.6)
Unknown	3	(1.3)	1	(0.1)	2	(0.2)					6	(0.1)
<b>Total</b>	<b>238</b>	<b>(100.0)</b>	<b>952</b>	<b>(100.0)</b>	<b>843</b>	<b>(100.0)</b>	<b>22</b>	<b>(100.0)</b>	<b>4,990</b>	<b>(100.0)</b>	<b>7,045</b>	<b>(100.0)</b>

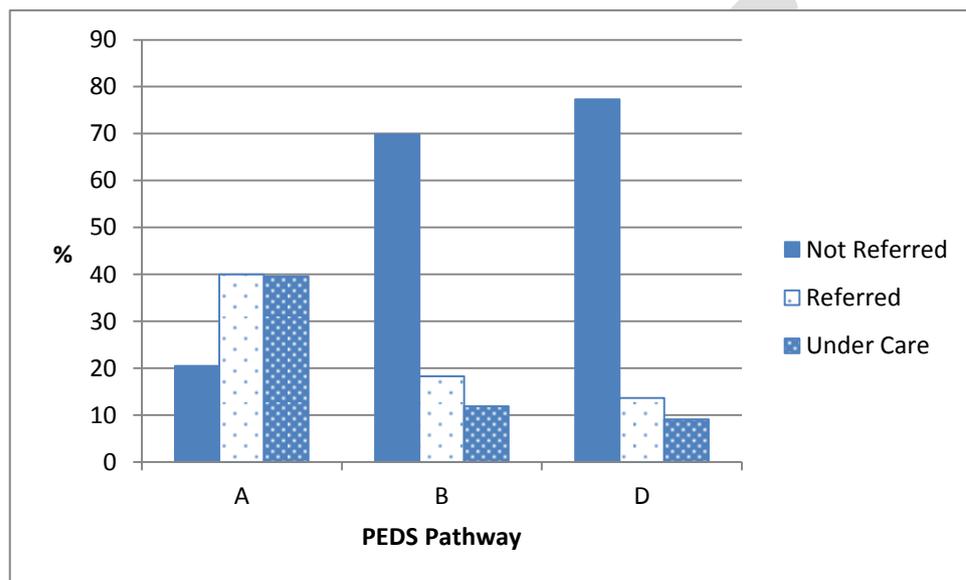
TABLE 4: PEDS OUTCOMES BY PEDS PATHWAY FOR CHILDREN WITH SHADED SCORES OF 2 OR MORE

Outcome	PEDS A		PEDS B		PEDS C		PEDS D		PEDS E		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Referred	91	(40.8)	9	(23.7)	3	(15.0)					103	(35.9)
Under Care	89	(39.9)	11	(28.9)	2	(10.0)			1	(50.0)	103	(35.9)
Other*	43	(19.3)	18	(47.4)	15	(75.0)	4	(100.0)	1	(50.0)	81	(28.2)
<b>Total</b>	<b>223</b>	<b>(100.0)</b>	<b>38</b>	<b>(100.0)</b>	<b>20</b>	<b>(100.0)</b>	<b>4</b>	<b>(100.0)</b>	<b>2</b>	<b>(100.0)</b>	<b>287</b>	<b>(100.0)</b>

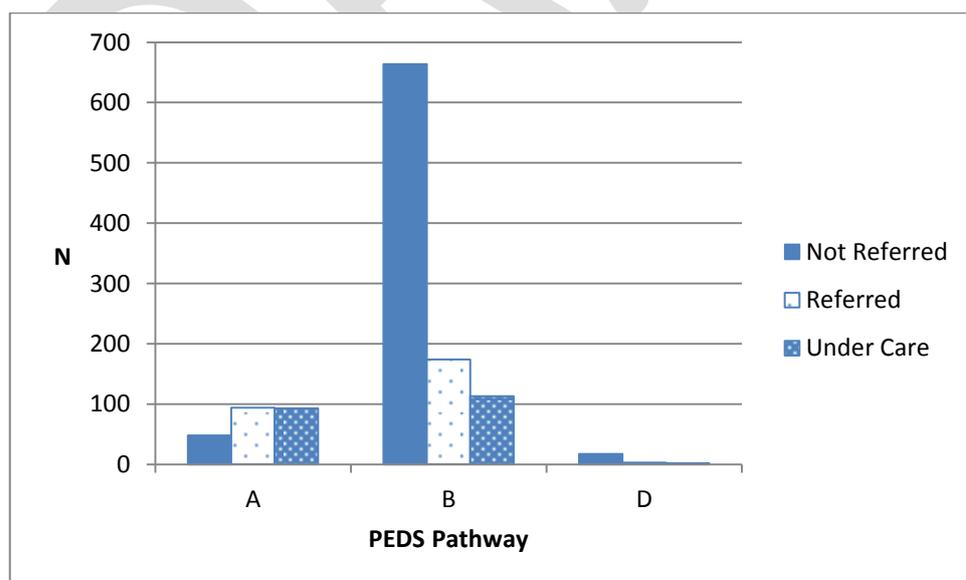
\* Advice given, not referred, referral declined, unknown

The percentage and numbers of children with selected outcomes are also shown for PEDS Pathways A, B and D in Figures 3 and 4 respectively. Most notably although the highest percentages of children either referred or under care are allocated to Pathway A (total 78.6%) – in terms of numbers there are more children allocated to Pathway B who are actually under care or referred (287 PEDS B compared with 187 PEDS A). Despite the parent(s) voicing 2 or more significant concerns 81 children (43 PEDS A) were neither referred or under care.

**FIGURE 3: PERCENTAGES OF PEDS PATHWAY A, B AND D CHILDREN WITH SELECTED OUTCOMES**



**FIGURE 4: NUMBERS OF PEDS PATHWAY A, B AND D CHILDREN WITH SELECTED OUTCOMES**



## PEDS REFERRALS

There were 395 PEDS referrals made from 1<sup>st</sup> July 2012 to 30<sup>th</sup> June 2013 inclusive for a total of 363 children. Twenty-eight children had 2 referrals made on their behalf in this time period and two had 3 referrals made. The referrals were to several different providers as listed in Table 5. In total 96 referrals were in PEDS A children, 179 in PEDS B, 77 PEDS C, 4 PEDS D and 6 PEDS E.

The majority of referrals were to the Ministry of Education (MoE) followed by parenting programmes. A number of children were also referred to audiology or a VHT rescreen (of note, a VHT rescreen is not a valid referral pathway). The referrals to audiology may partially reflect the fact that the Papakura MoE office requires children to have a full audiology assessment before they will accept referrals for speech language therapy, regardless of their hearing check outcome. A referral to CAG is not a true referral as CAG acts as a triage process to determine the best course of action for children for whom there are particular concerns or whose situation is complex. These children often the require referrals to multiple providers. The data entry for these children is inconsistent.

**TABLE 5 PEDS REFERRALS TO SELECTED PROVIDERS**

Referred To	Number	Notes
<b>Ministry of Education - Special Education</b>	217	
<b>Parenting programme</b>	73	3 IOSIS 11 Triple P 55 Incredible Years 1 HIPPY 3 Unspecified
<b>Audiology</b>	31	
<b>General Practitioner</b>	22	
<b>VHT Rescreen</b>	11	
<b>Ophthalmology</b>	8	
<b>CAG / Clinical Leader</b>	8	
<b>Counselling services / Family Support</b>	11	1 Plunket Kaiawhina 1 Franklin Family Support Services 3 Community Karitane 2 Play Truck 3 ATWC 1 Unspecified
<b>Orthopaedics</b>	5	
<b>Mental Health Services</b>	1	
<b>Paediatrician</b>	1	
<b>Public Health Nurse</b>	3	
<b>B4SC Nurse</b>	1	
<b>Gateway Assessment</b>	1	
<b>GM Kindy</b>	1	
<b>Speech and Language Testing</b>	1	
<b>Total</b>	<b>395</b>	

## DISCUSSION

The key findings were that surprisingly low numbers of children were identified with issues compared with international norms, children did not always have an appropriate screening outcome according to their test results, and referral rates for children identified with issues were low.

In Australia and the US the percentages of children allocated to pathways A or B in similar aged children was 28% and 34% respectively<sup>11</sup> compared with just 17% in CMDHB. It seems unlikely that our population in general has a lower rate of issues but rather that parents and / or nurses are not identifying problems to the same extent in our population using this tool. The percentage of children allocated to pathway A is also lower in CMDHB when compared with many other DHB's in New Zealand, particularly Hawkes Bay and The West Coast which have rates of approximately 10%<sup>12</sup>. It is however similar to Waikato and Auckland DHB's<sup>12</sup>. One factor that might be contributing to the low rate is that CMDHB programme coverage is only 80% and there may be a higher rate of issues in the 20% of children that are not seen. This argument would lend weight to the importance of reaching these remaining children.

The reason(s) underlying why some children were allocated to a pathway that is inconsistent with their shaded scores is unclear. Possibilities include data entry error, misclassification or the level of parental concern changing during the nursing assessment. Anecdotally different providers within CMDHB have different rates of children identified as PEDS A. These are not obviously explained by differences in any demographic variables between the different groups of children seen by the providers.

The flow charts for referrals from the B4SC are shown in Appendix Four. These offer guidance on the type of referral appropriate to each problem that may be identified by each component of the B4SC. For the PEDS the guidance is not strictly aligned to a particular PEDS pathway allocation however it would be expected that a child allocated to PEDS A would need referring to one or more secondary service providers unless they are already under care.

Some of the inconsistency between PEDS pathway allocation and outcomes could be because of incorrect pathway allocation with a correct outcome occurring according to the shaded score results. In other cases an inconsistent outcome was recorded for a correct pathway (43 children with both shaded score over 2 and PEDS A were not referred or under care). When these 43 children had their records checked by the clinical leader it was found that referral was not necessarily indicated for these children. The ability of the PEDS tool to identify children with problems that require referral through allocation to a particular pathway may therefore be suboptimal. Alongside this a greater number of PEDS B children were referred than PEDS A. Referral of a PEDS B child is certainly appropriate if the one concern their parent has is affecting the child's ability to thrive and succeed. It is unclear whether even more PEDS B children might have required referral but were not referred because they were PEDS B.

PEDS guidelines state that when the PEDS is used as a developmental screen it also requires the use of a secondary screen for all pathway B children (and some Pathway D children),

particularly to decrease the chance of referring children unnecessarily<sup>11</sup>. A second screen is also useful for Pathway A children to obtain the quality of information needed to inform a referral (which will be required for Pathway A children to audiology, SLT, intellectual or educational testing). Some secondary services report that referral letters frequently contain insufficient information to be meaningfully prioritised. Therefore PEDS A and B children should routinely have a second assessment (for example the Ages and Stages questionnaire (ASQ) or 'much more than words' resource) to help clarify and determine whether and what type of referral is indicated.

If all of PEDS A and B children were to have an additional assessment this would place significant extra workload on the B4SC providers. The health professionals who undertake these assessments will require training and providers who agree to undertake extra assessments will need to be appropriately reimbursed. Returning for a second assessment was noted to be a potential issue for families in the CMDHB pilot and ideally the ASQ (or equivalent) would be administered during the B4SC.

A study which analysed parent's comments on PEDS forms found that parents concerns were often due to inappropriate developmental expectations for their children or limited health literacy<sup>13</sup>. This study cautioned that screening tools should be used to 'enhance the care provided but not to replace patient provider communication<sup>13</sup>. The ASQ and PEDS have been shown to identify different children with problems<sup>14</sup> with at least one study suggesting that the sensitivity of the ASQ is greater for picking up developmental delay than the PEDS<sup>15</sup>.

Until recently monthly CAG meetings were held to discuss referral options for children for whom the clinical leaders of the B4SC providers had particular concerns. There was a lack of buy in from the smaller providers and some secondary services therefore CAG was discontinued. It may be that without CAG some of the more vulnerable children do not come to the attention of secondary services in as timely a fashion as previously or are referred to inappropriate secondary services. Notably the intersectoral Clinical Advisory Group in Hawkes Bay is felt to be critical to the success of their B4SC programme as it has achieved engagement and commitment from all stakeholders<sup>16</sup>. Hawkes Bay note that their triage process (referrals funnelled through the clinical nurse leader to an intersectoral group of senior clinical leaders) is 'time consuming but has led to very few inappropriate referrals or referrals declined and has contributed to the impact on services being manageable'<sup>16</sup>.

By quintile of deprivation 53.8% of PEDS A children and 43.1% of PEDS B children live in quintile 5 neighbourhoods (by comparison 43.4% of children who had a PEDS 2012/13 live in quintile 5 areas).

## RECOMMENDATIONS

1. Advocate nationally for the introduction of second assessment (for example the Ages and Stages Questionnaire, ASQ, or 'much more than words' resource) for children allocated to PEDS Pathway A and B. This will require adequate training and on going resourcing.

2. Audit PEDS assessments of nurses and providers to ensure assessments are being carried out to a high standard especially in circumstances where a very percentage of children are being identified with potential problems.
3. Liaise with secondary services regarding the information they require for referrals.
4. Audit data entry and provide further data entry training as necessary.
5. Consider reinstating CAG. There is evidence that the presence of a decision body such as CAG leads to improved outcomes for children. The previous lack of buy in to CAG needs to be explored so that it meets the expectations and needs of all participants.

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# STRENGTHS AND DIFFICULTIES QUESTIONNAIRE (SDQ)

## STRENGTHS AND DIFFICULTIES QUESTIONNAIRE (SDQ) 2012/13

### KEY POINTS

- Approximately 5% of children score in the abnormal range for total difficulties (TD) for the SDQ-P and 5% for the SDQ-T.
- The SDQ-Ps and SDQ-Ts identify different children as 'abnormal'. Only 20% of children who have an abnormal SDQ-P that also have an SDQ-T completed, scored in the abnormal range for the latter.
- SDQ-T completion rates are low. Only 25.5% of children that have an SDQ-P completed also have an SDQ-T documented as completed.
- The number of children identified with potential issues is high. In total 1,647 children (23.5% of those with a questionnaire completed) had at least one SDQ-P scale in the abnormal range.
- The most common SDQ-P scale to be scored in the abnormal range was the conduct scale (n =1,081, 15.4%).
- In total 402 children (22.5% of those with a questionnaire completed) had at least one SDQ-T scale in the abnormal range.
- The most common SDQ-T scale to be scored in the abnormal range was the pro-social behaviour scale (n =183, 10.2%).
- By quintile of deprivation 226/364 (62.1%) children with an abnormal SDQ-P lived in quintile 5 neighbourhoods. For the SDQ-T this percentage was 48.3% (43/89 children).
- Referral rates are low. 65.4% of children with an 'abnormal' SDQ-P TD and 76.4% of children with an 'abnormal' SDQ-T TD were neither referred or under care.
- The majority of referrals were to parenting programmes closely followed by the Ministry of Education Special Education Services.

### SDQ OVERVIEW

The Strengths and Difficulties Questionnaire is designed to assess whether a child has difficulties with emotions, concentration, behaviour, or getting along with others. The SDQ comprises five scales that relate to different psychological attributes; Conduct, emotional, peer problems, hyperactivity and pro-social behaviour. Each scale comprises five questions with each answer scoring between 0-2 points, giving a maximum score of 10 for each scale. For each score there is a normal, borderline and abnormal range. All scales with the exception of pro-social behaviour are then added together to obtain a total difficulties score – also divided into abnormal, borderline and abnormal categories<sup>1</sup>.

The SDQ it is considerably more sensitive at identifying issues if both a parent and teacher complete the questionnaire. Answers should be based on the previous 6 months<sup>1</sup>.

Children were identified as having their SDQ-P in 2012/13 by referring to the date entered in the SDQ-P 'date completed' fields for both the SDQ-P and the SDQ-T. This is because the SDQ-T date completed fields tended to reflect the date of data entry rather than date of SDQ-T completion.

## SDQ TOTAL DIFFICULTIES SCORES

In 2012 – 2013 7,002 children had a strengths and difficulties questionnaire completed by a parent (SDQ-P) and 1,788 children had a strengths and difficulties questionnaire completed by a teacher (SDQ-T). In total 1,786 children (25.5%) had both questionnaires completed (only two children had a SDQ-T returned in the absence of a completed SDQ-P).

Overall 364/7,002 (5.2%) SDQ-P's had a total difficulties score in the abnormal range and 428 (6.1%) were in the borderline range. The remaining 6,210 (88.7%) were in the normal range (Table 6).

Similar percentages of SDQ-Ts were found to have a total difficulties score in the abnormal or borderline ranges to the SDQ-Ps. In total 89/1,788 (5.0%) were abnormal, 87/1,788 (4.9%) borderline and 1,612 (90.1%) were normal (Table 6).

Only 70/364 (19.2%) children with an abnormal SDQ-P also had an SDQ-T completed. 14/70 (20%) of these had an SDQ-T result also in the abnormal total difficulties range and 5/70 (7.1%) were borderline. The remaining 51/70 SDQ-T (72.9%) results were normal (table 6,).

Of the 428 children with a borderline SDQ-P total difficulties score, 97(22.7%) had an SDQ-T completed. Of these, 13 (13.4%) were found to be either abnormal or borderline. The remaining 84/97 SDQ-T results fell into the normal total difficulties range (Table 6).

Of the 1,619 children with a normal SDQ-P that also had an SDQ-T completed, 1,475 had a normal SDQ-T total difficulties score. Of those remaining, 69 (4.3%) had an abnormal score and 75 (4.6%) a borderline score (Table 6).

Figure 5 shows the percentages of children with SDQ-T total difficulties scores in the abnormal, borderline and normal ranges, for children in each SDQ-P TD score range that had an SDQ-T completed.

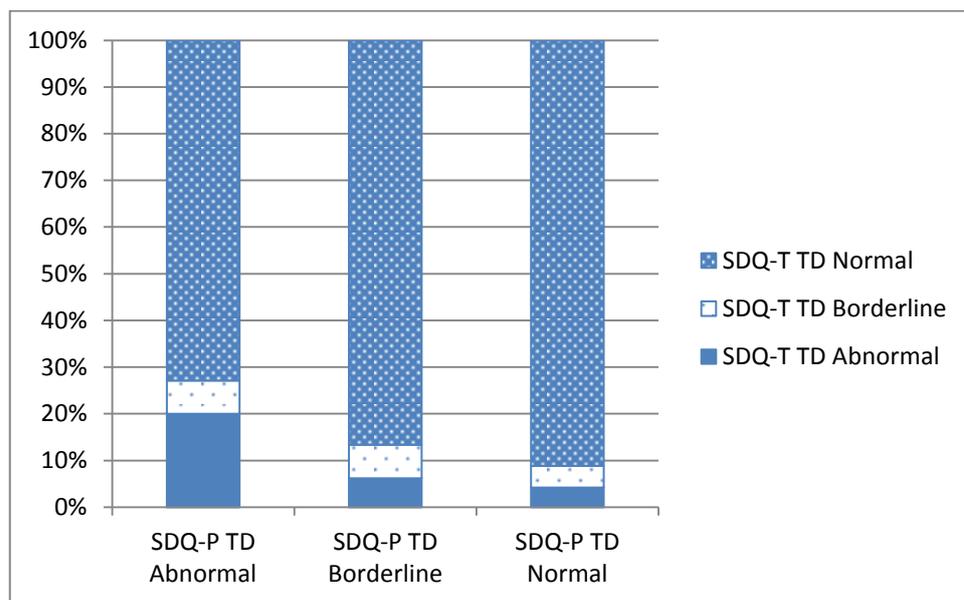
By quintile of deprivation 226/364 (62.1%) children with an abnormal SDQ-P lived in quintile 5 neighbourhoods. For the SDQ-T this percentage was 48.3% (43/89 children).

**TABLE 6: SDQ-P AND SDQ-T TOTAL DIFFICULTIES SCORE RANGES**

SDQ Total Difficulties Scores	SDQ-T Total Difficulties Scores				Total
	Abnormal	Borderline	Normal	Not completed	
SDQ-P Abnormal	14	5	51	294	364
SDQ-P Borderline	6	7	84	331	428
SDQ-P Normal	69	75	1,475	4,591	6,210
<b>Total</b>	<b>89</b>	<b>87</b>	<b>1,610*</b>	<b>5,216</b>	<b>7,002</b>

\*plus 2 SDQ-Ts normal, no SDQ-P completed

**FIGURE 5: PERCENTAGES OF CHILDREN BY SDQ-P AND SDQ-T TOTAL DIFFICULTIES SCORE RANGES FOR THOSE THAT COMPLETED BOTH**



## SDQ SCALES

1,647 children (23.5%) had at least one SDQ-P scale in the abnormal range. The percentages of children with either abnormal or borderline SDQ-P scale scores are shown in Figure 6 for each scale. The numbers and percentages of children with an abnormal or borderline SDQ-P scale score are tabulated below (Table 7). The most common scale to be scored in the abnormal range was conduct ( $n=1,081$ ) followed by peer problems ( $n=620$ ). In contrast just 97 children were abnormal for the SDQ-P prosocial behaviour scale.

All of the 364 children with abnormal SDQ-P total difficulties (TD) score had at least one individual SDQ-P scale in the abnormal range. Twenty-four children were abnormal in all 4 scales contributing to the SDQ-P TD score and 130 were abnormal in 3 scales. The percentages of children with abnormal scales are shown for each SDQ-P TD range in Figure 8. The exact numbers and percentages are tabulated separately for each SDQ-P TD range in Appendix Five. For the 364 children that were in the abnormal SDQ-P TD range altogether 85.4% ( $n=311$ ) had an abnormal conduct scale score and 64.6% ( $n=235$ ) had an abnormal peer problem scale.

**TABLE 7: SDQ-P SCALE SCORE RANGES FOR ALL CHILDREN WITH AN SDQ-P**

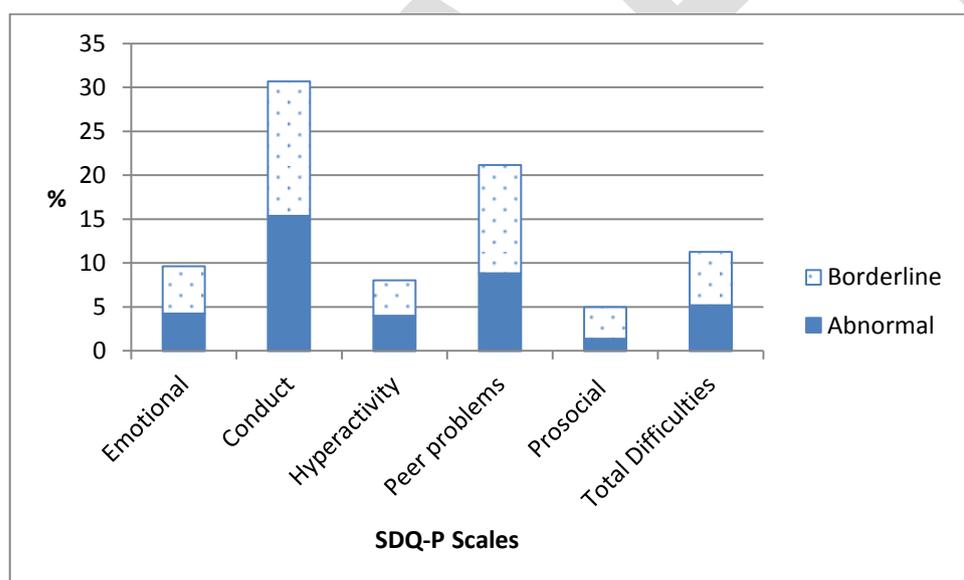
SDQ-P Scale	Abnormal scale		Borderline scale		Normal scale		Total Number
	Number	%	Number	%	Number	%	
<b>Emotional</b>	300	(4.3)	376	(5.4)	6,326	(90.3)	<b>7,002</b>
<b>Conduct</b>	1,081	(15.4)	1,071	(15.3)	4,850	(69.3)	<b>7,002</b>
<b>Hyperactivity</b>	282	(4.0)	282	(4.0)	6,438	(91.9)	<b>7,002</b>
<b>Peer Problems</b>	620	(8.9)	864	(12.3)	5,518	(78.8)	<b>7,002</b>
<b>(Prosocial Behaviour)</b>	97	(1.4)	253	(3.6)	6,652	(95.0)	<b>7,002</b>

TABLE 8: SDQ-T SCALE SCORE RANGES FOR ALL CHILDREN WITH A SDQ-T

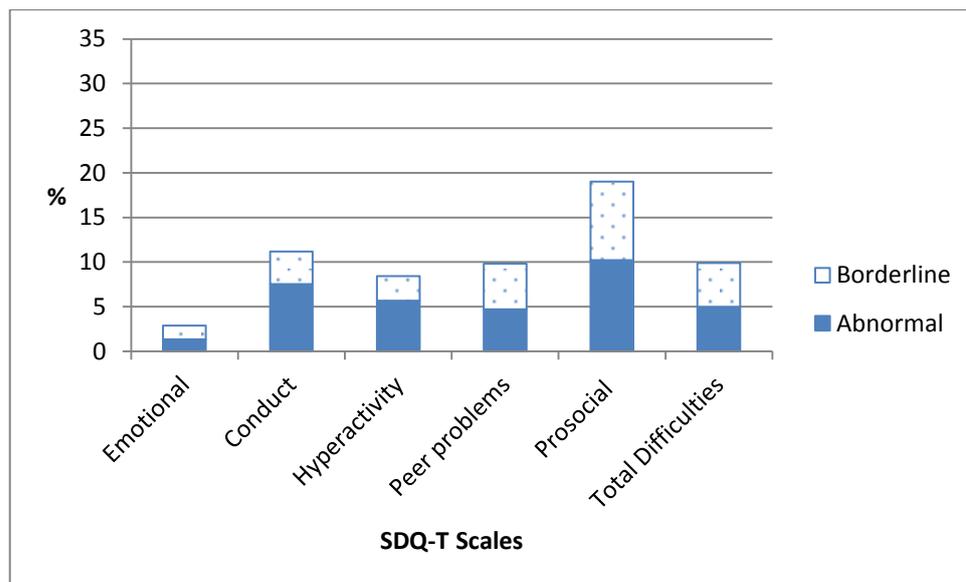
SDQ-T Scale	Abnormal scale		Borderline scale		Normal scale		Total Number
	Number	%	Number	%	Number	%	
Emotional	24	(1.3)	28	(1.6)	1,736	(97.1)	<b>1,788</b>
Conduct	135	(7.6)	65	(3.6)	1,588	(88.8)	<b>1,788</b>
Hyperactivity	102	(5.7)	49	(2.7)	1,637	(91.6)	<b>1,788</b>
Peer Problems	84	(4.7)	92	(5.1)	1,612	(90.2)	<b>1,788</b>
Prosocial Behaviour	183	(10.2)	157	(8.8)	1,448	(81.0)	<b>1,788</b>

Four hundred and two children (22.5%) had at least one SDQ-T scale in the abnormal range. The percentages of children with either abnormal or borderline SDQ-T scale scores are shown in Figure 6 for each scale. And the numbers and percentages of children with an abnormal or borderline scale score are tabulated above (Table 8). In contrast to the SDQ-P findings the most common scale to be scored in the SDQ-T abnormal range was prosocial behaviour (n=183) followed by conduct (n = 135).

FIGURE 6: PERCENTAGES WITH ABNORMAL OR BORDERLINE SDQ-P SCALE SCORE RANGES

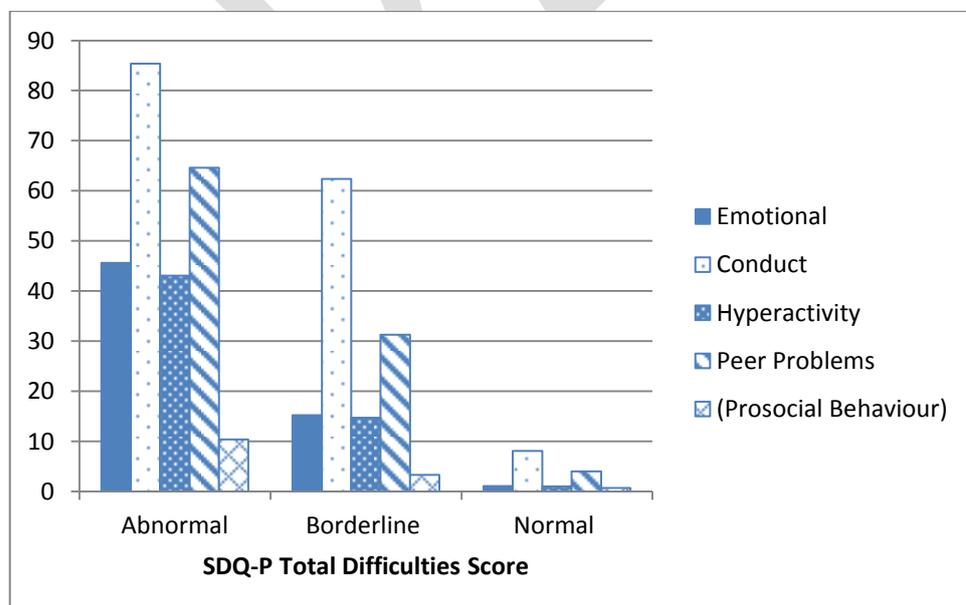


**FIGURE 7: PERCENTAGES WITH ABNORMAL OR BORDERLINE SDQ-T SCALE SCORE RANGES**

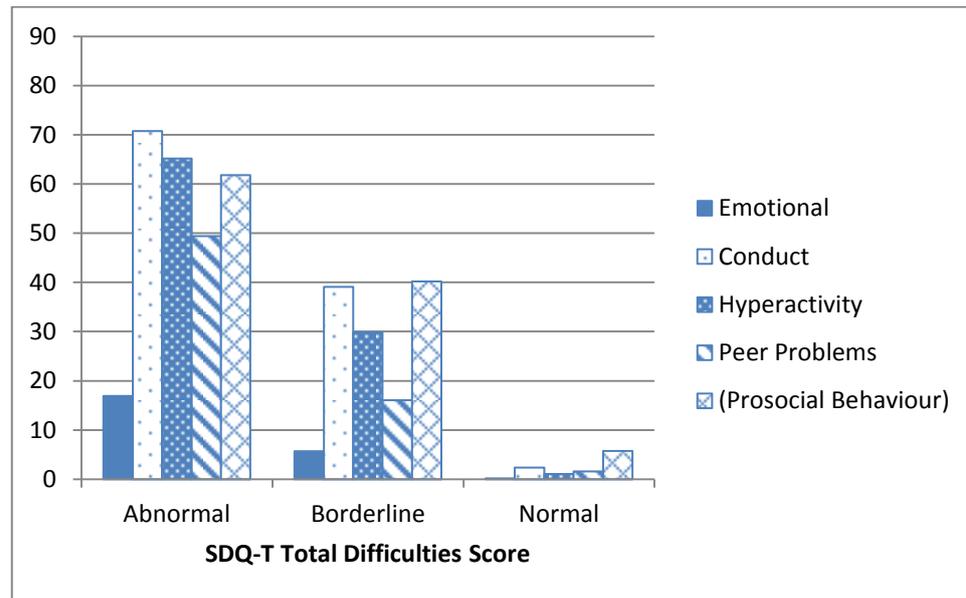


All children with an abnormal SDQ-T total difficulties (TD) score had at least one individual SDQ-T scale in the abnormal range. One child was abnormal in all 4 scales contributing to the SDQ-T TD score and 15 were abnormal in 3 scales. The percentages of children with abnormal scales are shown for each SDQ-T TD range in Figure 9. The exact numbers and percentages are tabulated separately for each SDQ-T TD range in Appendix Five.

**FIGURE 8: PERCENTAGES WITH SDQ-P SCALES IN THE ABNORMAL RANGE BY SDQ-P TOTAL DIFFICULTIES CATEGORY**



**FIGURE 9: PERCENTAGES WITH SDQ-T SCALES IN THE ABNORMAL RANGE BY SDQ-T TOTAL DIFFICULTIES CATEGORY**



### SDQ-P AND SDQ-T OUTCOMES

Table 9 and Figure 10 show the outcomes for children by SDQ-P total difficulties score range. Of the 364 children with an abnormal score 45 (12.4%) were already under care. Of the remaining 319 children 81 were referred to secondary services (22.3% of total). The majority of the remaining 238 (65.4%) children were recorded as ‘completed advice given’.

**TABLE 9: SDQ-P OUTCOMES, BY SDQ-P TOTAL DIFFICULTIES SCORE RANGE**

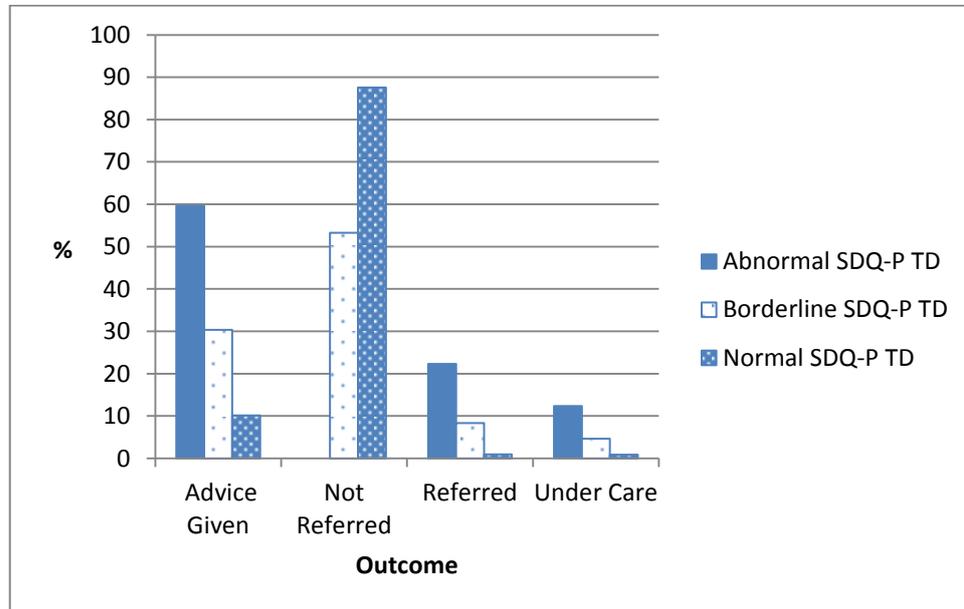
Outcome	Abnormal		Borderline		Normal		Total	
	N	%	N	%	N	%	N	%
Advice Given	217	(59.6)	130	(30.4)	632	(10.2)	979	(14.0)
Not Referred	-		228	(53.3)	5,439	(87.6)	5,667	(80.9)
Referral Declined	17	(4.7)	14	(3.3)	23	(0.4)	54	(0.8)
Referred	81	(22.3)	36	(8.4)	59	(1.0)	176	(2.5)
Under Care	45	(12.4)	20	(4.7)	56	(0.9)	121	(1.7)
Unknown (blank)	4	(1.1)	-		1		5	(0.1)
<b>Total</b>	<b>364</b>	<b>(100)</b>	<b>428</b>	<b>(100)</b>	<b>6,210</b>	<b>(100)</b>	<b>7,002</b>	<b>(100)</b>

**TABLE 10: SDQ-T OUTCOMES, BY SDQ-T TOTAL DIFFICULTIES SCORE RANGE**

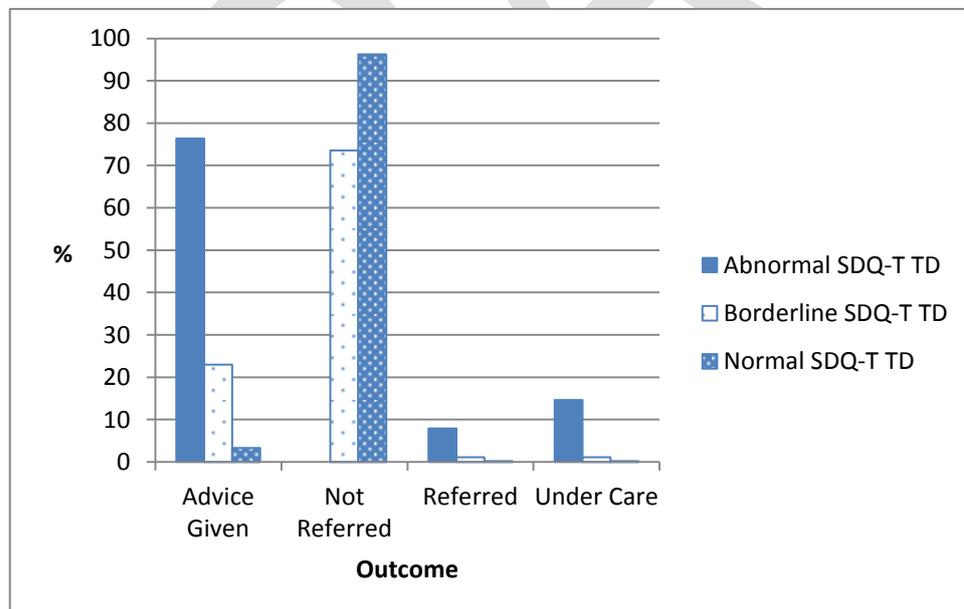
Outcome	Abnormal		Borderline		Normal		Total	
	N	%	N	%	N	%	N	%
Advice Given	68	(76.4)	20	(23.0)	53	(3.3)	141	(7.9)
Not Referred	-		64	(73.6)	1,552	(96.3)	1,616	(90.4)
Referral Declined	-		-		1	(0.1)	1	(0.1)
Referred	7	(7.9)	1	(1.1)	3	(0.2)	11	(0.6)
Under Care	13	(14.6)	1	(1.1)	3	(0.2)	17	(1.0)
Unknown (blank)	1	(1.1)	1	(1.1)	-		2	(0.1)
<b>Total</b>	<b>89</b>	<b>(100)</b>	<b>87</b>	<b>(100)</b>	<b>1612</b>	<b>(100)</b>	<b>1,788</b>	<b>(100)</b>

Table 10 and Figure 11 show the outcomes for children by SDQ-T total difficulties score. Of the 89 children with an abnormal score 13 (14.6%) were already under care. Of the remaining 76 children 7 were referred to secondary services (7.9% of total). All but one of the remaining 69 children were recorded as ‘completed – advice given’.

**FIGURE 10: SELECTED OUTCOMES BY SDQ-P TOTAL DIFFICULTIES SCORE RANGE**



**FIGURE 11: SELECTED OUTCOMES BY SDQ-T TOTAL DIFFICULTIES SCORE RANGE**



## SDQ REFERRALS

In the financial year 2012/13 there were 218 SDQ referrals made for a total of 189 children (Table 11). The majority of referrals were to parenting programmes (n=96). The second most common service that referrals were made to was the Ministry of Education Special Education Service (n=79).

TABLE 11: SDQ REFERRALS TO SELECTED PROVIDERS

Referred To	Number	Notes
<b>Ministry of Education SES Parenting programme</b>	79 96	70 = Incredible Years 18 = Triple P 6 = IOSIS 2 = Unknown
<b>Child Development Services / Paeds General Practitioner Clinical Leader / CAG</b>	3 8 8	6 = CAG 2 = Clinical Leader
<b>Audiology / Ophthalmology Counselling</b>	12 4	1 = ATWC 1 = HIPPY 2 = Unspecified
<b>Other</b>	8	1 = Public Health Nurse 1 = ECE 1 = EIT 1 = Family Start 1 = Family Works Social Worker 1 = Gateway Assessment 1 = GSE & Paeds 1 = Plunket Family Worker
<b>Grand Total</b>	<b>218</b>	

## DISCUSSION

For the SDQ-P the number of children identified with potential issues is reasonably high. In total 5% of children had a SDQ-P total difficulties (TD) score in the abnormal range with 1,647 children (23.5%) having at least one SDQ-P scale in the abnormal range. Internationally the SDQ-P has been undertaken in a range of age groups which makes comparisons difficult. The closest comparisons can be made with the UK and Spain. In the UK 8.1% of 3 year olds were found to have an SDQ-P in the abnormal TD range. In Spain this percentage was slightly lower at 7.3% of four year olds<sup>17</sup>. For the SDQ-T the percentages of children placed in the abnormal TD range was also 5% at CMDHB but slightly higher internationally (13.8% of UK 3 year olds and 7.8% of 4 year olds in Spain)<sup>17</sup>. The CMDHB rates are very similar to those of other NZ DHBs with comparable demographic profiles<sup>12</sup>.

The most common scale to be scored in the abnormal range by parents is the conduct scale (15.4% of children). It would be impractical to refer all of these children to a full parenting course. Indeed only 34.6% of children with an abnormal TD score were referred to a secondary service or parenting course and referring these children would be a priority over those with just one sub scale registering as abnormal. Even if only children with an abnormal SDQ-P TD score were referred to a parenting course, if they all attended the current providers would be overwhelmed. There appears to be a lack of interventions on offer. The Incredible Years parenting programme is of a high standard but requires a substantial time

commitment by parents. It may be that for some families, a shorter more intensive course tailored to our CMDHB population would be more achievable if there was sufficient evidence of effectiveness of such programmes. This is something that could be explored.

A review of which children should be referred and how the referral should be made (a formal referral or recommendation to a caregiver to make contact with a parenting programme) needs to be undertaken. Currently it appears the follow up for children with abnormal SDQ-Ps is very variable. The SDQ has an 'impact factor' box where the parent can indicate the extent to which the child's behaviour is affecting the child and family. This information is not included on the MRF and is not entered into the B4SC IS and it is unclear if it is being taken into account during decision making. It would be useful to collect this information so that it is clear that the impact of the child's behaviour has been considered when planning action.

It is clear that ECE teachers and parents often have different perceptions of a child's behaviour and / or that children's behaviour varies according to the setting. Only 20% of children who had an abnormal SDQ-P that also had an SDQ-T completed scored in the abnormal range for the latter. The most common SDQ-T scale to be scored in the abnormal range was the pro-social behaviour scale compared with the conduct scale for the SDQ-P. Anecdotally there have been cases where ECEs have not registered concerns about a child for fear that there will be repercussions from parents which may also explain differences in scores.

SDQ-T completion rates are low with only 25.5% of children that have an SDQ-P submitted also having an SDQ-T documented as completed. However it appears many more SDQ-Ts are filled out and returned but are not documented in the database. This is because they are returned late and due to a pressure to 'complete' B4SCs in a timely manner the child's case has already been closed off. This limits the validity of the SDQ as a screening tool.

In a Danish study several markers of socioeconomic disadvantages were associated with mental health problems at 5–7 years of age<sup>18</sup>. In CMDHB 226/364 (62.1%) children with an abnormal SDQ-P lived in quintile 5 neighbourhoods which would be in keeping with this finding. The lower percentage of children with an abnormal SDQ-T living in quintile 5 areas could be a true difference between the two groups or reflect a bias in the types of children for whom questionnaires were returned.

## RECOMMENDATIONS

1. Advocate for NZ cut off points to be calculated for the SDQ tool.
2. The guidance on referral options for children who have a total difficulties score or sub scale (s) in the abnormal range is unclear. Nurses require more formal guidance on referral pathways and options open to them.
3. More use or transparency of use of the impact score on the SDQ forms is required.
4. Explore modifying processes in order to increase completion rates and timeliness of completion of SDQ-T forms.

5. Data enter late SDQ-Ts to ensure that this information is available on the child's record.
6. Consider the development of an alternative low cost short intervention to target specific behavioural problems that are commonly being identified in the CMDHB population.
7. Liaise with parenting programme providers regarding their capacity to meet demand.
8. Work with Central government and local providers to improve communication between parenting programmes and the B4SC such that the B4SC are informed which parents undertake a parenting programme.

## MINISTRY OF EDUCATION (MOE) REFERRALS

### KEY POINTS

- 107 children were documented as referred to MoE SES by the B4SC 1<sup>st</sup> July 2012 to December 31<sup>st</sup> 2012 inclusive.
- 19.6% of children (n=21) referred to MoE by the B4SC could not be found in the MoE Case Management System.
- Several children have referrals made to MoE from other providers as well as the B4SC.
- The median time between a referral being sent and received was 4 days (range -192 to 336).
- The mean time on the MoE wait list was 131 days (median 140).
- 16/86 children on the CMS (18.6%) were declined. The remainder were accepted for an intervention.

### METHODS

In total 107 children were documented as referred to the Ministry of Education (MoE) Special Education Services (SES) from 1<sup>st</sup> July 2012 to 31<sup>st</sup> December 2012. Of these 32 were female and 75 were male.

The names and dates of birth of these 107 children were supplied to the MoE Service Manager who searched the MoE Case Management System (CMS) to try to ascertain when the B4SC referrals were received, how many referrals were accepted, how many were declined (and why) and how long children had to wait to start an intervention. It was not possible to extract meaningful data about the types of intervention offered, length of interventions and/ or their effectiveness due to privacy concerns.

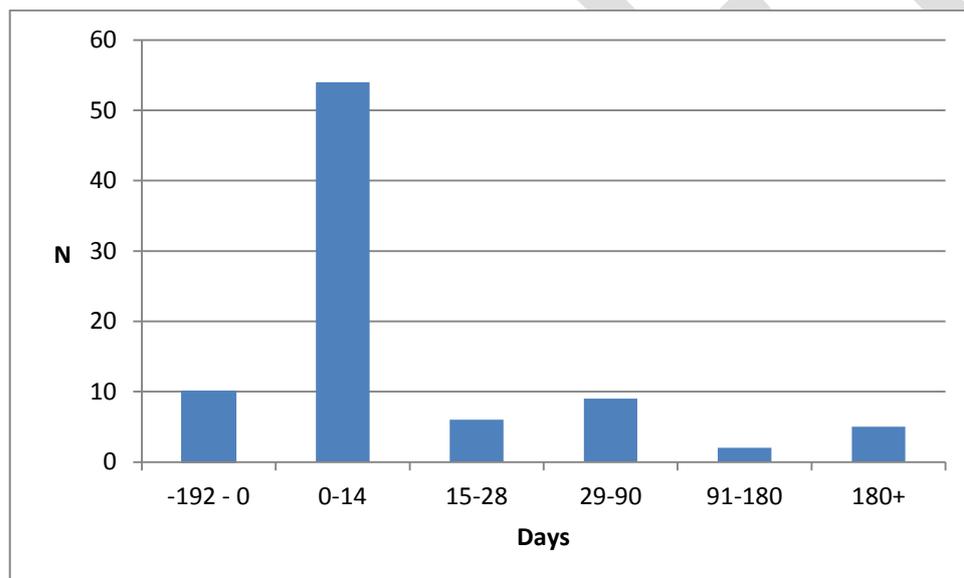
In total 21 children were unable to be traced in the database. The MoE Service Manager felt that misspelling of children's names was an unlikely reason for children not to have been located and it was more likely that the B4SC referral was never received by the MoE. Relevant details for the remaining 86 children were extracted.

### RESULTS

### *Time between B4SC referral being sent and received*

The times between the B4SC referrals being sent and being received appeared to vary widely (Figure 12). In some cases however the CMS 'date referral was received' could not relate to the B4SC referral. For instance in 10/86 children the referral is documented as being received between 22 days and 192 days *before* the B4SC referral was sent. It is assumed that these children were referred from other sources prior to their B4SC. The median time for the remaining 76 children was 4 days (range 0 to 326). The majority of children (n=54) had their referral received between 1 day and 14 days after the B4SC referral was sent. A further 6 children had their referrals received between 15 days and 28 days later. The remaining 16 children had their referrals received between 29 days and 326 days after the B4SC referral was documented as being sent (7 of these greater than 126 days). The reason(s) for the long delay for children in this latter group is/are quite unclear. Probably the most likely scenario is that the B4SC referral was either not received or not accepted by the MoE initially and these dates refer to the date of another referral for the child (either a re-referral from the B4SC or a new referral from another provider).

**FIGURE 12: DAYS BETWEEN B4SC REFERRAL BEING SENT AND BEING RECEIVED BY MOE SES**



### *Number of children receiving an intervention*

Of the 86 children who had a referral documented as received 10 were declined as they 'did not meet the referral criteria' and 6 were rejected as the referrals were received when the child was 'too old for an effective pre-school intervention to be offered'. The age on referral of these latter 6 varied from age 4 years 1 month to age 4 years and 11 months.

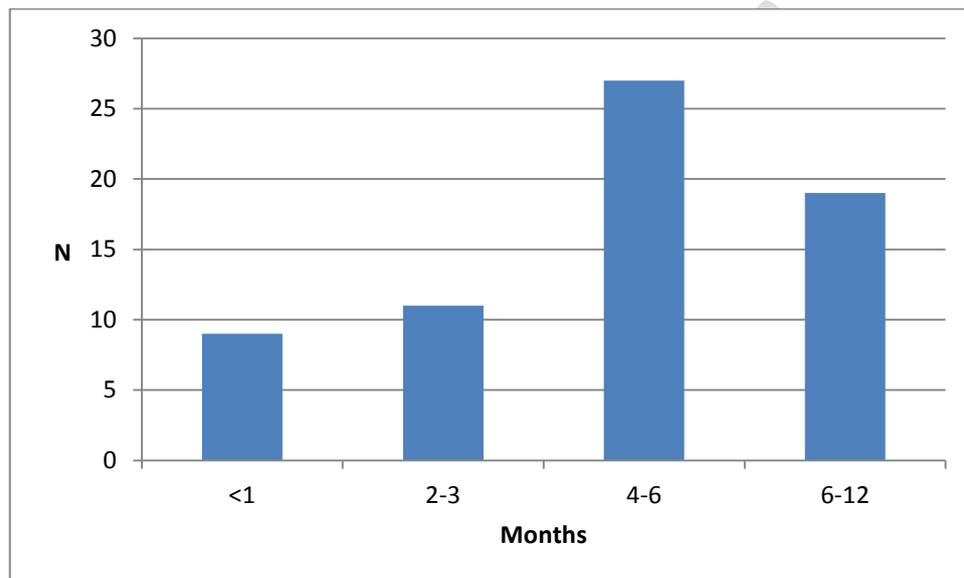
Therefore 68 /107 (63.6%) received an intervention and 2 were still waiting at the time of this analysis.

### *Waiting list time*

Two children had a start date prior to the date the B4SC referral was received. It assumed these children were referred from elsewhere prior to the B4SC.

The mean time that the remaining 66 children were on the MoE waiting list was 131 days. Figure 13 shows that this varied considerably between children. Overall 9 children were seen within 1 month of their referral being received and 11 between 2 and 3 months of their referral being received. A further 27 children were seen between 4 months and 6 months after their referral was received. Nineteen children had a wait of over 6 months before starting an intervention (range 184 to 336 days). Of note, 7 of these were for children in which the referral received date was before the B4SC had sent one so the wait from the time of their B4SC referral will be less.

**FIGURE 13: MOE SES WAITING LIST TIMES**



As the number of children whose data was not able to be found on the MoE CMS by the MoE Service Manager was concerningly high (n=21) it was decided to look further into this issue. The B4SC records of these children were checked in detail along with records of all other communication the B4SC had had with MoE regarding these children. According to these sources MoE had confirmed receipt of the B4SC referrals of 12 of these children at some point in time. It is likely that the majority if not all of the remaining 9 children were not actually referred and were incorrectly entered in the B4SC database as referred. Possible reasons could include parents declining a referral but the MRF not being amended by the B4SC nurse prior to data entry.

## DISCUSSION

Overall the quality of the data that was able to be obtained from the MoE on referrals from the B4SC to SES services was poor. This compromises the validity of the results. There were several reasons underlying the poor data. One is that as the MoE do not use NHI's but instead use children's names misspelling of names or use of different names in the B4SC IS and the MoE CMS for the same child made identifying children challenging. Secondly the MoE had recently changed databases<sup>20</sup> and this appears to have led to some difficulty tracking some of the referrals. Thirdly the MoE was not able to easily differentiate data relating to referrals received from the B4SC and from other sources.

Notwithstanding the data quality issues it appears that a significant number of children who are documented in the B4SC database as referred do not actually receive an appointment from MoE SES (23%). This can be because the referral is not received by the service (8%) or because of not meeting the services criteria (15%). This audit highlighted the fact that there is not a robust system to pick up on B4SC referrals not being received by the MoE. It also highlighted the fact that the referral criteria for MoE SES are rather unclear especially in regard to age at which MoE are prepared to accept referral for an intervention. The MoE Service Manager did note that referrals by the B4SC are often sent when the child is too old to receive an effective intervention and agreed that if possible moving the B4SC to a younger age may alleviate this problem. She also reported that a lack of information on referral forms meant that further information has to be sought from either the referrer or parent. Inevitably this can delay placement of a child on the waiting list for services as MoE are unable to effectively process and prioritise referrals with inadequate information.

Although the majority of children referred received (or will receive) an intervention, it is apparent that several of these children are referred to MoE from other sources (either before or after their B4SC). The value of the B4SC is therefore difficult to assess but will be less than it appears at first sight. It would be useful to quantify this to establish the 'value add' of the B4SC.

Ideally information on the type and success of interventions being received by the children would have been analysed however due to concerns over privacy MoE were not prepared to share this data. A formal study with ethical approval and explicit consent from parents to access records from MoE would be required in order to analyse this in the future.

## RECOMMENDATIONS

1. A systematic way of monitoring whether referrals have been received by MoE is required. Options could include an obligatory fax or e-mail being sent to the B4SC coordinator by MoE on receipt of each referral. A list of all referrals should be generated weekly against which this information can be cross checked.
2. Liaise with the MoE to clarify the information required on referral forms. Further training of nurses and other referrers may be necessary.
3. MoE need to be clear regarding their criteria for acceptance of referrals.
4. MoH needs to work with and advocate for MoE to have sufficient capacity to meet demand for their services generated by the B4SC. Solutions to the long waiting list times need to be found.

## INCREDIBLE YEARS PARENTING PROGRAMME REFERRALS

### KEY POINTS

1. The quality of the data was too poor to be meaningfully analysed

### METHODS

Children referred to Incredible Years (IY) for two cohorts of children were identified from the B4SC IS. Referrals to incredible years could be listed in one of three different fields: the 'referred to' field, the 'referred to other' field or the 'provider details' field (with the 'referred to' field being completed as 'other' or 'parenting programme' or left blank). Information on the referral outcomes for these children was requested from the Ministry of Education.

## RESULTS

In total 24 children were referred to IY from July 2012 to Dec 2012 inclusive and 41 children were referred from March to June 2013 inclusive. Of these 9 were found on the IY database to be currently still on the waiting list for a programme. Information on the status of the remaining 56 children was not available from the IY database.

## DISCUSSION

The IY database only contains the names and contact details of the parents who are currently on the waiting list for this MoE parenting programme. The details of parents who have declined or fully completed a course or who attend a parenting programme run by NGOs subcontracted by the MoE are not kept<sup>9</sup>. Even if available the quality of data from IY would be compromised by the fact that IY collects data on parents rather than children and linking families to a specific B4SC child can be difficult where there are different surnames in use.

The IY Database is being restructured at the beginning of 2014 and from January 2014 more information will be collected on IY participants<sup>9</sup>. In order to obtain information on numbers of children whose parents attend IY an audit would need to be carried out whereby all referrals to IY are noted at time of referral and followed up prospectively.

## RECOMMENDATIONS

1. Undertake another audit now that the IY database has been restructured

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# KIDZ FIRST DEVELOPMENTAL COHORT JAN 2013 – JULY 2013

## KIDZ FIRST DEVELOPMENTAL COHORT

### KEY POINTS

- 75.6% of children referred to Kidz First for a developmental assessment had previously had a B4SC at CMDHB
- 57.5% of children who had had a B4SC were allocated to PEDS A. 17.5% were PEDS E
- Of the children who had had a B4SC, 30% were scored in the abnormal SDQ-P TD range and 55.0% were scored in the normal range

### OVERVIEW

A cohort of children referred to Kidz First and diagnosed with a developmental and / or behavioural problem were identified. The PEDS pathways and SDQ scores were then obtained retrospectively from the B4SC IS for this cohort and analysed with the aim of establishing whether the PEDS and SDQ tools reliably pick up problems in these children in CMDHB.

### METHODS

A list of the names and NHIs of all children accepted for developmental paediatric assessment were obtained from the Kidz First Developmental intake meeting spread sheets for January 2013 to July 2013 inclusive. Those aged over 4 years and 3 months (at the time the referral was received) and whose date of birth was after July 2006 were selected for this analysis as being the age group most likely to have had a B4SC (from July 2011 onwards as B4SC data is more robust from this date) prior to their referral to Kids First.

In total there were 74 children that met these inclusion criteria. For some analyses the children were divided into those aged between 5 years and 7 years (n=40) and those aged 4 years 3 months to 5 years (n=34) as it was felt the findings might differ according to length of time between the child's B4SC and referral.

Concerto was then accessed to identify whether the child had attended their developmental assessment and if so, the clinic letter was read to determine the findings from the assessment – and in particular the child's diagnosis and whether the child was previously known to services.

The child's NHI was then used to search the B4SC database to retrospectively check each child's B4SC PEDS Pathways and SDQ outcomes.

## DEVELOPMENTAL DIAGNOSES

Many children had multiple diagnoses listed on their clinic letter. For ease of analysis minor diagnoses have been ignored and the diagnoses of Global Developmental Delay (GDD), Global Learning Difficulties (GLD), Autism Spectrum Disorder (ASD) have been prioritised with the diagnoses of Speech issues, Language disorder, Communication issues and Attention Deficit Hyperactivity Disorder (ADHD) listed only where one of the first 3 diagnoses was not present.

The diagnoses of 13 children were not available as they had not been seen in clinic by mid October 2013. Two children were listed in concerto as rejected. The main diagnoses of the remaining 59 children are shown in Table 12. The most common diagnosis was global developmental delay.

**TABLE 12: DIAGNOSES OF KIDZ FIRST DEVELOPMENTAL CLINIC ATTENDEES**

Diagnosis	Age 4yrs 3months – 5 years	Age 5 - 7 years	Total
<b>GDD</b>	16 (2 also ASD)	13 (3 also ASD)	28 (5 also ASD)
<b>ASD</b>	3	5	8
<b>GLD</b>	0	8 (1 also ADHD)	8 (1 also ADHD)
<b>Language Disorder</b>	4		4
<b>Speech Problems</b>	2		2
<b>Communication</b>	2		2
<b>ADHD</b>		1	1
<b>Nil concerns</b>		1	1
<b>Other*</b>		4	4
<b>Total</b>	<b>27</b>	<b>32</b>	<b>59</b>

Other = Acquired brain injury, Foetal alcohol syndrome, Behavioural issues, Specific learning difficulties

## PEDS

Of the total 74 children, 56 children had a B4SC and 18 did not. Six children just had a vision and hearing test. Fifty children had both a PEDS and SDQ-P completed. The reasons why children did not have a B4SC were unclear but it was apparent that some children that had not had a B4SC were living overseas when they were aged 4. It is possible that others had a B4SC completed at other DHBs as only the CMDHB B4SC database was checked.

The PEDS pathways results are shown by diagnosis in Tables 13 and 14 for children aged 4 years 3 months to 5 years and 5 to 7 years respectively. The numbers of all children combined are shown in Table 17 and Figure 14.

**TABLE 13: PEDS PATHWAY BY DIAGNOSIS FOR CHILDREN AGED 4 YEARS 3 MONTHS TO 5 YEARS**

Diagnosis	PEDs Pathway						
	A	B	C	D	E	No B4SC	Total
GDD (2 also ASD)	7	3		1		5	16
ASD	1	1			1		3
Language Disorder	1		1			2	4
Speech Communication	1		1		1	1	2
<b>Subtotal</b>	<b>10</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>8</b>	<b>27</b>
Awaited /rejected	3	1	1	1		1	7
<b>Total</b>	<b>13</b>	<b>5</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>9</b>	<b>34</b>

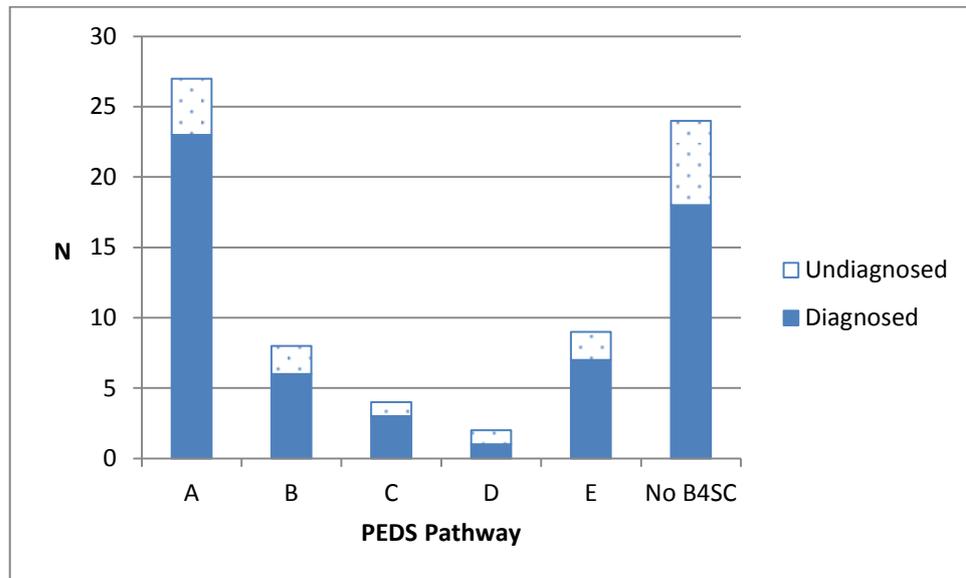
**TABLE 14: PEDS PATHWAY BY DIAGNOSIS FOR CHILDREN AGED 5 YEARS TO 7 YEARS**

Diagnosis	PEDS Pathway						
	A	B	C	D	E	No B4SC	Total
GDD (3 also ASD)	6	1	1		1	4	13
ASD	2	1			2		5
GLD (1 also ADHD)	4					4	8
ADHD	1						1
Other*					2	2	4
<b>Subtotal</b>	<b>13</b>	<b>2</b>	<b>1</b>		<b>5</b>	<b>10</b>	<b>31</b>
Nil concerns	1						1
Awaited /rejected		1			2	5	8
<b>Total</b>	<b>14</b>	<b>3</b>	<b>1</b>		<b>7</b>	<b>15</b>	<b>40</b>

In the younger age group of the 27 children with a documented diagnosis, 19 had a CMDHB B4SC. Of these, 10 were allocated to PEDS A, 4 to PEDS B, 2 to PEDS C, 1 to PEDS D and 2 to PEDS E. In the older age group of the 31 children with a documented diagnosis (excludes child diagnosed with nil concerns) 22 had a B4SC. Their pathways were 14 PEDS A, 2 PEDS B, 1 PEDS C and 5 PEDS E.

The percentages were not dissimilar in the two age groups. In total 39 children had both a clinical diagnosis documented in a clinic letter on concerto and had a B4SC, 23 were PEDS A (57.5%), 6 were PEDS B (15.0%) and 7 were PEDS E (17.5%).

**FIGURE 14: PEDS PATHWAYS OF ALL CHILDREN REFERRED TO KIDZ FIRST FOR A DEVELOPMENTAL ASSESSMENT**



### SDQ

In total 19 children in the younger age group had a definite diagnosis and an SDQ-P completed. Of these 5 were found to be in the abnormal SDQ-P range, 3 borderline, and 12 normal. When those without a definite diagnosis are also included 6 children in the younger age group were abnormal, 3 borderline and 16 normal (Table 15).

**TABLE 15: SDQ-P TOTAL DIFFICULTIES SCORE RANGE FOR CHILDREN AGED 4 YEARS 3 MONTHS TO 5 YEARS**

Diagnosis	SDQ-P total difficulties range					
	Abnormal	Border-line	Normal	Had B4SC	No B4SC	Total
GDD (2 also ASD)	3	1	7	11	5	16
ASD	1	1	1	3		3
Language Disorder			2	2	2	4
Speech Communication	1		1	2		2
Subtotal	5	2	12	19	8	27
Awaited /rejected	1	1	4	6	1	7
<b>Total</b>	<b>6</b>	<b>3</b>	<b>16</b>	<b>25</b>	<b>9</b>	<b>34</b>

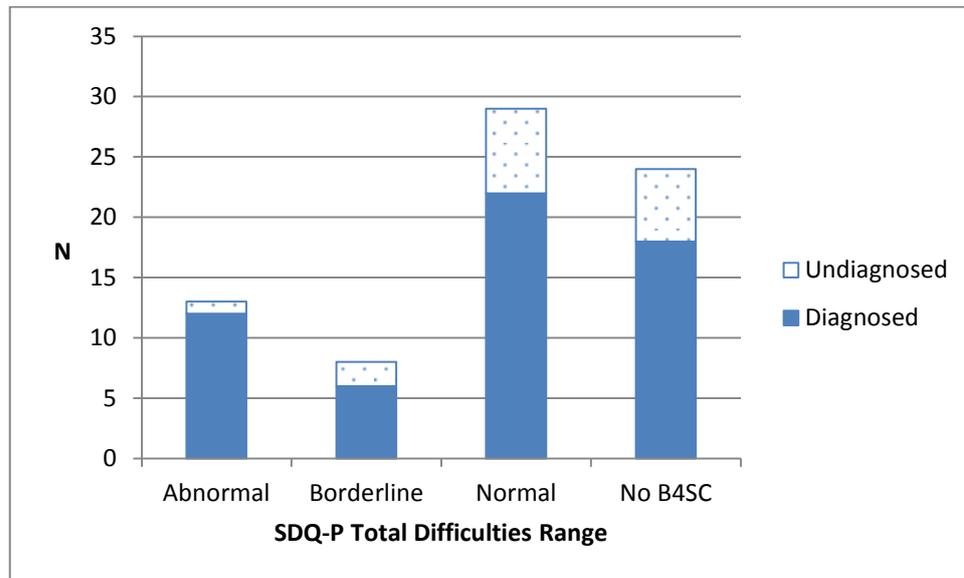
In the older group of the 31 that had a definite clinical diagnoses, 7 children were abnormal, 4 children were border line and 10 children were normal according to their SDQ-P total difficulties scores (Table 16). All the undiagnosed children that had a B4SC had a normal SDQ-P total difficulties score. The child diagnosed with nil concerns had a borderline score. Overall the majority of children who had a SDQ-P completed had normal SDQ-P total difficulties score (55.0%) and 30.0% of children were abnormal and 15% were borderline (Table 18).

**TABLE 16: SDQ-P TOTAL DIFFICULTIES SCORE RANGE FOR CHILDREN AGED 5 YEARS TO 7 YEARS**

Diagnosis	SDQ-P Total Difficulties Range					
	Abnormal	Borderline	Normal	Had B4SC	No B4SC	Total
GDD (3 also ASD)	4	2	3	9	4	13
ASD	1	1	3	5		5
GLD (1 also ADHD)			4	4	4	8
ADHD	1			1		1
Other*	1	1		2	2	4
Subtotal	7	4	10	22	10	31
Nil concerns		1		1		1
Awaited /rejected			3	3	5	8
<b>Total</b>	<b>7</b>	<b>5</b>	<b>13</b>	<b>25</b>	<b>15</b>	<b>40</b>

Very few children had an SDQ-T completed. Only one child in the older group had the questionnaire completed and this was normal. In the younger age group 10 children had the questionnaire completed. Of these a relatively high number were abnormal (n=7) or borderline (n=1). Only two children were felt to be in the normal SDQ-T range.

**FIGURE 15: SDQ-P TOTAL DIFFICULTIES SCORE RANGE FOR ALL THOSE REFERRED FOR DEVELOPMENTAL ASSESSMENT**



## DISCUSSION

In total, 75.6% of children referred to Kidz First for a developmental assessment had previously had a B4SC at CMDHB. This is consistent with the general population completion rates. Of these 57.5% were allocated to PEDS A and 17.5% were PEDS E. It is somewhat surprising that children that had a developmental issue severe enough to be referred and accepted for a developmental assessment were assessed as PEDS E. The ability of the PEDS tool to identify children with developmental concerns is somewhat questionable with these results however the numbers of children involved were small. It may be interesting to repeat this analysis in 6 months' time to see if findings change and to look more in depth at the children's B4SC findings.

Likewise only 30% of children who had had a B4SC were scored in the abnormal SDQ-P TD range and 55.0% were scored in the normal SDQ-P TD range. Although the SDQ-P is more focussed on behavioural issues than developmental issues, one child diagnosed with ADHD had a normal SDQ-P TD score. It would therefore likely be worth exploring these results further.

## RECOMMENDATIONS

1. Advocate for further research into the validity of the PEDS and SDQ tools in the New Zealand population

**TABLE 17: PEDS PATHWAYS FOR ALL CHILDREN REFERRED FOR A DEVELOPMENTAL ASSESSMENT**

Age Group	PEDS A		PEDS B		PEDS C		PEDS D		PEDS E		B4SC Sub Total		No B4SC		Total N
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	
4yrs 3months Diagnosed	10		4		2		1		2		19		8		27
5-7years Diagnosed	13		2		1		0		5		21		10		31
<b>Subtotal</b>	<b>23</b>	<b>(57.5)</b>	<b>6</b>	<b>(15.0)</b>	<b>3</b>	<b>(7.5)</b>	<b>1</b>	<b>(2.5)</b>	<b>7</b>	<b>(17.5)</b>	<b>40</b>	<b>(100.0)</b>	<b>18</b>	<b>(31.0)</b>	<b>58</b>
4yrs 3months Undiagnosed	3		1		1		1		0		6		1		7
5-7 years Undiagnosed	1		1						2		4		5		8
<b>Grand Total</b>	<b>27</b>	<b>(54.0)</b>	<b>8</b>	<b>(16.0)</b>	<b>4</b>	<b>(8.0)</b>	<b>2</b>	<b>(4.0)</b>	<b>9</b>	<b>(18.0)</b>	<b>50</b>	<b>(100.0)</b>	<b>24</b>	<b>(32.4)</b>	<b>74</b>

**TABLE 18: SDQ-P TOTAL DIFFICULTIES SCORE RANGE FOR ALL THOSE REFERRED FOR DEVELOPMENTAL ASSESSMENT**

Age Group	Abnormal		Borderline		Normal		B4SC Sub Total		No B4SC		Total N
	N	%	N	%	N	%	N	%	N	%	
4yrs 3months Diagnosed	5		2		12		19		8		27
5-7years Diagnosed	7		4		10		21		10		31
<b>Subtotal</b>	<b>12</b>	<b>(30.0)</b>	<b>6</b>	<b>(15.0)</b>	<b>22</b>	<b>(55.0)</b>	<b>40</b>	<b>(100.0)</b>	<b>18</b>	<b>(31.0)</b>	<b>58</b>
4yrs 3months Undiagnosed	1		1		4		6		1		7
5-7 years Undiagnosed			1		3		4		5		8
<b>Grand Total</b>	<b>13</b>	<b>(26.0)</b>	<b>8</b>	<b>(16.0)</b>	<b>29</b>	<b>(58.0)</b>	<b>50</b>	<b>(100.0)</b>	<b>24</b>	<b>(32.4)</b>	<b>74</b>

DRAFT

## VISION 2012/13

### KEY POINTS

- The majority of children (82.4%) pass their vision test.
- The referral rate for children who fail their vision test is high (>99%).
- In 2012/13, 48 children who should have been rescreened were passed (no further action).
- Some unnecessary referrals may be occurring with 173 children referred when their vision test results suggest they should have been rescreened or passed (no further action).
- 45.1% of children referred for vision issues lived in a quintile 5 area.

### VISION OVERVIEW

At CMDHB each child's vision is tested using a single optotype (Parr) 4m letter-matching test. If vision is 6/9 or better in both eyes the child's vision test is considered a pass. If the child's vision is 6/6 in one eye and 6/9 in the other the child should be rescreened in 3 to 6 months. If vision is 6/12 or worse in either or both eyes, the child's vision test is considered a fail, and the child should be referred for an ophthalmic assessment<sup>1</sup>.

### VISUAL ACUITY

7,912 children had a vision assessment 2012/13. In total 6,519 children passed their vision test (82.4%), 704 children (8.8%) failed their vision test outright and 358 (4.5%) children had a visual acuity of 6/6 in one eye and 6/9 in the other.

### VISION OUTCOMES

All but three of the children that failed their vision test were referred or already under care. However for children that passed or had a visual acuity of 6/6 in one eye and 6/9 in the other the documented outcomes did not always match to the appropriate outcome as suggested in the B4SC handbook. In Table 19 the shaded boxes highlight the children whose test result and outcome do not correlate. Most notably 48 children who should have been rescreened were documented as passing the vision test. A further 173 were referred when the results of their vision tests suggests they should either have been rescreened or passed. This will have an impact on the workload for DHB ophthalmology services. Three children who failed the screening test were rescreened rather than referred.

**TABLE 19: VISION OUTCOMES BY VISION TEST RESULTS**

Vision test Result	Pass		Referred		Re Screen		Under Care		Total	
	N	%	N	%	N	%	N	%	N	%
6/12+, 6/12+			312	(100)					<b>312</b>	(3.9)
6/9, 6/12+			324	(99.1)	1	(0.3)	2	(0.6)	<b>327</b>	(4.1)
6/6, 6/12+			62	(95.4)	2	(3.1)	1	(1.5)	<b>65</b>	(0.8)
6/6, 6/9	48	(13.4)	79	(22.1)	229	(64.0)	2	(0.6)	<b>358</b>	(4.5)
6/9, 6/9,	3,385	(96.7)	92	(2.6)	23	(0.7)			<b>3,500</b>	(44.2)
6/6, 6/6	3,017	(99.9)	2	(0.1)					<b>3,019</b>	(38.2)
Blank			29	(8.8)	190	(57.4)	112	(33.8)	<b>331</b>	(4.2)
<b>Total</b>	<b>6,450</b>	<b>(81.5)</b>	<b>900</b>	<b>(11.4)</b>	<b>445</b>	<b>(5.6)</b>	<b>117</b>	<b>(1.5)</b>	<b>7,912</b>	<b>(100)</b>

## VISION REFERRALS

In total there were 921 referrals documented for 2012/13 in 916 children. There were also 12 rescreens documented as referrals' rather than rescreens however rescreens are not true referrals and have therefore been excluded. Five children had multiple referrals. The majority of referrals were to the eye clinic followed by an ophthalmologist (Table 20) however the latter referrals are probably to ophthalmologists at the eye clinic – and reflect an inconsistency in data entry terminology rather than referrals to a different service.

By quintile of deprivation 45.1% of referrals lived in a quintile 5 area.

**TABLE 20: VISION REFERRALS TO SELECTED PROVIDERS**

Referred To	Number	%
Eye clinic	674	(73.2)
General Practitioner	2	(0.2)
Optometrist	9	(1.0)
Ophthalmologist	234	(25.4)
Parents	1	(0.1)
Public health nurse	1	(0.1)
<b>Total</b>	<b>921</b>	<b>(100.0)</b>

## DISCUSSION

Approximately one in five children failed their vision test. With over 7,000 children having the B4SC check in 2012/13 it follows that many rescreens and referrals are generated. Although not measured in this audit the workload generated by referrals from the B4SC programme for ophthalmology services at CMDHB will almost certainly be impacting on the ability of the service to provide appointments to those referred from elsewhere.

Of note the percentage of rescreens is quite high, although the numbers are even higher in many other DHBs around the country. For just under half of these rescreens the vision test result was blank and it is not clear why this is so. Possibilities include the child being uncooperative, unable to follow instructions or possibly not turning up on the day if the data

has been entered incorrectly. It would be useful if the B4SC IS were able to differentiate between these underlying reasons. For the majority of children the screening outcome correlates with their test result however there are a number of children who appear to be offered rescreens instead of referrals or vice versa further confusing analysis.

Anecdotally a number of vision referrals to ophthalmology are rejected. This has been analysed previously<sup>4</sup>. It appears that one of the main factors underlying rejections is the need to prove eligibility for secondary services. This needs to be addressed at a national level however it is likely that improved CMDHB referral processes (e.g. rejection letters consistently being sent to the B4SC co-ordinator) would also lead to greater numbers of children that are referred, being seen by ophthalmology. Currently the B4SC co-ordinator does not have the capacity to chase up all referrals that are rejected and finds herself having to prioritise children who have the worst vision test results (on the basis that these children will get most benefit from being assessed)<sup>20</sup>. It is also apparent that some children are being rejected as they 'do not meet the criteria for referral to ophthalmology services'<sup>20</sup>. It would be useful to ensure that the criteria for referral from the B4SC programme and criteria for referral acceptance by ophthalmology are in alignment. It may be that these rejections are for children who have been noted in this audit to have been referred potentially inappropriately or are occurring secondary to poor documentation on referral forms (which compromises the ability of ophthalmology services to process the referral).

The main purpose of preschool vision screening is the prevention of amblyopia. Although some retrospective studies have concluded pre-school vision screening programmes are effective at reducing the prevalence of amblyopia in school aged children the findings of a prospective study do not support this belief<sup>21</sup>. The effectiveness of treatment is difficult to ascertain in the absence of information on the natural history of the conditions being treated and some evidence suggests that mild degrees of amblyopia may resolve spontaneously<sup>21</sup>. A UK systematic review of research on the effectiveness of preschool vision screening suggests that trials should be undertaken in groups of children aged three to four and five to seven to determine whether screening in the preschool years confers any benefit over screening at school entry<sup>21</sup>.

Even if effective they may not be cost effective. A detailed systematic review and economic evaluation of screening programmes for amblyopia and strabismus in children up to the age of 4-5 years found that although the absolute cost of screening per case prevented was low the cost per quality adjusted life year gained was high<sup>22</sup>. This is because the impact on quality of life of having amblyopia is considered quite low. The main reason for treating unilateral vision loss seems to be concern for vision if the good eye is lost, but the prognosis for vision in the amblyopic eye following loss of vision in the better eye is again unknown. The impact of orthoptic treatment on family life and the psychological wellbeing of the child need to be considered however there has been little research undertaken in this area<sup>22</sup>.

The cost effectiveness will depend on prevalence of the condition. In a large systematic review no studies were found with the primary aim of establishing the prevalence of visual defects in preschool children<sup>21</sup>. Data from studies of screening programmes found a prevalence varied from 2.4-6.1%<sup>21</sup>. The mean referral rate was 6.7% for primary orthoptic

screening programmes which is slightly lower than our rate of 11.4%. The positive predictive value ranged from 47.5%-95.9% in the studies<sup>21</sup>.

The number of children being referred for vision assessment is not disproportionately high in children living in quintile 5 (NZDep 2006) areas in CMDHB. This would not support the targeting of vision screening on the basis of area of residence.

## RECOMMENDATIONS

1. Advocate for eligibility issues to be addressed at a central government level. In the interim ensure that referral rejection letters are consistently sent back to the B4SC coordinator (rather than General Practitioners) so that they can be followed up.
2. Ensure that if parents decline a referral that this is communicated to the B4SC programme and appropriately documented in the B4SC IS.
3. Consider the need for more FTE provision to the B4SC programme in order to ensure that referrals to ophthalmology result in appointments.
4. Ensure the B4SC referral guidelines for ophthalmology align with the referral acceptance guidelines of the ophthalmology service.
5. Explore the reasons underlying the high (and rising) rate of vision rescreens in the CMDHB population.
6. Modify the B4SC IS to enable more information to be collected on children that require vision rescreens.
7. Consider advocating for a change in the timing of the vision screening to school entry on the basis that:
  - The number of vision rescreens may be reduced
  - Coverage of hard to reach children will be higher
  - There is a lack of evidence to suggest that correcting vision prior to school confers any long term benefit over and above identifying and treatment commencing at school age.

## HEARING 2012/13

### KEY FINDINGS

- 18.9% of children (n=1,472) failed their audiometry sweep test (35.4% of these unilaterally and 64.6% of these bilaterally).
- The majority of children that had tympanometry passed (655/678, 96.6%).
- 57.5% of children referred for hearing issues lived in a quintile 5 area.

### HEARING OVERVIEW

Audiometry screening using the sweep test is the initial screen used for screening asymptomatic preschool children for hearing loss.

Audiometry screening is unnecessary children who wear a hearing aid, or have a cochlear implant or grommets or who are already otherwise under the care of an ORL/ENT specialist or an audiologist<sup>1</sup>.

If the audiometry sweep test result is normal at the test tones of 40dB, 1000Hz, a further 4 frequencies are tested and if normal no action is required. If the child fails to hear the test tones then tympanometry should be undertaken to differentiate whether the child is more likely to have sensorineural or conductive hearing loss. If tympanometry is normal the child may have a sensorineural hearing loss and should be referred to audiology for further assessment. If the child fails tympanometry then conductive hearing loss is more likely and the child should initially be referred to their GP or ear nurse<sup>1</sup>.

If the child passes the test tones but fails the audiometry test on subsequent frequencies appropriate action is determined by the presence or otherwise of developmental concerns. If there are no developmental concerns then children can be rescreened in 3 to 6 months. If there are developmental concerns or if the audiometry test showed significant hearing loss children should be referred to audiology<sup>1</sup>.

### AUDIOMETRY AND TYMPANOMETRY

In total, 7,836 children had an audiometry test. Four hundred and seven children had no testing, just 117 of which were already under care and for whom testing was therefore not indicated. The reasons for no results being entered for the remaining 290 children are unclear but potentially children were uncooperative or unwilling to have the test or were absent on the day of testing.

The majority of children (n=6,365, 81.1%) passed their audiometry sweep bilaterally and 1,472 children (18.9%) failed their audiometry of which 521 failed unilaterally and 951 bilaterally (Table 21).

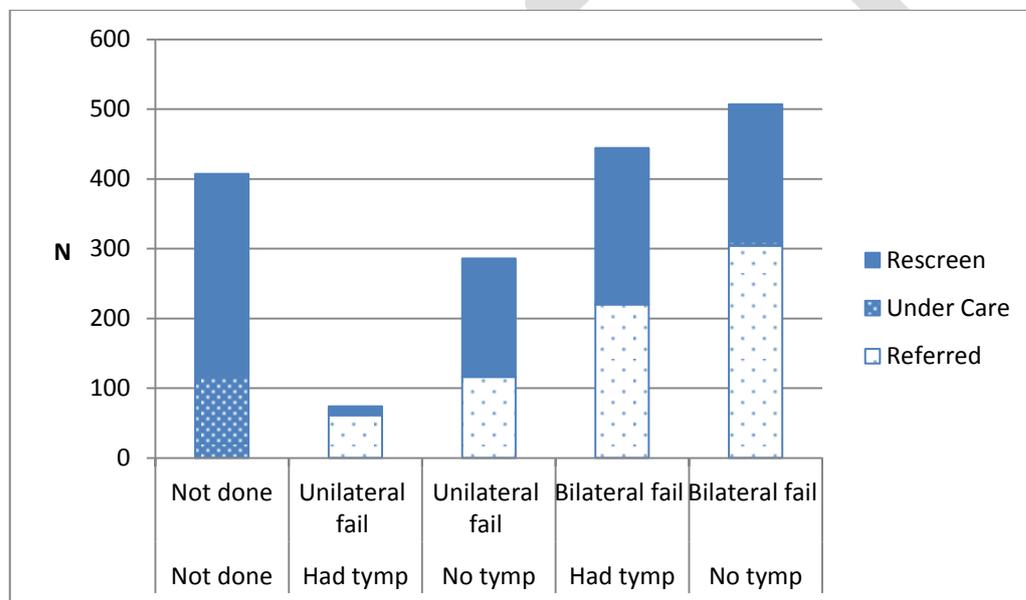
Of the 678 that had tympanometry 655 children (96.6%) passed and 23 children (3.4%) failed (Table 21, Figure 16).

## HEARING OUTCOMES

It was difficult to assess the appropriateness of hearing outcomes as the exact test tone at which children failed their hearing was not ascertained from the database.

All children that fail audiometry bilaterally or unilaterally at the initial test tone of 40db and 1000Hz should have tympanometry and should be referred – the tympanometry just differentiating whether they should be referred to a GP / ear nurse or audiologist. Children failing unilaterally or bilaterally at subsequent test tones do not require tympanometry but should either be rescreened or referred depending upon whether or not they have language or speech difficulties.

**FIGURE 16: NUMBERS WITH SELECTED HEARING OUTCOMES BY AUDIOMETRY AND TYMPANOMETRY RESULTS**



In total there were 235 children who failed their audiometry and who had tympanometry but who were not referred.

## HEARING REFERRALS

In 2012/13 there were 724 referrals documented as sent for 719 children. The majority (71.1%) were to the ear nurse followed by an audiologist (27.8%) (Table 22). There were also 27 VHT rescreens that were entered into the database as referrals in one particular week. VHT rescreens are not referrals and should not be entered as such and have therefore not been included in this analysis.

By quintile of deprivation 57.5% of children referred for hearing issues lived in a quintile 5 area (Appendix Six).

**TABLE 21: HEARING OUTCOMES BY AUDIOMETRY AND TYMPANOMETRY RESULTS**

Test Results		Outcomes				
Audiometry	Tympanometry	Pass Bilaterally	Referred	Under Care	Rescreen	Total
Not done	Not done			117	290	407
Pass bilaterally	Not required	6,356	2	2	5	6,365
Fail unilaterally	Pass		58	1	8	16,227
Fail unilaterally	Not done		116	1	169	287
Fail unilaterally	Fail		3		4	7
Fail bilaterally	Not done bilaterally		304	6	197	507
Fail bilaterally	Pass unilaterally / not done		118		72	190
Fail bilaterally	Pass bilaterally		90		148	238
Fail bilaterally	Fail / equivocal unilaterally		3	1	1	5
Fail bilaterally	Fail / equivocal bilaterally		9		2	11
<b>Total</b>		<b>6,356</b>	<b>703</b>	<b>128</b>	<b>1,056</b>	<b>8,243</b>

**TABLE 22: HEARING REFERRALS TO SELECTED PROVIDERS**

Referred to	Number
Audiologist	201
Ear Nurse	515
General Practitioner	7
ADHB provider	1
<b>Total</b>	<b>724</b>

## AUDIOLOGY REFERRALS

### KEY POINTS

- 117 children were referred to audiology 1<sup>st</sup> July 2012 – 31<sup>st</sup> December 2012 inclusive.
- Only 80/117 (68%) were given an appointment
  - 11 referrals (9%) were not received by audiology
  - 26 more children (22%) were not offered appointments (eligibility issues and other)
- 6/80 did not attend (DNA) their First Specialist Appointment (FSA)
- 54/74 (73%) children seen were considered to have normal hearing
- 7 (9%) required an intervention for hearing loss:
  - 5 were recommended hearing aids (4 fitted, 1 declined)
  - 2 were recommended grommets
- 8 (11%) required on-going monitoring for mild hearing loss
- 12/74 (16%) were referred to Otorhinolaryngology (ORL)
- The DNA rate for follow up audiology appointments was 32%
- Number needed to be referred for each child who received an intervention through audiology = 17\*
- Number needed to screen for each child who received an intervention through audiology = 565\*

\* There may have been additional children who received grommets after being referred through the ear nurse / GP pathway rather than through the audiology pathway. The children who received on going monitoring for mild hearing loss may also require an intervention in the future.

### OVERVIEW

From 01/07/2012 to 31/12/2012 there were 124 referrals to audiology documented in the B4SC database for 117 children.

For each of these 117 children the CMDHB Concerto database was checked to establish the outcome of the audiology referral.

### RESULTS

For 11/117 no audiology referral was documented as received in Concerto. Five of these were actually seen in ear clinic, and six had no hearing related referrals documented (1 had a referral to ophthalmology). Therefore 106 children had an audiology referral documented in Concerto. It is possible, but unlikely, that these children were referred to audiology in other DHBs.

Of the 106 whose audiology referral was documented in Concerto, 19 had their referral rejected. Of these 5 were subsequently re referred (and accepted) and 14 were not. Additionally 12 children were not offered an appointment although their referral was documented as accepted. On receipt of a referral the family is sent a letter asking if the

referral is required. Failure to respond to this letter may result in the episode being closed off in Concerto without an appointment being scheduled. This is the most likely scenario for these 12 children.

Therefore 80/117 children (68%) who were documented as referred to audiology were actually offered an audiology first specialist appointment (FSA). Of these 80 children 74 attended their appointment and 6 did not attend (DNA).

The outcomes of the 74 children seen by audiology are given in Table 23 below. Overall 54 (73%) children were considered to have normal hearing, four (5%) had bilateral hearing loss requiring hearing aids, one child had profound unilateral hearing loss but declined the recommended hearing aid, two were placed on the waiting list for grommets, eight (10%) children had mild hearing loss and were given follow up appointments for on-going monitoring and the outcome of the remaining five children is unknown as they did not attend follow up appointments therefore no clinic letter was available in Concerto.

In total twelve children were referred to otorhinolaryngology (ORL) for further assessment.

**TABLE 23: AUDIOLOGY FIRST SPECIALIST ASSESSMENT OUTCOMES**

<b>Outcome of Audiology Assessment</b>	<b>Number</b>	<b>Outcome of ORL assessment (if required)</b>	<b>Number</b>
Normal hearing	51	-	
Bilateral hearing loss – Hearing Aids fitted	1	-	
Bilateral hearing loss – Hearing Aids fitted and referred to ORL	3	Hearing Aids	3
Unilateral Hearing loss – Hearing Aid recommended but declined. Referred to ORL	1	Diagnostic counselling given	1
Mild hearing loss – for further monitoring. F/up audiology appointment in Concerto.	6	-	
Mild hearing loss – for further monitoring. F/up audiology appointment in Concerto and referred to ORL	1	No surgical intervention indicated	1
Referred to ORL for further assessment	7	For Grommets	2
		For ongoing monitoring	1
		Not seen (DNA x2)	1
		No surgical intervention indicated	3
Unknown (no letter in concerto as DNA F/up appt)	4	-	
<b>Total Seen</b>	<b>74</b>	<b>Total seen</b>	<b>12</b>

The more detailed diagnoses for those with hearing aids are:

1. Mild conductive hearing loss in both ears
2. Mild-to-severe, sensorineural hearing loss in both ears

3. Slight sloping to moderate sensorineural hearing loss in one ear and a normal sloping to moderate sensorineural hearing loss in the other
4. Moderate level predominantly sensorineural hearing impairment in both ears which is most evident in the mid-frequencies.
5. Normal hearing on the right and a profound sensorineural hearing loss on the left

The median time between the B4SC referral being sent and the referral being documented as received on concerto was six days. The median time between the referral being documented as received and time of the FSA (excluding those re referred) was 96 days (range 31 days to 196 days). For those re referred the time between original referral and FSA was a mean time of 180 days (range 102 – 294).

A total of 6/80 children (8.0%) did not attend their FSA. For follow up appointments the rate of non-attendance was considerably higher. The 76 children without hearing aids were offered 24 follow up appointments of which 8 were not attended (33%). The four children with hearing aids were offered 19 follow up appointments of which 6 were not attended (32%).

## DISCUSSION

The type of hearing screening undertaken in New Zealand is used commonly worldwide however concerns have been raised in the literature about the validity of this methodology when used in settings where the ambient noise is high<sup>23</sup>. Anecdotally some ECE settings in CMDHB are quite noisy and therefore may be affecting the ability of the VHTs to administer the tests to a satisfactory standard. The reason for the relatively large number of children requiring rescreens that do not have any test results recorded is unclear. It may be that the ECE setting is a factor contributing to the VHT technicians being unable to administer the test at first visit. This finding may also be artefact due to inconsistent data entry practice. As the B4SC IS does not have a category for the child being absent from the ECE on the day of testing it appears that in some cases children they are entered as declined and in others they are entered as rescreens. Another factor contributing to the high number of rescreens may be that children are being screened at a younger age than previously i.e. as close to their 4<sup>th</sup> birthday as possible. This test is relatively harder to administer to younger children.

The number of children failing their screening test is high. Even allowing for the number of rescreens a significant workload is being generated for audiology by the B4SC. By quintile of deprivation 57.5% of children referred for hearing issues lived in a quintile 5 area. This does mean that hearing problems are more prevalent in the most economically disadvantaged subgroup of our population and that hearing screening stands to help reduce inequalities in CMDHB.

Looking at referrals to audiology, referral processes were found to involve several steps at which it is possible for communication to breakdown. In total 32% of children who are documented in the B4SC database as referred did not actually receive an appointment from audiology either because the referral was not received (9%) or because of eligibility issues or not meeting the services criteria (22%). In total 73% of those seen had normal hearing and

only 9% required an intervention such as a hearing aid or grommets for hearing loss meaning the number needed to be screened for one child to receive an audiology intervention was 565 and the number needed to be referred for one child to receive an audiology intervention was 17. This number is very approximate as there may have been additional children who received grommets after being referred through the ear nurse / GP pathway rather than through the audiology pathway and children who received on going monitoring for mild hearing loss may also require an intervention in the future. It still however represents a considerable outlay of money and effort per child who receives benefit from the process.

The cost effectiveness of screening for hearing loss in preschool children has been looked into internationally with some results published in the recent literature. Childhood hearing loss can be temporary or permanent with the most common cause of temporary loss being Otitis Media with Effusion (OME).<sup>24</sup> Some children have acquired or late onset sensorineural hearing loss.<sup>24</sup> There is much debate about the cost benefit of identifying children with temporary hearing loss due to conductive hearing loss. It is estimated that in only 1-5% of cases is OME recurrent or persistent and accompanied by hearing loss of a marked enough severity to have significant effects on a child's language and behavior.<sup>24</sup>

Cost effectiveness is closely related to the prevalence of hearing loss in the population. With the introduction of new born screening the prevalence of unidentified sensorineural hearing loss in four year olds should be lower than previously (although mild congenital permanent hearing loss may be missed at birth). This would reduce the cost effectiveness of screening at the B4SC age. It may be that with the establishment of the new born screening programme there is an argument for moving the 4 year old hearing screening back to the school setting where participation rates should be higher and the test easier to administer.

## RECOMMENDATIONS

1. Advocate for eligibility issues to be addressed at a central government level. In the interim ensure that referral rejection letters are consistently sent back to the B4SC coordinator (rather than General Practitioners) so that they can be followed up.
2. Ensure that if parents decline a referral that this is communicated to the B4SC programme and appropriately documented in the B4SC IS.
3. Consider the need for more FTE provision to the B4SC programme in order to ensure that referrals to audiology result in appointments.
4. Ensure the B4SC referral guidelines for audiology align with the referral acceptance guidelines of the audiology service.
5. Explore the reasons underlying the high (and rising) rate of hearing rescreens in the CMDHB population.
6. Modify the B4SC IS to enable more information to be collected on children that require hearing rescreens.
7. Consider advocating for a change in the timing of the hearing screening to school entry on the basis that:
  - The number of hearing rescreens may be reduced
  - Coverage of hard to reach children will be higher

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## DENTAL 2012/13

### KEY POINTS

- 502 children (7.1% of those seen) required enrolment with the Auckland Regional Dental Service (ARDS)
- 1,692 children (24% of those seen) had levels of decay (Lift the Lip scores) requiring referral
- 600 children (35.4% of children requiring referral) were not referred or under care
- Almost all (93.6%) of the 141 children referred to ARDS July - December 2012 with decay levels 5 or 6 were enrolled at ARDS and given an appointment to attend
- Only 54.6% of children referred to ARDS July - December 2012 with decay levels 5 or 6 had their treatment completed by September 2013.

### DENTAL OVERVIEW

The dental component of the B4SC comprises ascertainment of whether the child is enrolled with a dental service, promotion of oral health to parents and a 'Lift the Lip' check for dental caries. Rates of decay as measured by the 'Lift the Lip' score are not directly comparable with DMFT (decayed, missing or filled teeth) scores however there is a high correlation between the 'Lift the Lip' score and decayed and filled teeth. Children who are not enrolled with a dental service should be enrolled with the Auckland Regional Dental Service (ARDS). Children with a 'Lift the Lip' score of 2-6 should be referred to a dental service for further assessment and treatment.

### DENTAL ENROLMENT STATUS

A total of 7,083 children were documented as completing the dental component of the B4SC from 1st July 2012 to 30<sup>th</sup> June 2013. Of these 47 were recorded as 'declined' therefore 7,036 children were actually assessed.

At assessment 6,534 (92.9%) were found to be already enrolled with the school dental clinic and 502 (7.1%) were enrolled at the check (Table 24).

### PROGRESSION OF DECAY (LIFT THE LIP SCORE)

The Lift the Lip assessment found high levels of decay in some children although the majority, 5,344 children (76%) had very little or no decay (Table 24). In total 459 (6.5%) children had very high levels of decay (progression of decay 5 or 6). There were significantly higher percentages of children with moderate or high levels of decay in the unenrolled children compared with the children who were already enrolled (Table 24).

## DENTAL OUTCOMES

The amount of decay did not always correlate with the pathway outcome with some children being referred to the dental school nurses with very low levels of decay or no decay and other children with high levels of decay recorded as not referred (Table 26, Figure 17). The accepted standard is that children with progression of decay (Lift the Lip score) 2 or more should be referred. Of note this is not clear in the B4SC handbook and some providers in other DHBs have only been referring children with levels of decay of 3 or more until recently<sup>18</sup>. The children who should have been referred to the school dental nurse but who were not recorded as referred are shaded in Table 26. Overall 600/1,692 (35.4%) children with levels of decay of 2 or more were not referred. Most had a 'Lift the Lip' score of 2 but 144 had scores of 3 to 6. Of these 600 children 306 children were recorded as 'completed advice given', 256 'completed not referred' and 38 as 'enrolled at check' (Table 26).

TABLE 24: PROGRESSION OF DECAY (LIFT THE LIP SCORE) BY ENROLMENT STATUS

Enrolment Status	Progression of decay (Lift the Lip score)				
	Number	1 (%) 95% CI	2 to 4 N (%)	5 & 6 N (%)	Total N
Enrolled	5,054	(77.3) 95% CI 76.3 – 78.3	1,097 (16.8)	383 (5.9)	6,534
Un enrolled	290	(57.8) 95% CI 53.5 – 62.1	136 (27.1)	76 (15.1)	502
Grand Total	5,344		1,233 (17.5)	459 (6.5)	7,036

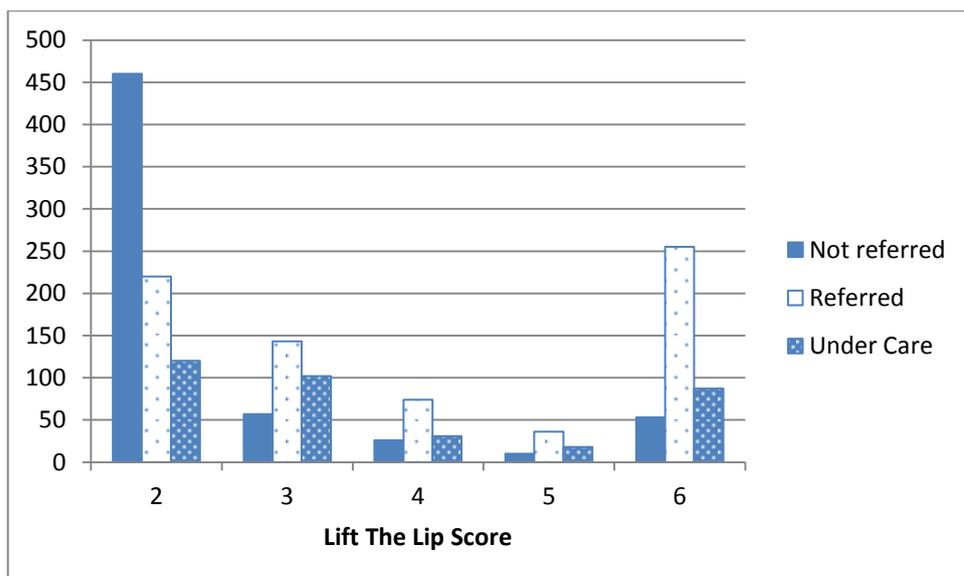
TABLE 25: DENTAL ASSESSMENT OUTCOMES BY ENROLMENT STATUS

Outcome	Enrolment Status			
	Not Enrolled	Enrolled	Number	%
Completed - Advice Given		861	861	(12.2)
Completed - Not Referred		4,499	4,499	(63.9)
Completed - Referral Declined		9	9	(0.1)
Enrolled at Check	222		222	(3.2)
Enrolled at Check and Referred	280		280	(4.0)
Referred		679	679	(9.7)
Under Care		486	486	(6.9)
Grand Total	502	6,534	7,036	(100.0)

TABLE 26: DENTAL ASSESSMENT OUTCOMES BY PROGRESSION OF DECAY (LIFT THE LIP SCORE)

Outcome	Progression of Decay						Total
	1	2	3	4	5	6	
Completed - Advice Given	555	176	51	20	8	51	861
Completed - Not Referred	4,243	256	-	-	-	-	4,499
Completed - Referral Declined	3	4	-	1	-	1	9
Enrolled at Check	184	24	6	5	2	1	222
Enrolled at Check and Referred	106	54	38	9	8	65	280
Referred	125	166	105	65	28	190	679
Under Care	128	120	102	31	18	87	486
Grand Total	5,344	800	302	131	64	395	7,036

FIGURE 17: NUMBERS WITH DENTAL ASSESSMENT OUTCOMES BY 'LIFT THE LIP' SCORE



'Not referred' = Completed - Advice Given, Completed Not Referred and Enrolled at Check

## DENTAL REFERRALS

Cross checking with the referrals database showed good correlation between numbers of children recorded as referred and actual numbers of referrals. Virtually all referrals were to ARDS with just a couple of children documented as referred to a private dentist.

## DENTAL REFERRALS TO THE AUCKLAND REGIONAL DENTAL SERVICE

In order to try and ascertain dental referral outcomes the results of referrals to ARDS were analysed for a six month cohort of referrals.

## METHODS

As the Auckland Regional Dental Service (ARDS) does not consistently record the NHI's of children that they see, or the referral source, the only way to check whether children referred to ARDS attend for treatment is to check the ARDS database by searching for each child's name. It was too time consuming to undertake this process for all the children referred to ARDS July 2012 to December 2012. A check was therefore undertaken for a smaller subgroup of referrals - children referred with dental decay levels 5 and 6 (Table 27).

## RESULTS

In total 141 children were referred from July 2012 to December 2012 inclusive with decay levels 5 or 6 (108 referred and 33 enrolled at check and referred, Table 27). Of these 136 were recorded as enrolled with ARDS at Sept 2013 (32 were previously unenrolled at B4SC). Five children were not able to be found on the ARDS database. These children may be under a private dentist or are not being seen at all. In total 132 had a date of first appointment recorded by ARDS and four did not. Of those with appointments in the database 77 were completed and 51 not completed and four had an unknown completion status as at September 2013.

**TABLE 27: OUTCOMES FOR CHILDREN REFERRED TO ARDS JUL - DEC 2012 WITH DECAY LEVELS 5 OR 6**

B4SC Outcome	Total referred (decay 5 or 6)	ARDS Database Outcome Information			
		Enrolled in ARDS	FSA date given	ARDS Completion status 'completed'	
				Number	%
Referred	108	104	101	60	(55.6)
Enrolled at Check and Referred	33	32	31	17	(51.5)
<b>Total</b>	<b>141</b>	<b>136</b>	<b>132</b>	<b>77</b>	<b>(54.6)</b>

In total 83/141 children were listed as referred by CMDHB Plunket, one by Papakura Marae, two by South Seas Health Care, two by ETHC Bairds Road, seven by another DHB and 37 had no data recorded in this field.

## DISCUSSION

Dental enrolment rates are good in the B4SC cohort with 92.9% of children that have a B4SC already enrolled with ARDS in 2012/13. It is unclear why unenrolled children were not enrolled at previous Well Child checks. Although the numbers are small there were significantly higher percentages of children with moderate or high levels of decay in the unenrolled children compared with the children who were already enrolled. It may be that if the B4SC nurse led component was carried out slightly earlier (e.g. at 3 years and 6 months) that the earlier enrolment of these previously unenrolled children with ARDS would catch their decay sooner and potentially reduce the amount of treatment required.

The rates of dental decay among children in CMDHB are amongst the highest in New Zealand according to B4SC data<sup>12</sup>. It is concerning that in 2012/13, 600 children (35.4%) of children requiring referral because of decay evident at 'lift the lip' were not referred or under care. This could possibly be due to data anomalies (such as misclassification of level of decay in previously treated children) but it would be useful to follow up the reasons underlying this finding to ensure that children that appear to have dental decay are having a formal dental assessment and treatment. Auditing the number of children actually seen for treatment following referral to ARDS is made difficult by the poor use of NHIs in the ARDS database.

## RECOMMENDATIONS

1. Clarify documentation / classification of the lift the lip decay levels are appropriate in CMDHB B4SC providers.
2. Investigate the reason(s) for low referral rates to ARDS for children with significant levels of decay.
3. Advocate for ARDS to document NHI to facilitate cross checking and follow up of referrals by B4SC providers.

## GROWTH 2012/13

### KEY POINTS

- 1,114 (15.8%) children had a weight above the 97<sup>th</sup> percentile
- 240 children (3.5% total) also had a Body Mass Index (BMI) calculated as 21 or over
- Only 119 children (49.6%) of children with a high BMI and whose weight was >97<sup>th</sup> percentile were referred or under care
- Very small percentages of children < 3<sup>rd</sup> percentile for weight or height were referred or already under care (10.9% and 5.5% respectively)

### GROWTH OVERVIEW

As part of the B4SC each child should have their height and weight measured. Their Body Mass Index (BMI) can then be calculated. Although this is not a perfect measure of obesity it is a reasonable screening tool to identify the children who are at highest risk. Children who have a weight >97<sup>th</sup> percentile for their age and who have a BMI of 21 or over should be referred for on-going weight monitoring and management. Children who are in the lower third percentile for height or weight should also be referred for assessment of unrecognised growth problems. The nurse can provide parents and caregivers with information on healthy eating and healthy activity.

### WEIGHT, BMI AND HEIGHT PERCENTILES

The numbers of children with the growth component marked as completed was 7,080 in 2012/13. Of these 37 were recorded as declined therefore 7,043 children actually had a growth assessment. In total 1,114 (15.8%) children had a weight above the 97<sup>th</sup> percentile. This high percentage reflects the ethnic composition of the CMDHB population and the majority did not require referral as their BMI was less than 21. In total 244 (3.5%) children had a BMI calculated as 21 or over and of these 240 also had a weight percentile over 97%. A total of 55 children (0.8%) had a weight in the lower third percentile. Regarding height 92 children (1.3%) children were in the lower third percentile for their age.

### GROWTH OUTCOMES

The outcomes for children who should be referred as per the recommendations in the B4SC handbook are given in Table 28 and shown in Figure 18. Approximately 50% of children who had a high BMI and whose weight was >97<sup>th</sup> percentile were either referred or already under care but this was the case for very few children in the lower 3<sup>rd</sup> percentiles for height and / or weight.

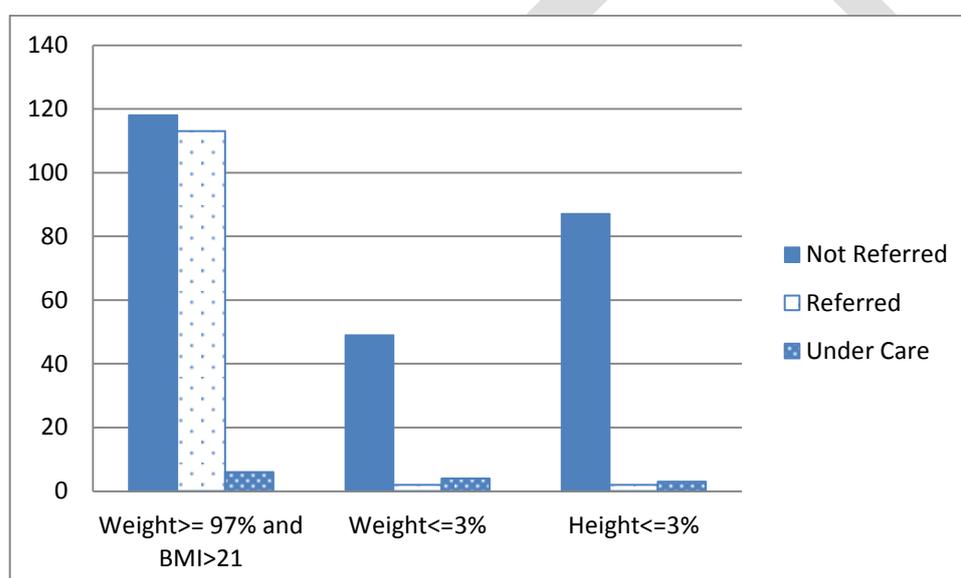
Of note 10 children who should have been referred as they were overweight were under the care of the Tongan Health Society. Whilst the children are resident in CMDHB this provider is

under the governance of Auckland DHB therefore the referral pathways that they use are those of ADHB.

TABLE 28: GROWTH OUTCOMES BY HEIGHT AND WEIGHT PERCENTILES

Outcome	Weight $\geq$ 97% and BMI $>$ 21		Weight $\leq$ 3%		Height $\leq$ 3%		Total Number
	Number	%	Number	%	Number	%	
Advice Given	104	(43.3)	6	(10.9)	7	(7.6)	117
Not Referred	-		43	(78.2)	80	(87.0)	123
Referral Declined	14	(5.8)	-		-		14
Referred	113	(47.1)	2	(3.6)	2	(2.2)	117
Under Care	6	(2.5)	4	(7.3)	3	(3.3)	13
Unknown	3	(1.3)	-		-		3
<b>Total</b>	<b>240</b>	<b>(100.0)</b>	<b>55</b>	<b>(100.0)</b>	<b>92</b>	<b>(100.0)</b>	<b>387</b>

FIGURE 18: NUMBERS OF CHILDREN WITH SELECTED OUTCOMES FOR GROWTH



\* Not referred = Not referred, advice given, referral declined

## GROWTH REFERRALS

All but two referrals were to the General Practitioner. These two referrals were to 'Kids in Action' and to the Child Developmental Service. It was not feasible to check the outcomes of these referrals.

## DISCUSSION

Referral rates were low for children noted as having a weight  $>$  97% percentile and BMI over 21. This is a nationwide problem but because children with obesity make up a higher percentage of our children than in other DHBs this affects a relatively large number of our children. The current pathway in CMDHB recommends referral to Primary Care. Anecdotally the advice and level of support provided to families by Primary Care is variable. In addition there are no community or secondary services in CMDHB that address obesity in children

under the age of 5 years. Instead children are expected to be referred to their GP for monitoring and advice and then referred to 'Kids in Action' once they are 5 years of age by their primary care provider.

A lack of evidence to support interventions targeting obesity in pre-schoolers has been cited as a reason for the lack of available interventions for this age group. However childhood obesity is known to be an independent risk factor for adult obesity.<sup>25</sup> Most interventions target school aged children and it is not clear whether the few that have targeted pre-schoolers are genuinely ineffective or whether their short intervention time and lack of evaluation of long term effects has compromised their results.<sup>5</sup> Once a child is obese, it is difficult to reverse through interventions<sup>27</sup> and so there is urgent need for more research into this area. There are now some newer studies whose results are pending. Doone Winnard has summarised the current research in this area to support the infant nutrition project.<sup>27</sup>

The causes of obesity are complex. Experience in several countries has shown that successful obesity prevention during childhood can be achieved through a combination of population-based initiatives<sup>5</sup>. With the lack of significant evidence to clarify to practitioners and policymakers which interventional programmes for individuals are best to target obesity in preschool children support of population based programmes should be prioritised.

The rates of referral were even less for underweight children – perhaps an indication that this is not seen as an issue especially if the parents themselves are of small build. However the recommendation currently is that children < 3<sup>rd</sup> percentile for weight should be referred to their GP for monitoring.

## RECOMMENDATIONS

1. Provide guidelines to Primary Care on the management of referrals for overweight preschool children in order to standardise current practice for the CMDHB population
2. Consideration needs to be given to developing and evaluating interventions for obese pre-school children living in CMDHB. This is not clear cut given the limited evidence of effectiveness in the literature.

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# IMMUNISATION

## IMMUNISATION 2012/13

### KEY POINTS

- Immunisation rates are high amongst children that have a B4SC (96.7% fully immunised up to and including age 15 months, 61.4% fully immunised up to and including age 4 years).

### IMMUNISATION OVERVIEW

At the B4SC the nurse asks which immunisations the child has had. The B4SC appointment is an opportunity to give scheduled immunisations that are due or overdue.

### IMMUNISATION RATES

6,950 children had their B4SC immunisation check completed in 2012/13. At their B4SC 6,721 children (96.7%) who had their immunisation status recorded were fully immunised up to 15 months inclusive and 4,264 were fully immunised up to and including their 4 year old immunisations (61.4%, Table 29). A further 81 children had their 4 year immunisation despite not being up to date for the previous courses (Table 30).

### IMMUNISATION OUTCOMES

The immunisation data was somewhat difficult to interpret as the immunisation outcomes did not always match the child's immunisation status. For instance 55 incompletely immunised children are documented as 'completed' (shaded in Table 31). If this data correct, this would seem to indicate that the child's immunisation status has been assessed but the information gathered has not been acted on. It may however reflect confusion over which outcome to select. It is also difficult to interpret from the B4SC IS how many children were opportunistically given their immunisations during the B4SC appointment. These should be documented as 'immunised' but it appears that they are sometimes recorded as 'completed'. The outcomes as recorded are shown by immunisation status in Table 31. According to the data 55 children were immunised at the B4SC but this number may be higher if they are recorded as completed.

TABLE 29: CHILDREN WITH IMMUNISATIONS COMPLETE UP TO 15 MONTHS

Immunisation Course	Immunisation Status					
	Total number Completed	% of total	Declined	Partial	Blank	Total
6 weeks	6,775	(97.5)	1	2	172	6,950
3 months	6,768	(97.4)	1	1	180	6,950
5 months	6,757	(97.2)	-	1	192	6,950
15 months	6,736	(96.9)	4	3	207	6,950
All the above	6,721	(96.7%)			229*	6,950

\*combined declined / partial / blank

TABLE 30: CHILDREN WITH IMMUNISATIONS COMPLETE UP TO 4 YEARS

Immunisation Course	Immunisation Status					
	Total number Completed	% of total	Declined	Partial	Blank	Total
4 years previously fully immunised	<b>4,264</b>	63.4	3	128	2,326	6,721
4 years previously incomplete	81	35.4	1	12	135	229
<b>4 years total</b>	<b>4,345</b>	<b>(62.5)</b>	<b>4</b>	<b>140</b>	<b>2,461</b>	<b>6,950</b>

TABLE 31: IMMUNISATION OUTCOMES BY IMMUNISATION STATUS

	Completed	Completed - Advice Given	Declined	Immunised	Referred	Total
Partially or not immunised to 15 months and no 4 year imms	14	82	26	5	21	148
Partially or not immunised to 15 months but has 4 year imms	41	23	-	17	-	81
Fully immunised to 15 months but no 4 year imms	34	2,287	1	13	122	2,457
Fully Immunised to 4 years	4,155	89	-	20	-	4,264
<b>Total</b>	<b>4,244</b>	<b>2,481</b>	<b>27</b>	<b>55</b>	<b>143</b>	<b>6,950</b>

## IMMUNISATION REFERRALS

All referrals were to the general practitioner. Referral outcomes have not been determined as CMDHB immunisation rates are well documented in other reports. The number of children that were immunised by their GP after being referred by the B4SC is therefore unknown.

## DISCUSSION

Immunisation rates are high amongst children that have a B4SC (96.7% fully immunised up to and including age 15 months). The immunisation rates in children that did not have a B4SC could well be lower as they are likely to be a higher needs group. This could be assessed by looking up their NHI on the NIR but time did not allow for this to be undertaken. Anecdotally the B4SC appointment is used to opportunistically immunise children and is therefore likely to be contributing to the high immunisation rate in the CMDHB child population.

## RECOMMENDATIONS

1. Improve B4SC IS data entry training to ensure that the B4SC IS is able to differentiate children immunised at their B4SC so that the direct impact of the B4SC on immunisation rates can be readily assessed.
2. Consider cross checking the children's immunisation status on the NIR after referral to the GP for immunisation to determine the impact on immunisation rates of these referrals.

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# TIME TRENDS 2008 - 2013

## TIME TRENDS 2008 - 2013

### KEY POINTS

- There is poor correlation between those recorded as referred in the 'outcome' field in the B4SC database and actual referrals made prior to July 2012.
- In 2012/13, 3.4% children were allocated to PEDS pathway A. This percentage was significantly lower than in the pilot and previous years ( $p < 0.05$ ).
- The percentage of children with a completed SDQ-P that also have a completed SDQ-T has declined steadily from 63.5% in 2008/09 to just 25.5% in 2012/13. This may reflect a real decrease or a change in data entry practice.
- The number and percentage of Hearing outcomes that are 'rescreens' has been increasing steadily over time and was significantly higher in 2012/13 than in 2010/11 and previous years ( $p < 0.05$ ).
- The number and percentage of Vision outcomes that are 'rescreens' has been increasing steadily over time and was significantly higher in 2012/13 than in all previous years ( $p < 0.05$ ).
- There has been no change in levels of dental decay found at the lift the lip check over time. Outcomes (whether referred or not) were unable to be analysed due to inconsistencies in recording this data over time.

### RESULTS

It was difficult to analyse trends in B4SC screening outcomes over time as the quality of data was relatively poor for the earlier years. Modifications have been made to the B4SC IS over time and data entry has altered over the years. Despite these limitations some conclusions could be drawn as follows:

#### *PEDS*

From 1<sup>st</sup> July 2008 to 30<sup>th</sup> June 2013 23,047 children had a PEDS completed. Overall 1,031 were assessed as pathway A (4.5%), 3,140 (13.6%) as pathway B, 2,662 as pathway C (11.5%) 70 as pathway D (0.3%) and 16,144 were pathway E (70.0%).

Table 32 shows the numbers and percentages of children in each PEDS pathway by year. The percentages of those determined to be pathway A, B or C dropped over time and of those determined to be pathway E increased over time. Most notably the percentage of PEDS E children was significantly lower in 2008 – 2009 than other years ( $p < 0.05$ ) and the percentage of PEDS A children was significantly lower in 2012 – 2013 than previously ( $p < 0.05$ ).

#### *SDQ*

From 1<sup>st</sup> July 2008 to 30<sup>th</sup> June 2013 22,947 children had a Strengths and Difficulties questionnaire completed by a parent and 7,149 had one completed by a teacher. The

percentages found to be in the abnormal or borderline ranges have not changed significantly throughout the five years for either the SDQ-P (Table 33) or SDQ-T (Table 34) but the percentage of children having an SDQ-T completed has dropped over this time from 63.5% in 2008/9 to 25.5% in 2012/13. In actual fact several SDQ-Ts are currently completed but not able to be entered into the B4SC IS as they are returned late.<sup>28</sup> This trend may therefore partially reflect a change in data entry practice over time as well as a drop in rates of SDQ-T completion.

#### *Vision*

From 1<sup>st</sup> July 2008 to 30<sup>th</sup> June 2013, 24,993 children had a vision test (this total excludes 'declines' but includes declines that were under care). The number and percentage of vision tests that pass bilaterally was lower in the most recent 3 years compared with the earlier 2 years (2008/9 and 2009/10)(Table 35).

The percentage of children that require rescreens has been increasing steadily over time and was significantly higher in 2012/13 than in all previous years ( $p < 0.05$ ). Several children were noted to have 'rescreen' as their screening outcome when no test results were entered for the initial test (57.4% of rescreens).

#### *Hearing*

The trends over time for hearing are very similar to those of vision. From 1<sup>st</sup> July 2008 to 30<sup>th</sup> June 2013, 25,073 children had a hearing check (this total excludes 'declines' but includes declines that were under care). The number and percentage of children that passed their hearing check bilaterally was lower in the most recent 3 years (2012/13, 2011/12 and 2010/11) compared with the earlier 2 years (2008/9 and 2009/10) (Table 36).

As per vision, the percentage of children that require rescreens has been increasing steadily over time and was significantly higher in 2012/13 than in 2008/9, 2009/10 and 2010/11 ( $p < 0.05$ ).

#### *Dental*

From 1<sup>st</sup> July 2008 to 30<sup>th</sup> June 2013 22,990 children had a lift the lip oral assessment (Table 37). The levels of decay in children have not changed substantially over time. The outcomes of the assessment (whether referred, not referred or under care) could not be analysed as this has been recorded inconsistently over time.

#### *Growth and Immunisation*

BMI percentile, Weight percentile and height percentile were not recorded prior to 2011 therefore a time trend cannot be undertaken for growth. Time trends have not been reported here for immunisation rates as these are well documented elsewhere.

## DISCUSSION

Although data is recognised to be poor in the earlier years there are some notable trends.

Firstly the number of children allocated to PEDS pathway was slightly lower than in the pilot and previous years ( $p < 0.05$ ) The reasons for this are not clear but could reflect underlying

differences in the population taking up the B4SC over time or differences in application and interpretation of the test as nurses become more experienced and used to the tool.

Secondly the percentage of children with a completed SDQ-P that also have a completed SDQ-T has declined steadily from 63.5% in 2008/09 to just 25.5% in 2012/13. This may reflect a real decrease in completion rates or a change in data entry practice. Anecdotally it often takes several months before an SDQ-T is returned. Because of the need to close cases in a timely manner in order to be reimbursed by the MoH (and to in turn pay Plunket and other providers) the cases are being closed before the SDQ-Ts are returned. Late SDQ-Ts are not being entered. This has several implications. For one the validity of the SDQ is higher when both the SDQ-P and SDQ-T are completed and looked at in unison<sup>1</sup>. Also in the absence of an SDQ-T it may be that abnormal SDQ- results are being ignored. Another scenario is that the ECE may assume the B4SC has acted on the information in the late SDQ-Ts and fail to refer children that they would otherwise have referred to services themselves.

Finally over the time that the B4SC has been delivered the numbers and percentages of hearing and vision tests that result in 'rescreens' have been increasing. Once again the underlying reasons for this trend are unclear but one hypothesis is that this could be because children are now being screened at a younger age. It could also be due to other factors such as data entry changes. For vision several children were noted to have 'rescreen' as their screening outcome when no test results were entered for the initial test (57.4% of rescreens). It would be useful to have more information on these rescreens – whether they were absent on the day of testing or present but uncooperative.

**TABLE 32: PEDS PATHWAY RESULTS BY FINANCIAL YEAR**

Year	PEDS A			PEDS B		PEDS C		PEDS D		PEDS E			Total	
	N	%	95% CI	N	%	N	%	N	%	N	%	95% CI	N	%
2008/9	60	(5.5)	4.1 – 6.8	240	(22.0)	196	(17.9)	13	(1.2)	582	(53.3)	50.3 – 56.3	1,091	(100.0)
2009/10	121	(5.2)	4.3 – 6.1	305	(13.1)	280	(12.1)	2	(0.1)	1,604	(69.1)	67.2 – 71.0	2,312	(100.0)
2010/11	274	(5.2)	4.6 – 5.8	645	(12.2)	596	(11.3)	13	(0.2)	3,761	(71.1)	69.9 – 72.3	5,289	(100.0)
2011/12	338	(4.6)	4.1 – 5.1	998	(13.6)	747	(10.2)	20	(0.3)	5,207	(71.1)	70.1 – 72.1	7,310	(100.0)
2012/13	238	(3.4)	3.0 – 3.8	952	(13.5)	843	(12.0)	22	(0.3)	4,990	(70.8)	69.7 – 71.9	7,045	(100.0)
<b>Total</b>	<b>1,031</b>	<b>(4.5)</b>		<b>3,140</b>	<b>(13.6)</b>	<b>2,662</b>	<b>(11.6)</b>	<b>70</b>	<b>(0.3)</b>	<b>16,144</b>	<b>(70.0)</b>		<b>23,047</b>	<b>(100.0)</b>

**TABLE 33: SDQ-P TOTAL DIFFICULTIES SCORE RANGE RESULTS BY FINANCIAL YEAR**

Year	SDQ-P Abnormal		SDQ-P Borderline		SDQ-P Normal		Total	
	Number	%	Number	%	Number	%	Number	%
2008/9	79	(7.3)	65	(6.0)	945	(86.8)	1,089	(100.0)
2009/10	101	(4.4)	128	(5.5)	2,081	(90.1)	2,310	(100.0)
2010/11	347	(6.6)	411	(7.8)	4,499	(85.6)	5,257	(100.0)
2011/12	387	(5.3)	490	(6.7)	6,412	(88.0)	7,289	(100.0)
2012/13	364	(5.2)	428	(6.1)	6,210	(88.7)	7,002	(100.0)
<b>Total</b>	<b>1,278</b>	<b>(5.6)</b>	<b>1,522</b>	<b>(6.6)</b>	<b>20,147</b>	<b>(87.8)</b>	<b>22,947</b>	<b>(100.0)</b>

**TABLE 34: SDQ-T TOTAL DIFFICULTIES SCORE RANGE RESULTS BY FINANCIAL YEAR**

Year	SDQ-T Abnormal		SDQ-T Borderline		SDQ-T Normal		Total		% of SDQ-P with SDQ-T completed
	Number	%	Number	%	Number	%	Number	%	
2008/9	26	(3.8)	45	(6.5)	620	(89.7)	691	(100.0)	63.5%
2009/10	54	(4.3)	89	(7.1)	1,102	(88.5)	1,245	(100.0)	53.9%
2010/11	67	(4.0)	100	(6.0)	1,494	(89.9)	1,661	(100.0)	31.6%
2011/12	90	(5.1)	96	(5.4)	1,579	(89.5)	1,765	(100.0)	24.2%
2012/13	89	(5.0)	86	(4.8)	1,612	(90.2)	1,787	(100.0)	25.5%
<b>Total</b>	<b>326</b>	<b>(4.6)</b>	<b>416</b>	<b>(5.8)</b>	<b>6,407</b>	<b>(89.6)</b>	<b>7,149</b>	<b>(100.0)</b>	<b>31.2%</b>

**TABLE 35: VISION OUTCOMES BY FINANCIAL YEAR**

Year	Pass Bilaterally		Referred		Rescreen		95% CI	Under Care		Total Number
	Number	%	Number	%	Number	%		Number	%	
2008/9	756	(88.1)	70	(8.2)	4	(0.5)	0.03% - 0.97%	28	(3.3)	858
2009/10	1,990	(86.0)	243	(10.5)	63	(2.7)	2.04% - 3.36%	17	(0.7)	2,313
2010/11	5,165	(80.5)	841	(13.1)	248	(3.9)	3.43% - 4.37%	164	(2.6)	6,418
2011/12	6,187	(82.6)	899	(12.0)	296	(4.0)	3.56% - 4.44%	110	(1.5)	7,492
2012/13	6,450	(81.5)	900	(11.4)	445	(5.6)	5.09% - 6.11%	117	(1.5)	7,912
<b>Total</b>	<b>20,548</b>	<b>(82.2)</b>	<b>2,953</b>	<b>(11.8)</b>	<b>1,056</b>	<b>(4.2)</b>		<b>436</b>	<b>(1.7)</b>	<b>24,993</b>

**TABLE 36 HEARING OUTCOMES BY FINANCIAL YEAR**

Year	Pass Bilaterally		Referred		Rescreen		95% CI	Under Care		Total Number
	Number	%	Number	%	Number	%		Number	%	
2008/9	916	(87.7)	117	(11.2)	12	(1.1)	0.47% - 1.73%	0	(0.0)	1,045
2009/10	1,763	(84.4)	110	(5.3)	208	(10.0)	8.71% - 11.29%	7	(0.3)	2,088
2010/11	4,911	(79.0)	492	(7.9)	683	(11.0)	10.22% - 11.78%	128	(2.1)	6,214
2011/12	5,851	(78.1)	692	(9.2)	868	(11.6)	10.87% - 12.33%	75	(1.0)	7,489
2012/13	6,356	(77.1)	703	(8.5)	1,056	(12.8)	12.08% - 13.52%	128	(1.6)	8,243
<b>Total</b>	<b>19,797</b>	<b>(79.0)</b>	<b>2,114</b>	<b>(8.4)</b>	<b>2,827</b>	<b>(11.3)</b>		<b>335</b>	<b>(1.3)</b>	<b>25,073</b>

**TABLE 37: GROUPED LIFT THE LIP SCORE RESULTS BY FINANCIAL YEAR**

Year	Decay 1		Decay 2-4		Decay 5-6		Total Number
	Number	(%)	Number	(%)	Number	(%)	
2008/9	865	(80.7)	118	(11.0)	89	(8.3)	1,072
2009/10	1,623	(70.2)	526	(22.8)	162	(7.0)	2,311
2010/11	3,836	(72.6)	1,252	(23.7)	195	(3.7)	5,283
2011/12	5,715	(78.4)	1,174	(16.1)	399	(5.5)	7,288
2012/13	5,344	(76.0)	1,233	(17.5)	459	(6.5)	7,036
<b>Total</b>	<b>17,389</b>	<b>(75.6)</b>	<b>4,306</b>	<b>(18.7)</b>	<b>1,304</b>	<b>(5.7)</b>	<b>22,990</b>

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## DISCUSSION

### KEY FINDINGS

There were specific findings for each of the B4SC components but the general themes were that children did not always have an appropriate screening outcome according to their test results, referral rates for children identified with issues were low and numbers of children receiving an effective intervention for a problem identified at the B4SC were sub-optimal.

Referral outcomes were analysed for audiology, the Incredible Years parenting programme and the Ministry of Education Special Education Services. The common theme was that referral processes are complex and time consuming and involve several steps at which it is possible for communication to breakdown. Although it was difficult to obtain good quality data on referral outcomes (particularly for Incredible Years) it appears that a significant number of children who are documented in the B4SC database as referred do not actually receive an appointment from the specialist service (32% for audiology, 23% for MoE SES). This can be because the referral is not received by the service (9% for audiology, 8% for MoE) or because of eligibility issues or not meeting the services criteria (22% for audiology, 15% for MoE).

In summary currently a number of children are being identified with potential problems at their B4SC but are not being referred to secondary services for further assessment. The cost of delivering the B4SC is not insignificant at between \$95 and \$120 per child depending on their area of residence (NZDep 2006).<sup>29 29</sup> In addition there are staff costs and cost of providing secondary services for children in whom further assessment and / or treatment is indicated. When all of these are taken into consideration the cost of the programme per child benefitted is very high.

In order to get the best value from the B4SC in terms of outcomes for individuals and for the population this issue needs to be addressed across all components of the B4SC. Until this is resolved much of the effort being put into the B4SC programme goes wasted.

### STRENGTHS AND LIMITATIONS

The main strength of this audit is that it links data from multiple sources to gain a picture of how well the whole B4SC screening pathway is performing from start to end. It focuses on the most recent data available (that from the 2012/13 financial year) and provides a comprehensive overview of how the B4SC is performing across all components of the B4SC.

Limitations mainly relate to the quality of data available from each of the data sources. The B4SC IS is designed to collect data in order to track B4SC outcomes however some fields are not intuitive and even after training it appears that some data is entered into the system inconsistently by the data entry personnel. This limits the ease and validity of its use to monitor outcomes. One example is the recording of referrals to the Incredible Years

parenting programme in several different fields. Another is use of the term 'declined' in the database. This is generally initially assumed to refer to the scenario in which the parent has actively opted out of the check whereas in reality it just means that the child did not have the check. The reason could include the family not responding to correspondence or attempts to make contact by telephone, as well as actively opting out of having the check.

Another relevant fact is that some B4SC IS fields were not available in the automated reports. One example is VHT rescreen data. This limits the ease by which individual DHBs can analyse their own data and validity of conclusions reached.

Although this report attempts to assess the outcomes of referrals made to selected secondary services this was hindered by the comprehensiveness of the data that is collected and available from these services and privacy concerns that the secondary services had regarding sharing data. In order to undertake a meaningful audit of outcomes it is likely to be necessary to undertake a prospective study using a study design that is agreed in advance by all services involved. This may require obtaining ethical approval.

This audit was not qualitative in nature. Although information was sought from some individuals – in particular the Plunket Clinical leader and CMDHB B4SC coordinator, it is likely that a more complete view of the B4SC would be obtained by methodically undertaking interviews of a broader selection of healthcare providers (in particular the VHT team leader, B4SC nurses and VHTs) and parents. Unfortunately time did not allow for this but rather this report serves to highlight areas that need to be explored in more depth in the future.

## RECOMMENDATIONS

If the NHC screening criteria were to be strictly adhered to then the B4SC programme should be disestablished as it does not meet these criteria. An invitation to preschool screening carries with it the implicit assumption that screening is going to benefit the child. However given that disinvestment in an existing programme would be contentious, restructuring the B4SC programme in order to maximise the benefits of the programme in terms of health outcomes, whilst still keeping costs from escalating out of control, may be the preferred option.

Below is a list of recommendations aimed at improving the quality of the B4SC delivery at CMDHB.

Individual Components:

### PEDS

1. Addition of a second screen (such as use of an ASQ) should be undertaken for children that are allocated to PEDS pathways A, and B This may help decision making regarding whether a referral to a secondary service is required and improve the quality of information provided on the referral forms. The health professionals who undertake these assessments will require training. Providers who undertake extra assessments will need to be appropriately reimbursed.

2. Explore the reasons underlying the low rate of children allocated to pathways A and B for NZ children compared to international norms.
3. Liaise with MoE to resolve the issue of children missing out on SLT input due to long waiting lists and the low cut off age for referrals.

#### SDQ

4. The guidance on referral options for children who have a total difficulties score or sub scale (s) in the abnormal range is unclear. Nurses require more formal guidance on referral pathways and options open to them.
5. More use or transparency of use of the impact score on the SDQ forms is required.
6. Explore modification of processes in order to increase completion rates and timeliness of completion of SDQ-T forms.
7. Data enter late SDQ-Ts to ensure that this information is available on the child's record.

#### Vision and Hearing

8. Ensure the B4SC referral guidelines for audiology align with the referral acceptance guideline of the audiology service.
9. Explore the reasons underlying the high (and rising) rate of rescreens in the CMDHB population.

#### Dental

10. Clarify documentation / classification of the lift the lip decay levels and ensure nurses are aware that children with a lift the lip score of 2 or more should be referred for dental assessment.

#### Growth

11. Consideration needs to be given to developing and evaluating interventions for obese pre-school children living in CMDHB. This is not clear cut given the limited evidence of effectiveness in the literature.
12. Provide guidelines to standardise management offered in Primary Care.

#### Immunisation

13. Improve B4SC IS data entry training to ensure that the B4SC IS is able to differentiate children immunised at their B4SC so that the direct impact of the B4SC on immunisation rates can be readily assessed.

14. Consider cross checking the children's immunisation status on the NIR after referral to the GP for immunisation to determine the impact on immunisation rates of these referrals.

#### Referral Processes

15. CAG: Consider reinstating CAG. There is evidence that the presence of a decision body such as CAG leads to improved outcomes for children. The previous lack of buy in to CAG would need to be explored to ensure that it meets the expectations and needs of all participants.
16. Monitoring Referrals: A systematic way of monitoring whether referrals have been received by secondary services is required. Options could include an obligatory fax or e-mail being sent to the B4SC coordinator by the secondary service on receipt of each referral. A list of all referrals should be generated weekly against which this information can be cross checked.
17. Referral Forms: Liaise with the MoE and other secondary services to clarify the information required on referral forms. Paucity of information is currently resulting in delays in processing referrals by some providers. Further training of nurses and other refers may be necessary
18. Eligibility: Advocate for eligibility issues to be addressed at a central government level. In the interim ensure that referral rejection letters are consistently be sent back to the B4SC coordinator (rather than General Practitioners) so that they can be followed up.
19. Referral Declines: Ensure that if parents decline a referral that this is communicated to the B4SC programme and appropriately documented in the B4SC IS.
20. Ensure there is clear documentation of all referrals. In particular verbal recommendations to parents to self-refer to incredible years should be clearly documented or this practice discontinued. Currently it appears that only formal referrals are entered into the database.
21. Resource: Consider the need for more FTE provision to the B4SC programme in order to ensure referrals result in appointments with secondary service providers. It is a waste of resource to undertake the B4SC if identified problems are then not addressed.

#### B4SC IS

22. Ensure the SDQ impact factor can be documented in a useful way.
23. Enable differentiation between children who were unable to be contacted or traced and children whose parents actively declined the check. This will allow acceptability of the B4SC to be assessed.
24. Structure the B4SC IS such that if a child fails a screening test they cannot be 'completed advice given' in the database but have to be entered as referred, referral declined or under care. This will improve documentation and ensure children do not inadvertently miss out on a referral.

25. Enable reports to show which immunisations were given at the time of the B4SC. This would allow an assessment of the impact of the B4SC programme on CMDHB immunisation rates.
26. Improve data entry training. There needs to be consistency not only within CMDHB but also nationally.
27. Modify the B4SC IS to enable more information to be collected on children that require hearing or vision rescreens.

#### General

28. Continue to evaluate the B4SC in order to inform improvements and advocate for change at the national level.
29. Focus on delivering this programme to those most hard to reach in order to maximise the likelihood of the B4SC reducing inequalities in our population.
30. Audit individual providers as anecdotally there are differences in delivery between the various providers (although none were identified during this audit).
31. Consider terminating the contracts of providers that fail to deliver a quality service.
32. Consider prospectively evaluating referral outcomes to selected providers.
33. Consider whether changing the timing of the B4SC components will improve outcomes and cost effectiveness of the programme. The nurse led components may benefit from being moved earlier to facilitate effective interventions being delivered before school entry age. Moving the vision and hearing screening to school age may increase participation rates and decrease rescreen rates.

#### CONCLUSION

In its current format the B4SC programme appears to be very costly in terms of the effort expended for the impact on health achieved. The B4SC also runs the risks of increasing inequalities in the CMDHB population if changes are not made. Many of the issues identified in this report need to be resolved at a national level and are not unique to CMDHB.

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## APPENDIX ONE: NHC SCREENING CRITERIA –A FRAMEWORK TO SUMMARISE CONCERNS FOR THE CMDHB B4SC PROGRAMME

### *1. The condition is a suitable candidate for screening*

Conditions are generally deemed suitable for screening if they are an important health problem in terms of either disease incidence or prognosis. The developmental, dental, hearing and vision issues being screened for in the B4SC programme, whilst not serious in terms of mortality, all have an impact on children's ability to thrive and succeed and therefore can reasonably be considered significant in terms of morbidity. Unlike the majority of other conditions that are the subject of national organised screening programmes the B4SC conditions do not have a latent phase however they are generally more amenable to treatment if recognised early. An issue is that developmental disorders lie on a spectrum of severity and there are ill-defined cut-off points for what is normal and abnormal. The somewhat subjective nature of diagnosis and the fact that for some developmental conditions there is little evidence for effective interventions makes their suitability for screening debatable.

### *2. There is a suitable test*

Screening tests should be safe, simple, reliable and valid. They should also be highly sensitive and specific. The screening tools used in the B4SC are all safe and simple. However there are concerns regarding the latter four parameters.

PEDS and SDQ:

The reliability and validity of these tools are both questionable. Anecdotally in CMDHB:

- a. The percentage of children assessed as pathway A on the PEDS is felt to be surprisingly low and possibly inconsistent between the different B4SC providers.
- b. Children who inadvertently have two PEDS tests administered are getting different results with the two tests.
- c. The correlation between SDQ-Ps and SDQ-Ts is generally poor.
- d. New Zealand norms for the SDQ are not known.
- e. The tools have not yet been validated in the New Zealand population.

Although good international data is available, the sensitivity and specificity of the tools are also unknown in the NZ setting. Some school aged children are being referred to secondary services for developmental concerns but were not referred from a B4SC. This indicates that the sensitivity could be sub optimal.

## Vision and Hearing:

Although the tests for hearing and vision are well validated there remain some concerns about their use as follows:

- a. The ambient noise level in ECE centres is often high which may be compromising screening results.
- b. The positive predictive values of the tests are quite low (anecdotally high numbers of children who fail the screening tests are found to be normal on further assessment).
- c. Children who are inadvertently screened twice frequently have different screening test results the second time.

The use of a different vision screening tool has been suggested and is currently being researched.

## Lift the Lip, Growth and Immunisation:

The Lift the lip screening tool appears well validated. It also seems reasonable to use a combination of BMI, weight and height to screen for issues with growth, although there is debate about the use of BMI for some ethnicities.

### *3. There is an effective and accessible treatment or intervention for the condition identified through early detection*

Whilst effective treatment and interventions exist for most conditions there are significant concerns about the accessibility of these interventions to children identified with potential problems as part of the B4SC. Notably:

- a. The Ministry of Education (MoE) has an age cut off for referral to their speech language early intervention programme. As there is a long waiting list for this programme, by the time a child reaches the top of the list they are frequently over this age limit and their referral is rejected.
- b. Eligibility issues for children accessing secondary health services are a barrier for both truly ineligible and eligible children receiving assessment and treatment by CHMDHB secondary services. There is a requirement for families to provide proof of eligibility before an appointment is made. Anecdotally a high number of children have referrals rejected because provision of this documentation has not been forthcoming. There have been children who have required glasses whose referrals to eye clinic have been rejected up to 3 times before being eventually accepted.
- c. If a child has their referral rejected for eligibility issues and subsequently proves their eligibility a re-referral is required. This does not always occur.
- d. A significant number of children are not attending their appointments. It is unclear whether this is because the appointment letter was never received by the family or because of parental choice or accessibility issues.

- e. There are long waiting lists for all secondary service first specialist appointments.
  - f. There is little evidence for effective programmes targeting obesity for those aged 4 or under and there are no funded programmes for this age group in CMDHB.
4. *High quality evidence ideally from randomised controlled trials shows that a screening programme is effective in reducing morbidity or mortality*

There are no randomised controlled trials of the B4SC. Two pilot programmes were undertaken (Counties Manukau and Wanganui DHBs) in late 2007. A study of the development and behavioural outcomes of the CMDHB B4SC pilot did not support roll out of the programme (ref). In particular poor parental acceptability of follow up was highlighted as a major issue. The need for a second screen for developmental issues to avoid unnecessary over-referrals was also evident. Secondary service capacity was considered a potential issue and it was felt the pilot had not demonstrated overall benefit (ref).

5. *The potential benefit from the screening programme should outweighs the potential physical and psychological harm (caused by the test, diagnostic procedures and treatment)*

Harms and benefits from screening programmes are notoriously difficult to quantify. The number of false positives in the B4SC programme is high. Audiology and Ophthalmology services in particular note that the majority of children with an abnormal screening test are normal on further assessment. This raises concerns that the overall burden of psychological harm from failing the screening test, which is then compounded by the wait for further assessment, is out of percentage to the overall benefit of the programme at a population level. For children that have a degree of hearing loss, vision impairment, or dental decay however the treatments are simple and effective. Regarding developmental and behavioural problems, although some interventions can be offered to those with more severe issues, labelling a child as having mild behavioural disorders or developmental delays without providing any support to the families affected may do more harm than good.

6. *The health care system is capable of supporting all necessary elements of the screening pathway, including diagnosis, follow up and programme evaluation*

The Ministry of Health (MoH) has identified that rates of referral for children identified with issues during the B4SC is sub-optimal nationwide (particularly for the developmental, growth and lift the lip components) and has developed a set of quality indicators to monitor these. However there is also anecdotal evidence locally that referred children are not all offered appointments for assessment. This is one of the key concerns about the B4SC programme at CMDHB and raises questions about

eligibility issues, referral processes and the overall capability of CMDHB to support the diagnostic and follow up elements of the screening pathway.

Many secondary service providers note that the information provided to them by the B4SC is insufficient for them to judge whether an assessment by their service is merited.

Many children who are referred to audiology and ophthalmology secondary services following B4SC screening are normal on further assessment (false positives). Although it is to be expected that some false positives will occur the current numbers impact significantly on the workload of the secondary services involved.

Finally there is currently a lack of buy in to the CAG meeting with very few providers attending. The reasons for this are likely multiple but an evaluation of the B4SC programme in Hawkes Bay found the existence of a forum for discussion such as CAG to be key to successful implementation of the B4SC programme in that DHB.

#### *7. Social and ethical issues are considered*

The B4SC programme has made attempts to ensure that children living in high deprivation areas and tamariki Māori are specifically targeted but there are indications that the programme may still be failing to screen significant percentages of children who are considered to be at highest risk by virtue of their ethnicity or area of residence. This failure may be due to accessibility issues or the parents of these children making an active choice not to participate. Whatever the underlying cause a screening programme that fails to gain participation of the most vulnerable sub groups of the population potentially stands to increase rather than decrease inequalities in healthcare. As mentioned previously proving eligibility also appears to be proving a barrier to some children needing to access secondary services following their B4SC. These factors raise ethical and social issues which need to be resolved at a central as well as a local level.

#### *8. Cost-benefit issues are considered*

The exact 'number needed to screen' in order to benefit one child is unknown. The CMDHB pilot however estimated that only 1% of children received an intervention for a developmental or behavioural disorder. As more evidence about the costs and benefits of the B4SC programme become available the programme design should be evaluated to ensure that the cost-benefit ratio is satisfactory. It may be that a targeted approach is more cost effective at identifying children in need of interventions in the CMDHB population.

## APPENDIX TWO: REFERRALS AND ELIGIBILITY PROCESSES

Any referrals that are indicated for a child following their B4SC screening are made by the healthcare professional that complete the relevant component of the child's B4SC (i.e. the B4SC nurse or VHT). Each secondary service requires a specific referral form to be completed. These are then faxed to the secondary service providers. There appears to be no reliable system in place for the B4SC providers to be informed or be able to check that these referrals have actually been received by the secondary service.

For referrals to CMDHB services (generally Audiology, Ophthalmology, General Paediatrics and Developmental Paediatrics) the eligibility status of the child is immediately checked by the DHB. Eligibility is defined as the right to be considered to receive publicly funded services.<sup>1</sup> Under the Eligibility Direction 2011 a child is eligible to receive Well Child/Tamariki Ora services (which includes the B4SC) whether or not the child is otherwise eligible to receive other healthcare services.<sup>2</sup> However they are required to prove eligibility in order to access any secondary health services that they are referred to following their B4SC. Previously, being born in New Zealand conferred automatic NZ citizenship and therefore eligibility, however for those born on or after 01/01/2006 this is no longer the case.

If the child has not previously been cleared for eligibility the parent will be sent a letter requiring them to prove eligibility before the referral is processed any further. Currently all those born outside of New Zealand (NZ), or born in NZ on or after 01/01/06 must send or present copies of relevant documents to outpatient administration staff within 14 days of being sent a letter advising this. If documents are not received within this timeframe the referral is rejected (unless urgent) and returned to the referrer. To access the service another referral must be made and eligibility documentation provided. The B4SC programme (as the referrer) should receive notification of all referral rejections.

Once eligibility has been ascertained the referral is graded and a letter sent to the referrer to inform them of the grading results and of the likely time frame until the child's appointment. A letter may also be sent to the parent asking them to confirm that the appointment is still required.

The B4SC programme (as the referrer) should receive notification of all referral rejections. If such notification is received the B4SC coordinator will liaise with the clinical leader, B4SC nurse or VHT on a case-by-case basis to try and ensure assistance to prove eligibility is provided to families and to ensure that a re-referral is made. This is however not always successful and can be extremely time consuming. The number of cases that need follow up is also currently too high for the FTE allocated to this task therefore the B4SC coordinator has to prioritise cases to which assistance can be offered. Occasionally rejection letters are sent to the GP rather than the B4SC referrer. In the absence of a rejection letter it may be incorrectly assumed by the B4SC personnel that the referral is progressing well.

For children in whom eligibility has been proven a letter may be sent to the parent asking them to confirm that the appointment is still required. Failure to respond to this letter may result in a child not being seen for assessment.

Referrals to Kids First Developmental Disability Services are managed by module 4 staff and do not go through the usual eligibility services. The Module 4 staff undertake extra work to ensure children are actually eligible and failure to respond in 2 weeks is not a prompt to reject referrals to this service.

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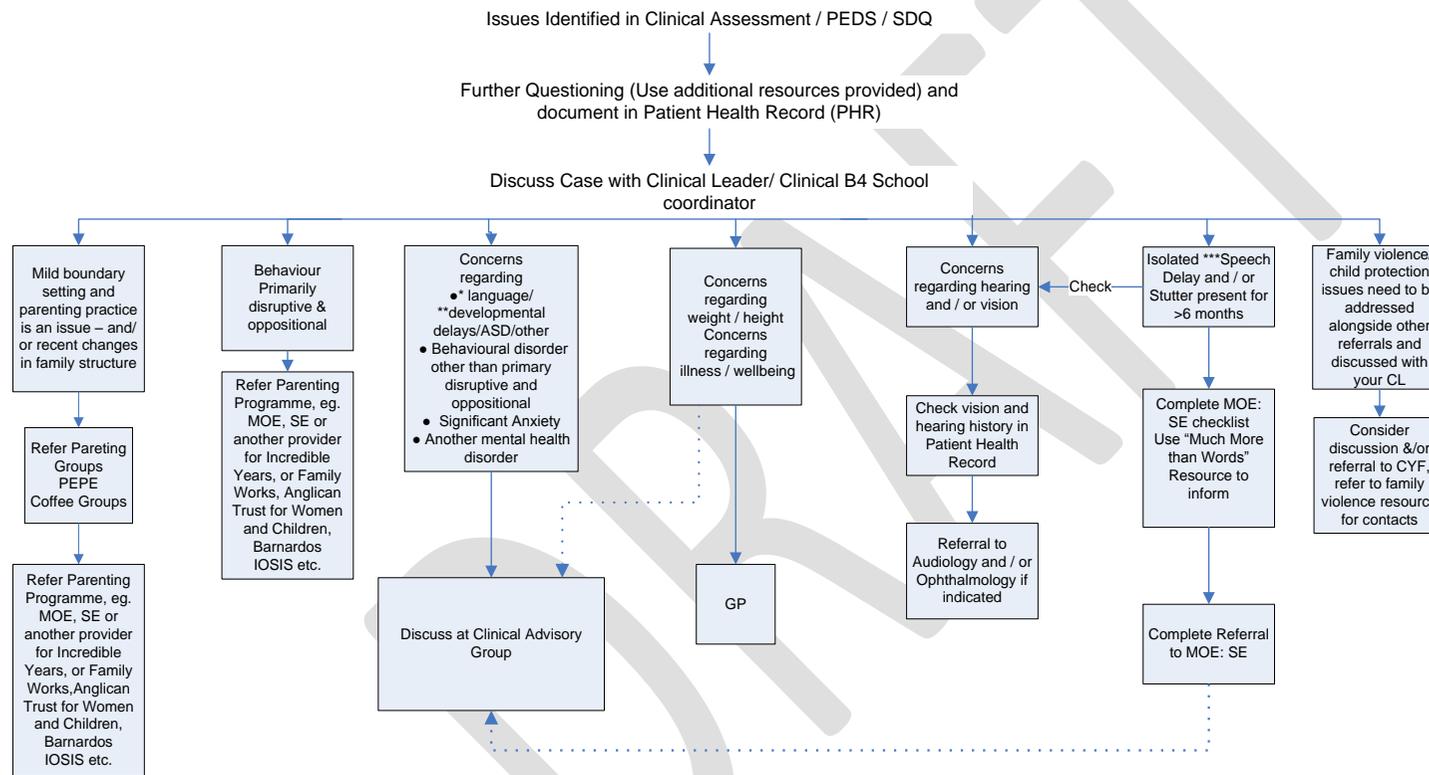
## APPENDIX THREE: MINISTRY OF HEALTH WCTO QUALITY IMPROVEMENT FRAMEWORK B4SC QUALITY INDICATORS

**TABLE 38: MINISTRY OF HEALTH WCTO QUALITY IMPROVEMENT FRAMEWORK B4SC QUALITY INDICATORS**

Standard	Measure	December 2014 target	June 2016 target
All children and families/whānau have access to primary care WCTO services, including the B4SC, and early childhood education	Four-year-olds receive a B4SC	90%	90%
All children and families/whānau with additional need have access to specialist and referred services in a timely manner	Children and families are seen within five months of referral to specialist services	100% within 5 months	100% within 4 months
WCTO services are delivered at the right time	B4SCs are started before age four and a half	81%	90%
WCTO providers deliver services according to best practice (inappropriate variation is reduced)	Children with an abnormal SDQ score at the B4SC are referred to specialist services	86%	95%
	Children with a Parental Evaluation of Development Status (PEDS) pathway A at the B4SC are referred to specialist services	86%	95%
	Children with a lift-the-lip (LTL) score of 2–6 at the B4SC are referred to oral health services	86%	95%
	Children with a vision problem at the B4SC are referred to specialist services	86%	95%
	Children with a hearing problem at the B4SC are referred to specialist services	86%	95%
	Children with a body mass index (BMI) >21 at the B4SC are referred to a GP or specialist services	86%	95%

## APPENDIX FOUR: REFERRAL PATHWAYS

Flow Chart for Clinical Referrals arising from B4 School Check Counties Manukau



\* Language refers to both **expressive** language i.e. the words and patterns of words that are used to relate meaning and communicate ideas and thoughts as well as **receptive language** i.e. ability to comprehend vocabulary, directions, concepts and questions  
 \*\*\*Speech refers to the sounds and sequences of sounds that are used for talking (Refer to Ministry of Education "Much more than words" for further detail)  
 \*\*Refer to ASD checklist, Gross Motor Developmental delay checklist, Russell Wills checklist, Queensland health and CDC websites  
[http://www.health.qld.gov.au/chs/growth\\_approp.asp](http://www.health.qld.gov.au/chs/growth_approp.asp)  
<http://www.cdc.gov/ncbddd/actearly/milestones/index.html>

## APPENDIX FIVE: SDQ SUPPLEMENTARY TABLES

### SDQ-P

**TABLE 39: SDQ-P SCALE SCORE RANGES FOR THOSE WITH AN ABNORMAL SDQ-P TOTAL DIFFICULTIES SCORE**

SDQ-P Scale	Abnormal scale		Borderline scale		Normal scale		Total Number
	Number	%	Number	%	Number	%	
Emotional	166	(45.6)	80	(22.0)	118	(32.4)	364
Conduct	311	(85.4)	34	(9.3)	19	(5.2)	364
Hyperactivity	157	(43.1)	62	(17.0)	145	(39.8)	364
Peer Problems	235	(64.6)	65	(17.9)	64	(17.6)	364
(Prosocial Behaviour)	38	(10.4)	34	(9.3)	292	(80.2)	364

**TABLE 40: SDQ-P SCALE SCORE RANGES FOR THOSE WITH A BORDERLINE SDQ-P TOTAL DIFFICULTIES SCORE**

SDQ-P Scale	Abnormal scale		Borderline scale		Normal scale		Total Number
	Number	%	Number	%	Number	%	
Emotional	65	(15.2)	85	(19.9)	278	(65.0)	428
Conduct	267	(62.4)	102	(23.8)	59	(13.8)	428
Hyperactivity	63	(14.7)	72	(16.8)	293	(68.5)	428
Peer Problems	134	(31.3)	144	(33.6)	150	(35.0)	428
(Prosocial Behaviour)	14	(3.3)	43	(10.0)	371	(86.7)	428

**TABLE 41: SDQ-P SCALE SCORE RANGES FOR THOSE WITH A NORMAL SDQ-P TOTAL DIFFICULTIES SCORE**

SDQ-P Scale	Abnormal scale		Borderline scale		Normal scale		Total Number
	Number	%	Number	%	Number	%	
Emotional	69	(1.1)	211	(3.4)	5,930	(95.5)	6,210
Conduct	503	(8.1)	935	(15.1)	4,772	(76.8)	6,210
Hyperactivity	62	(1.0)	148	(2.4)	6,000	(96.6)	6,210
Peer Problems	251	(4.0)	655	(10.5)	5,304	(85.4)	6,210
(Prosocial Behaviour)	45	(0.7)	176	(2.8)	5,989	(96.4)	6,210

## SDQ-T

TABLE 42: SDQ-T SCALE SCORE RANGES FOR THOSE WITH AN ABNORMAL SDQ-T TOTAL DIFFICULTIES SCORE

SDQ-T Scale	Abnormal scale		Borderline scale		Normal scale		Total Number
	Number	%	Number	%	Number	%	
Emotional	15	(16.9)	10	(11.2)	64	(71.9)	<b>89</b>
Conduct	63	(70.8)	13	(14.6)	13	(14.6)	<b>89</b>
Hyperactivity	58	(65.2)	9	(10.1)	22	(24.7)	<b>89</b>
Peer Problems	44	(49.4)	17	(19.1)	28	(31.5)	<b>89</b>
(Prosocial Behaviour)	55	(61.8)	14	(15.7)	20	(22.5)	<b>89</b>

TABLE 43: SDQ-T SCALE SCORE RANGES FOR THOSE WITH A BORDERLINE SDQ-T TOTAL DIFFICULTIES SCORE

SDQ-T Scale	Abnormal scale		Borderline scale		Normal scale		Total Number
	Number	%	Number	%	Number	%	
Emotional	5	(5.7)	4	(4.6)	78	(89.7)	<b>87</b>
Conduct	34	(39.1)	13	(14.9)	40	(46.0)	<b>87</b>
Hyperactivity	26	(29.9)	12	(13.8)	49	(56.3)	<b>87</b>
Peer Problems	14	(16.1)	23	(26.4)	50	(57.5)	<b>87</b>
(Prosocial Behaviour)	35	(40.2)	21	(24.1)	31	(35.6)	<b>87</b>

TABLE 44: SDQ-T SCALE SCORE RANGES FOR THOSE WITH A NORMAL SDQ-T TOTAL DIFFICULTIES SCORE

SDQ-T Scale	Abnormal scale		Borderline scale		Normal scale		Total Number
	Number	%	Number	%	Number	%	
Emotional	4	(0.2)	14	(0.9)	1,594	(98.9)	<b>1,612</b>
Conduct	38	(2.4)	39	(2.4)	1,535	(95.2)	<b>1,612</b>
Hyperactivity	18	(1.1)	28	(1.7)	1,566	(97.1)	<b>1,612</b>
Peer Problems	26	(1.6)	52	(3.2)	1,534	(95.2)	<b>1,612</b>
(Prosocial Behaviour)	93	(5.8)	122	(7.6)	1,397	(86.7)	<b>1,612</b>

## APPENDIX SIX: QUINTILE OF NZ DEPRIVATION 2006 SUPPLEMENTARY TABLES

TABLE 45: PEDS PATHWAY RESULTS BY QUINTILE OF NZDEP2006

Quintile	PEDS A		PEDS B		PEDS E		Total	
	N	%	N	%	N	%	N	%
0 / Blank	2	(<1)	4	(<1)	22	(<1)	31	(<1)
1	23	(9.7)	136	(14.3)	708	(14.2)	1,000	(14.2)
2	28	(11.8)	130	(13.7)	624	(12.5)	886	(12.6)
3	22	(9.2)	92	(9.7)	625	(12.5)	850	(12.1)
4	35	(14.7)	180	(18.9)	870	(17.4)	1,223	(17.4)
5	128	(53.8)	410	(43.1)	2,141	(42.9)	3,056	(43.4)
<b>Total</b>	<b>238</b>	<b>(100.0)</b>	<b>952</b>	<b>(100.0)</b>	<b>4,990</b>	<b>(100.0)</b>	<b>7,046</b>	<b>(100.0)</b>

TABLE 46: THOSE WITH ABNORMAL SDQ-P AND SDQ-T TOTAL DIFFICULTIES SCORES BY QUINTILE OF NZDEP2006

Quintile	Abnormal SDQ-P		Total SDQ-P		Abnormal SDQ-T		Total SDQ-T	
	N	%	N	%	N	%	N	%
0 / Blank	2	(<1)	32	(<1)	1	(1.1)	8	(<1)
1	23	(6.3)	1001	(14.2)	8	(9.0)	312	(17.4)
2	32	(8.8)	884	(12.6)	8	(9.0)	249	(13.9)
3	28	(7.7)	853	(12.1)	10	(11.2)	252	(14.1)
4	53	(14.6)	1216	(17.3)	19	(21.3)	324	(18.1)
5	226	(62.1)	3039	(43.3)	43	(48.3)	643	(36.0)
<b>Total</b>	<b>364</b>	<b>(100.0)</b>	<b>7025</b>	<b>(100.0)</b>	<b>89</b>	<b>(100.0)</b>	<b>1788</b>	<b>(100.0)</b>

TABLE 47: SELECTED VISION SCREENING OUTCOMES BY QUINTILE OF NZDEP2006

Quintile	Pass		Referred / Rescreen		Under care		Total	
	N	%	N	%	N	%	N	%
0 / Blank	40	(<1)	3	(<1)	1	(<1)	44	(<1)
1	980	(15.2)	156	(11.6)	13	(11.1)	1,149	(14.5)
2	851	(13.2)	158	(11.7)	18	(15.4)	1,027	(13.0)
3	839	(13.0)	147	(10.9)	24	(20.5)	1,010	(12.8)
4	1,101	(17.1)	238	(17.7)	20	(17.1)	1,359	(17.2)
5	2,639	(40.9)	643	(47.8)	41	(35.0)	3,323	(42.0)
<b>Total</b>	<b>6,450</b>	<b>(100.0)</b>	<b>1,345</b>	<b>(100.0)</b>	<b>117</b>	<b>(100.0)</b>	<b>7,912</b>	<b>(100.0)</b>

TABLE 48: SELECTED HEARING SCREENING OUTCOMES BY QUINTILE OF NZDEP2006

Quintile	Pass		Referred / Rescreen		Under care		Total	
	N	%	N	%	N	%	N	%
<b>0 / Blank</b>	36	(<1)	7	(<1)	2	(1.7)	<b>45</b>	<b>(&lt;1)</b>
<b>1</b>	1,035	(16.3)	131	(7.4)	13	(11.1)	<b>1,179</b>	<b>(14.3)</b>
<b>2</b>	901	(14.2)	134	(7.6)	20	(17.1)	<b>1,055</b>	<b>(12.8)</b>
<b>3</b>	850	(13.4)	178	(10.1)	15	(12.8)	<b>1,043</b>	<b>(12.7)</b>
<b>4</b>	1,072	(16.9)	317	(18.0)	22	(18.8)	<b>1,411</b>	<b>(17.1)</b>
<b>5</b>	2,462	(38.7)	992	(56.4)	45	(38.5)	<b>3,499</b>	<b>(42.5)</b>
<b>Total</b>	<b>6,356</b>	<b>(100.0)</b>	<b>1,759</b>	<b>(100.0)</b>	<b>117</b>	<b>(100.0)</b>	<b>8,232</b>	<b>(100.0)</b>

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