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Title: An audit of Paediatrician recognition of children's vulnerability to harm at The Royal Children's Hospital, Melbourne.

(i) Original Article

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What is already known:

1. The vulnerable child is one either at risk for abuse and neglect or one who experienced multiple adverse childhood events (ACE).
2. Children who experience >4 ACE or multiple risk factors for abuse and neglect are at risk of adverse health outcomes.
3. Recognition of, and intervention for vulnerable children may offer an avenue to prevent child maltreatment.

What this study adds:

1. Paediatricians infrequently documented ACE, risk and protective factors.
2. Children were more likely to be recognised as vulnerable by the clinician if they have >4 ACE and for every increase in risk factor compared to those who were not recognised as vulnerable.

3. Documentation of ACE risk and resilience factors correlated with referrals for intervention and alerts regarding vulnerability on the EMR

Abstract

Aims: Vulnerable children can be defined as those at risk of child abuse and neglect and long-term adverse health, neurodevelopmental and behavioural outcomes. This study examined whether a cohort of Paediatricians and advanced trainees at the Royal Children's Hospital, Melbourne, recognised children's vulnerability.

Methods: We reviewed the clinical note in the electronic medical record (EMR) for 425 new patients presenting to five paediatric clinics between 1 July 2017 and 31 December 2017. We examined Paediatrician documentation of Adverse Childhood Experiences (ACE), risk and resilience factors, referrals for intervention to improve psychosocial wellbeing, and the application of "vulnerable child" alert flags in the EMR to indicate vulnerability to harm. Children were deemed vulnerable if the Paediatrician explicitly stated it in the EMR, if the child had a "vulnerable child" alert placed in their record or had an appropriate referral for management of neurodevelopmental trauma.

Results: Of the original cohort, 8% was documented as vulnerable, 21% had a referral for intervention and 2% had a "vulnerable child" alert. Overall, Paediatricians infrequently documented ACE, risk and protective factors. The odds of identifying vulnerability increased with each added risk factor recorded (OR 2.6 $p < 0.001$ 95 CI [1.9-

3.5]), with an ACE score was >4 (OR 72 $p<0.001$ [14.3-361]) and decreased with each added protective factor recorded (OR 0.6 $p<0.001$ [0.5-0.8]).

Conclusion: Paediatricians infrequently document ACE, risk and protective factors and rarely “flag” children’s vulnerability to harm. Identification of the vulnerable child is correlated with documentation of risk and resilience factors at the initial consultation.

Key words: child abuse, risk factors, protective factors, paediatricians, electronic health records.

Introduction:

A vulnerable person is defined as someone requiring special care or protection because of age, disability or risk of harm.¹ In Australia particularly vulnerable subgroups such as Aboriginal Torres Strait Islanders (ATSI) and children residing in out of home care (OOHC) are over-represented among those experiencing adversity, child abuse and neglect². In this study we define the vulnerable child as one either at risk for child maltreatment; defined as abuse and neglect that causes harm³ or those at risk of long-term adverse health outcomes due to their experience of adverse childhood events.⁴

It is now 20 years since the publication of the seminal Adverse Childhood Experiences (ACE) Study⁴ *table 1*. The ACE research has continued to highlight the long-term negative health impacts of experiencing 4 or more ACE; including chronic disease, high risk behavior and early death.^{4,5} Australian data suggest that over 20% of children experience three or more family adversities (environmental stressors, separation/loss and indicators of poor health).⁶ In particularly vulnerable communities as many as 28% of children have four or more ACE.⁷

Of the nine ACE in the original study, five are forms of child maltreatment. The

Australian Institute of Family Studies (AIFS) has outlined 19 risk and 18 protective factors for child maltreatment divided by ecological level⁸ *table 2*. Many of these factors constitute the social determinants of health.⁹ The cumulative risk of abuse or neglect increases almost exponentially with the number of risk factors a child experiences.¹⁰ There is no evidence, however, that defines the number of protective factors needed, but social supports, family resources, parental education (>12 years of formal education) and a two parent household are most strongly associated with attenuating risk.^{11,12}

Recognition of the vulnerable child and information sharing to convey this risk-assessment may offer an avenue to prevent child maltreatment and address the pervasive nature of adversity.^{7,13} US data suggest over 30% of Paediatricians do not routinely ask about any ACE.¹⁴ Similarly, documentation of child maltreatment in the electronic medical record (EMR) is frequently incomplete and significantly lower than published rates of maltreatment.¹⁵ To our knowledge there has been no research evaluating Paediatrician recognition of childhood adversity and neurodevelopmental trauma; (defined as the experience of abuse, neglect and adversity and the associated consequences on the developing brain)¹⁶ in ambulatory tertiary service settings in Australia. This is important as paediatricians are opportunely placed to identify, manage, advocate and possibly prevent adverse health outcomes for their most vulnerable patients.¹⁷ All doctors in Australia are also subject to mandatory notification laws regarding abuse and neglect of children.

Aims/Objective

The aim of this study was to examine whether a cohort of Paediatricians (including Advanced Trainees in Paediatrics) at The Royal Children's Hospital (RCH) Melbourne recognised vulnerable children at new patient appointments in outpatient specialist

clinics. The objectives were to examine:

- 1) Rates of documentation of ACE, risk and resilience factors for vulnerability in children within the EMR.
- 2) Whether Paediatricians recognised vulnerability, by either explicitly documenting vulnerability or a synonym (for example “at risk”), by placing a For Your Information (FYI) “vulnerable child” alert in the EMR and/or generating a referral for management of neurodevelopmental trauma.
- 3) Paediatrician referrals for protective or therapeutic/intervention services e.g. reported to Child Protection, referred to Child FIRST (Child and Family Information, Referral and Support Team), a psychologist, or a social worker.
- 4) Whether documentation of risk/resilience factors and ACE scores correlated with recognition of vulnerability.

Methods

A single investigator conducted a cross sectional chart review of the Paediatrician’s medical record, (all patient data is held within this EMR) for a cohort of new patients aged between birth and 17 years seen at RCH between 1 July 2017 and 31 December 2017. A paediatric advanced trainee in community child health manually examined the notes for documentation of ACEs (*Table 1*) risk and protective factors (*Table 2*). For example; low birthweight was defined as <3rd percentile for weight at birth for a term baby (2.5kg), family cohesion was defined as parent/guardians living together and functioning as a pair, self-efficacy was defined as a combination of mastery experiences e.g. success in housing/ employment and absence of emotional/physiological states that

dampen capacity e.g. depression, stress, substance abuse. Finally; low socioeconomic status defined as housing and financial stress with unemployment, welfare dependence and/or families with a healthcare card. Please see the supplemental methods in Appendix 1 for definitions of terms and how the data was collected.

We chose the initial patient visit as it is usually the longest and most of the history is recorded during this session. We chose five different clinics across three departments that were likely to have a high proportion of vulnerable patients. [Referrals to these tertiary clinics were from general practitioners or community Paediatricians](#). Behaviour, Encopresis and Unsettled Babies Clinic are staffed by both general and community paediatricians and senior trainees and are within the Centre for Community Child Health (CCH). Immigrant Health Clinic, under General Medicine is staffed by General Paediatricians and Advanced trainees. Adolescent Physicians, General Paediatricians and Advanced Trainees staff the Adolescent clinic under Adolescent Health. Each clinic has at least 2 consultants and 2 advanced trainees, for further details regarding the clinics see Appendix 1. Most of the children attending these clinics reside in Melbourne but some live in regional Victoria.

EPIC is the EMR in use at the RCH. When a treating Paediatrician mentioned contemporaneous documentation by another clinician (for example as part of same-day consultation with a multi-disciplinary team) these records were also reviewed.

For the purposes of this study, we defined recognition of child vulnerability by Paediatricians as 1. Explicit documentation of vulnerability or a synonym such as 'at risk', 2. A "vulnerable child" alert placed in the EMR ([specific to RCH EMR EPIC](#)) or 3. The Paediatrician referred the child to a service for management of neurodevelopmental trauma.

For comparison with study criteria of vulnerability we also collected data on alternate

indicators of vulnerability, including ATSI, OOHC status and postcode, which was matched with the Socio-Economic Indexes for Areas (SEIFA) scores based on relative advantage and disadvantage.¹⁸

We used descriptive analysis and logistic regression models to determine whether risk for vulnerability was predicted by a cumulative increase or decrease in risk and protective factors and greater than 4 ACE (associated with long term adverse health outcomes).⁴ A p value of <0.05 was considered to be statistically significant. We then developed a Receiver Operator Characteristic (ROC) curve to see what the optimal cut-off score of risk factors that maximised sensitivity and specificity to predict vulnerability in our dataset as this is an exploratory, observational study, not designed to develop a valid population level screening tool.

The RCH Human Research Ethics Committee (HREC) provided ethics approval (ref no. 37315A) Data was collected in Redcap and analysed using Stata/IC 15.1 for Mac.

Results

Between July and December 2017, there were 425 new patient visits, 26% of the cohort were seen in the Adolescent clinic, 18% in Immigrant Health, 15% in Unsettled Babies clinic, 13% in Behaviour clinic and 28% in Encopresis clinic. There was a slight male preponderance and only 2% of the overall cohort identified as ATSI or OOHC. Table 3 outlines the characteristics of the children in each clinic. Paediatricians recorded a median of 0 ACE (Inter-quartile range (IQR) 1), 2 risk factors (IQR 2) and 3 protective factors (IQR 4), *table 4*.

The frequency of individual ACE, risk and resilience factors varied. Parental separation was the most documented ACE, however, across all clinics over 90% of the other ACE

were not documented. Documentation of risk factors related to the child's medical history and presenting complaint were well recorded (pregnancy and birth complications, disability, temperament and access to medical care). However, all other risk factors were infrequently recorded (>65% for each risk factor not recorded). Resilience factors that were well documented (<30% not recorded) were social/emotional competence of the child, family cohesion, two parent household and access to medical services. In over 60% of the cohort the remaining protective factors were not recorded. The median number of risk factors, ACE and protective factors recorded for children identified as vulnerable were 5, 3 and 2 respectively (*Table 5*).

There were 33 (8%) children explicitly identified as vulnerable by the Paediatrician. Only 9 (2% of the total cohort) had an FYI alert and 5 of these were already on the patient's record when the Paediatrician first saw the child. There was one case where the patient had an existing FYI alert (placed by a social worker 2 months prior to the consultation) but was not identified as vulnerable by the Paediatrician who documented only 3 risk factors, and 2 protective factors. Of the 8 children in OOHC, 3 were not explicitly documented as vulnerable.

Across the cohort, 90 children (21%) were referred for an intervention. Of those 33 children recognised as vulnerable 25 (76%) were referred for intervention, many were referred to more than one service. 21 were referred to mental health services (private psychologist, child and adolescent mental health services CAMHS), 9 were referred to Child FIRST or Child Protection, 1 was referred to RCH social work and 4 to alternative services or existing supports.

Univariate regression analysis (table 6) showed that children were more likely to be identified as vulnerable if they were in OOHC, had greater than 4 ACE and for every increase in risk factor. Children were less likely to be identified as vulnerable for every

additional protective factor recorded.

These associations persisted after controlling for possible confounders. Multivariate Logistic regression results controlling for ATSI, OOHC status and SEIFA Decile are displayed in table 7. Regression models were structured using risk factors, ACE and protective factors collectively in part due to missing data and despite statistically significant odds ratios, the 95% CI are therefore wide. Results were relatively consistent between those identified as vulnerable and those referred for intervention. Figure 1 demonstrates how the number of risk factors can be used as a potential screening tool for vulnerability, with ROC area under the curve 0.89 and 8 risk factors showing the highest sensitivity and specificity.

Discussion

Recognising vulnerability at the first outpatient clinic consultation is challenging. Documenting risk, resilience factors and ACE at this visit correlated with Paediatricians documenting vulnerability and with referral for appropriate intervention.

Our data are consistent with previous research that suggests paediatricians rarely record information about adversity or neurodevelopmental trauma.^{10,14} The reasons for this might include Paediatrician reluctance, embarrassment, haste or perceived low utility of information. Alternatively, Paediatricians may have sought information but not documented it due to privacy concerns.

Paediatricians may work on the assumption that screening for ACEs is only valid if there is an appropriate therapeutic intervention available and does not come with added costs or negative outcomes.¹⁹ Despite significant challenges and limited evidence for any quality screening instruments,²⁰ an evaluation of neurodevelopmental trauma and adversity is a valuable part of the assessment and formulation²¹ with the intention of

improving social history taking and evaluation of social risk factors.²²

In our study only 8% of the cohort was recognised as vulnerable. This percentage is significantly lower than expected when compared to the original ACE study⁴ and vulnerable cohorts in community clinics in Australia⁷ and may be secondary to differences in methodology of these studies. The variability in recognition of vulnerability between clinics despite similar numbers of ACE, risk and protective factors suggests that demographic differences exist between clinics such that older children have more ACE⁷ or fewer vulnerable children attended Encopresis and Unsettled Babies clinics.

Although consultants and trainees were equally likely to document risk factors and ACE, consultants were more likely than trainees to recognize vulnerability. Barriers to recognition of vulnerability include inadequate physician education/training, lack of resources to assist in clinical reasoning and inadequate collaboration between primary care providers and specialist child protective services.^{23,24} Educating Paediatricians and building capacity has been shown to improve confidence and change practice.²⁵

The low number of children who had an alert placed may be due to systemic factors (no protocols regarding how to use the FYI alerts for example obtaining informed consent), clinician factors (inadequate training or familiarity with the tool) or perceived ineffectiveness of the EMR alert system (Paediatricians may be unsure of meaning of the alert or how to respond to it). The EMR is an efficient resource for documentation and information sharing but challenges to its use to screen for child physical abuse and communicating information about the social determinants of health remain.^{26,27} There is also the added risk of stigma that may accompany a vulnerability designation, parents are usually not informed that this alert has been placed in their child's record.

Our study found that recognition of vulnerability was positively predicted by increasing risk factors or an ACE score of >4 and negatively predicted by increasing protective

factors when controlled for ATSI, OOHc and SEIFA decile. The ROC curve suggests that eight risk factors offer the greatest sensitivity and lowest false positive rate for Paediatrician recognition of vulnerability. An EMR-generated checklist could be used to automatically identify vulnerability.²⁸

Referrals for those children identified as vulnerable were predominantly to mental health and child protective services, with few to social work. There is a large body of evidence for various therapeutic interventions²⁹ but Paediatrician knowledge and limited access to services might have affected referral patterns in this cohort. For example; many Paediatricians across clinics were referring patients for Medicare rebatable private psychology services (external to the hospital system) whilst others had access to social work support through their service. There was also variation in the target population for the referral (including child-based (school/private psychology) and family based (ChildFIRST for in home parenting support)).

Limitations of our study include its cross-sectional design; data collection at a single time point may have underestimated the number vulnerable children as Paediatricians may not have recorded it in the note examined. Observer agreement was not completed as a single investigator audited all records. Comparison of data between clinics is difficult given the demographic differences in patient population, Paediatrician experience in screening for vulnerability and length of appointment time [and interpreter use \(which was not specifically collected\)](#). A more detailed study evaluating the entire assessment period may result in more children being identified as vulnerable, however this was not within the scope of this project. The power of this study is greatly reduced by the large quantity of missing data, which is, in itself, an important finding. The very small group sizes for particular vulnerable populations (ATSI and OOHc) has resulted in very large confidence intervals following regression analysis is another weakness of this study.

Significant selection bias and increased standard error was introduced given the non-random nature of the missing data. Multiple imputation to account for missing/incomplete data by creating a new (imputed) dataset was not considered possible due to the lack of ‘missing at random assumption’. The generalisability of these results outside of these RCH clinics is unknown. Further research is needed to accurately evaluate rates of vulnerability in this population and the addition of qualitative data to explore patient and Paediatrician factors that influence documentation, evaluation of risk [and communication of vulnerability](#).

Conclusion

Paediatricians and trainees seeing vulnerable children in an ambulatory setting at the RCH are infrequently documenting risk factors and protective factors for child maltreatment or ACE. During these new patient consultations, an assessment of vulnerability was made in only 8% of children. Recognition of vulnerability is correlated with documentation of risk and resilience factors and ACE. Addressing this gap requires the Paediatrician to take an active and wholistic approach to social history taking.

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