Journal of Nursing Management

Utilisation of specialist pediatric health-care services in Australia: a retrospective review

Journal:	*Journal of Nursing Management*
Manuscript ID	Draft
Manuscript Type:	Original Article
Topic Areas:	Health Inequalitites, Health
Research Methods:	Quantitative Methods, Health Services Research

Utilization of specialist pediatric health-care services in Australia: a retrospective review

Abstract

This study aimed to measure changes to health service utilization by pediatric inpatients attending a tertiary quaternary specialist pediatric hospital.

Globally, rates of migration between countries have risen, resulting in an increased number of people whose culture, beliefs and language may differ from the host country. The impact global migration trends have had on health service utilization within an Australian pediatric setting is largely unknown.

A retrospective review of pediatric inpatient data admitted to a hospital in Sydney, Australia during 2015- 2017. Variables of interest such as country of birth were measured. Analysis of variance (ANOVA) and Poisson regression analysis were used to assess time trends in health service utilization.

Pediatric inpatients born in a country other than Australia (8,762, 5.7%) emigrated from 155 countries or were 'born at Sea' (n=13, 0.1%) and spoke an array of primary languages (n=139), other than English. A diverse population, in terms of country of birth and language spoken at home were reported. Changes were significantly different over time.

This study demonstrates the importance of monitoring and reviewing local inpatient data to inform health service nurse managers and planners.

Implications for Nursing Management

Change to local populations, identified over time, in this study have implications for pediatric health-care managers and enable appropriate service and nursing

workforce planning. Study findings reinforce the benefits of monitoring service utilization locally.

Key words

Diversity, pediatrics, health service access, cultural and linguistically diverse

Utilization of specialist pediatric health-care services in Australia: a retrospective review

Running Head: Use of Pediatric health-care services in Australia.

Globally, rates of migration between countries have risen, resulting in an increased number of people whose culture, beliefs and language may differ from the host country (International Organisation for Migration, 2020; Kennedy, Kidd, McDonald, & Biddle, 2015). Up to date knowledge of emigrational patterns, local population profiles and the culturally and linguistically diverse (defined as people who were born overseas, speak a variety of languages and varied religion) (Australian Bureau of Statistics, 2017) of new populations, at a national, state and local level, enable adequate planning for health-care services and delivery of care. Australia has experienced a steady growth in the number of people born overseas in the last fifty years (Australian Bureau of Statistics, 2012, 2017) thereby building a culturally and linguistically rich country. In the last four year report period (2012-2016), growth was rapid with 26% (n=6,163,667 people,) of Australia's population reportedly born overseas, and with children aged between 0 to 19 years of age representing close to a tenth (592,890, 0.096%) of this population group (Australian Bureau of Statistics, 2012, 2017). The migration patterns of people born in non-English speaking countries such as China (6.0% to 8.3%) and India (5.6% to 7.4%) have increased (Australian Bureau of Statistics, 2017). Such dynamic changes in population pose ongoing challenges to health-care professionals, service managers and planners, in particular the way in which health services accommodate the needs of migrant families from non-English speaking countries, who are more likely to experience

health-care barriers and a decline in health post migration (Jatrana, Richardson, & Pasupuleti, 2018; Kennedy et al., 2015).

Linguistically diversity influences health outcomes(Cordova, Beaudin, & Iwanabe). Studies report a lack of English proficiency disadvantages children and that these children are at risk of poorer health outcomes. Over 300 languages are currently spoken in Australian homes (Australian Bureau of Statistics, 2016) with Chinese languages (Mandarin, Cantonese), Arabic and Vietnamese the most commonly reported language spoken at home after English (Australian Bureau of Statistics, 2016). Self-reported English proficiency by year of arrival has proportionally declined (Australian Bureau of Statistics, 2016) with close to half a million people (n=413,372/3,635786) reporting that they were not proficient or could not speak English at all. Languages spoken by children <19 years of age were not collected. Studies have shown that a lack of English proficiency leads to health inequalities (Cordova et al.; Flores, 2004), patient safety risks (Divi, Koss, Schmaltz, & Loeb, 2007), discharge against medical advice and loss to follow up care (Araújo Dawson & Williams, 2008; Guo, Woolfenden, McDonald, Saavedra, & Lingam, 2019) increased stress (Araújo Dawson & Williams, 2008; Goldfeld et al., 2011) miscommunication and fewer explanations (Choe et al., 2019; Crawford, Candlin, & Roger, 2017). There is a reliance on good communication, particularly in family models of care, to enhance family engagement in providing care over time. Linguistic discordance can disempower and isolate the patient and family members and lead to miscommunication between clinicians, patients and families.

Although, culturally and linguistically diverse (CALD) population groups, who attend Australian pediatric hospitals are likely to mirror migration patterns of Australia and Sydney (Garg et al., 2017), it is unclear how such diversity is encountered in a pediatric hospital setting or has changed over time. Mapping the linguistic diversity of patients and their families, including changes over time, is essential to inform future demand and enable the development of appropriate health service strategies and resources to overcome language discordance, communication barriers and optimise access to pediatric health-care. This study aims to determine the linguistic and cultural diversity of Pediatric inpatients and measure changes to service utilization that may impact on service delivery, patient safety and care. Findings from this retrospective review have the potential to inform and support health service managers to develop and plan appropriate culturally sensitive and competent services and workforce.

Methods

A retrospective audit of electronic data of pediatric inpatients admitted during 2015, 2016 and 2017. The study was conducted at the largest Australian Pediatric hospital network within metropolitan Sydney, with 52,000 inpatient admissions per annum (The Sydney Children's Hospital Network, 2017). The study site is classified as a level 6 tertiary hospital and provides a high level of expertise to urgent, complex and rare disease care to children and adolescent patients. State-wide and interstate admissions and/or transfer for specialist care are in addition to a catchment of the population that live in relative proximity to the hospital location.

Following Human Research Ethics Committee approval, de-identified inpatient data were extracted from the Management Support Analysis Unit (MSAU) database into a password protected file. Variables of interest included include country of birth, primary language spoken at home, postcode of permanent residence, age of child, gender, and religion and interpreter utilization. Data were cleaned and coded in the Statistical Package for the Social Sciences (Version 21). Country of birth other than Australia were grouped and coded according to the United Nations geographical regions. Languages were group by regional language as language families of the world such as Indo- European (n=437 daughter languages) are vastly diverse and therefore difficult to interpret meaningful outcomes. Religion was categorized as per Australian consensus data; Christianity, Buddhism, Islam, Hinduism, Sikhism, Judaism, no religion and not stated. Family's place of residence was grouped by Australian postcode or as overseas visitor.

An exploratory analyses was conducted to inspect variable distributions. Means and standard deviations, medians and ranges for continuous data such as age and length of stay were calculated. Categorical and ordinal data including gender, country of birth, preferred language spoken at home and religion were reported as frequencies and proportions. Analysis of variance (ANOVA) was used to determine the mean difference by year of utilization and variables of interest. Poisson regression analysis was used to assess associations between time trends in the rate of health service utilization and variables of interest; country of birth, preferred language spoken at home, postcode of residence.

Results

Hospital admissions were consistent during the study period (Table 1) with a three day (SD 14.2) mean length of hospital stay. Inpatients were predominantly male (87542, 57.5%) and were, on average, 6 years of age (SD 5.2). Pediatric patients lived in urban New South Wales, Australia, however admissions were received from rural and remote regions, interstate and from international visitors (Diagram 1). Close to 95% (n=142 605, 93.6%) of pediatric inpatients were born in Australia with Aboriginal & Torres Strait Islander children accounting for 3.4% (n=5118) of the study population. Pediatric inpatients born in a country other than Australia came from 155 countries categorised into seven geographical regions or 'born at Sea' (Table 1). A vast number of preferred languages other than English were reported to be spoken at home (n=139). Of these, 133 primary languages were spoken by Australian born children including 14 different Indigenous languages (n= 273, 0.2%) and Universal sign language (n=30). Arabic (n= 4079, 2.7%), Chinese languages (n=2715, 1.7%) and languages of India, Sri Lanka and Bangladesh (N=2348, 1.5%) were the most commonly reported.

The annual use of interpreter services was constant over the three year period (Table 1). Interpreters were sought by 3,038 (2%) patients within the study period with Arabic, Chinese (Mandarin and Cantonese) and Vietnamese the most translated language with no change of usage over time reported. A small percentage of pediatric inpatient families (n=121/3038, 4%) sought the use of an interpreter despite reporting that their preferred language spoken at home was English.

There were no differences over time in health service utilization (2015 -2017) according to gender, place of residence, religion, interpreter use, mean number of

admissions, mean length of hospital stay. An increase rate of pediatric tertiary health-care service utilization from 2015 to 2017 was reported for children born in Asia (IRR 1.3, p≤0.001, 95%CI 1.2-1.4) and Middle East (IRR 1.4, p≤0.001, 95%CI 1.2-1.6). Conversely, children born in European countries were less likely to utilise pediatric services during the study period, however significant differences were only observed in 2016 (Table 2). Utilization of inpatient services by families who reported that they preferred to speak Chinese Languages (Cantonese, Mandarin, and other Chinese dialects), Middle Eastern languages (not Arabic), Khmer and Indian, Sri Lankan and Bangladeshi languages significantly increased (Table 3). Families who preferred to speak Arabic at home reported a steady decline of health service utilization in 2016 (IRR 0.95, p=0.018) and 2017 (IRR 0.82, p=0.001) compared to 2015.

Discussion

Summary of findings

A dynamic culturally and linguistically diverse pediatric population attended the study hospital over a three-year period. Whilst, health service utilization remained constant, the diverse nature of the population, in terms of country of birth and language spoken at home, are key findings. The dynamic changes that were observed in this study, and select differences between our findings and recent migration and Australian population data (Australian Bureau of Statistics, 2016), reinforce the need for regular monitoring of local data to enable informed workforce and health service planning to meet the needs of inpatient children and attending families.

Less than 6% of pediatric inpatients were born overseas with the most common birth place by UN region being countries of Asia, Middle East and Oceania. The observed rates of service utilization by children who were born in Asian and European countries were consistent with recent Australian immigration patterns, however increased rates of utilization by children born in Middle Eastern countries are in contrast to Australian data (Australian Bureau of Statistics, 2016, 2017) and suggest that population data alone may not mirror health service utilization. Knowledge of inpatients country of birth is particularly important given the potential for health decline of populations from non-English speaking countries post migration (Goldfeld et al., 2011; Jatrana et al., 2018). Previous studies of countries with high immigrant populations such as Australia have found that adult migrant populations are frequently healthier than native-born populations (Australian Bureau of Statistics, 2016, 2017; Kennedy et al., 2015). This phenomena is referred to as the 'healthy migrant effect', however this effect is not sustainable for populations of people migrating from non-English speaking countries (Jatrana et al., 2018; Kennedy et al., 2015) Jatrana et al (2017) demonstrated a significant decline in physical, mental and self-reported health after living in Australia for longer than 10 years (Jatrana et al. 2014; Kennedy et al. 2007). Although the 'healthy migrant effect' has only been described in adult populations, the effect on children, directly or indirectly, is plausible given the pivotal role that parents play in care of a sick child and their access to appropriate healthcare. Strategies to prevent the potential decline of overseas born parents and/or family health, in particular child health, are necessary. Identification of a child's country of birth on hospital admission may determine families most at risk of health decline post migration and enable the implementation

of strategies such as collaboration and linkage to culturally appropriate health services during hospitalisation (Sawrikar & Katz, 2008).

Our study reported a vast number of languages other than English were spoken at home with 95% (n=133) of these languages practiced by children born in Australia. Chinese languages and Arabic were the most commonly reported language spoken at home consistent with national and state based data national and state based data (Australian Bureau of Statistics, 2016, 2017), whereas other reported languages contrast national data and again reinforce the benefits of reviewing local inpatient data to identify change. Although, a family's preferred language spoken at home does not imply a lack of English proficiency, clinicians should be mindful and observe for signs of communication barriers that may inadvertently impact on the provision of safe care (Ali & Watson, 2018; Divi et al., 2007). Bilingualism in children has been shown to have numerous benefits such as early reading skills (Carlson & Meltzoff, 2008), however children with limited English proficiency or no English may experience increased stress (Araújo Dawson & Williams, 2008; Goldfeld et al., 2011) and poorer health outcomes. English language proficiency of families play a pivotal role in determining and sustaining health status and therefore clinician's awareness of a family's level of English proficiency is necessary (Crawford et al., 2017; Jatrana et al., 2018; Sawrikar & Katz, 2008; Verdon S, McLeod S, & A., 2014). Potential areas of concern for families include difficult access to health-care (Ali & Watson, 2018; Sawrikar & Katz, 2008) and/or axillary health services for migrants (Jatrana et al., 2018; Pottie, Ng, Spitzer, Mohammed, & Glazier, 2008), poor engagement with health-care clinicians, lack of awareness of service availability (Garg P et al., 2017; Guo et al., 2019), increased adverse event rate in hospitals (Divi et al., 2007) and

ineffective clinician-patient/family communication (Ali & Watson, 2018; Crawford et al., 2017).

In a pediatric hospital setting, family centred care is reliant upon effective communication, where the planning and delivery of safe quality health-care is a partnership among health-care providers, patients, and families at the bedside and long term (Shields & Zhou, 2011). Linguistic discordance can disempower and isolate the patient and family members. Culturally and linguistically diverse parents are 1.3 times more likely to leave the hospital with their child against medical advice, 1.6 times as likely to leave emergency departments left against advice or did not wait to be seen, and 1.5 times more likely to not show for an outpatient appointment (Guo et al., 2019), or be unaware of the services available to them (Garg P et al., 2017; Overs et al., 2017). Our findings also highlighted that Australia's First People who, although born in Australia, may not report English as a preferred language and therefore experience health-care barriers (Goldfeld et al., 2011; Guo et al., 2019). It cannot be assumed that children born in Australia, including the first Australians, are proficient in English (Goldfeld et al., 2011).

Fluctuating annual rates of patient and/or family's preferred language spoken at home were observed. Rates of Chinese languages, Indian, Sri Lankan, Bangladeshi, Khmer and Middle Eastern languages (excluding Arabic) increased whereas Arabic language declined during the study period. The decreased rates of Arabic speaking families utilising the specialist health service was unexpected and warrants further exploration. Possible reasons for this may be over reporting of English spoken at home due acculturation stress (Jatrana et al., 2018), desire to assimilate or embarrassment (Huff, 2011). The number of languages and dynamic change per

year reported in this study pose numerous challenges to the workforce and health-care service planning. Workforce may be challenged by the sheer number of languages spoken by patients and their family and inability to communicate with the child and/or family. In any single shift on a general pediatric ward a clinician may care for a minimum of four patients and their family all of whom may have different linguistic needs. Clinician understandings of patient's language preference are essential, as the responsibility to communicate healthcare information and patient safety in a way that is understood by patients and carers lies with clinicians (Australian Commmission on Safety and Quality in Health Care, 2013). Efforts to communicate effectively within a busy acute care pediatric setting may contribute to additional stress for staff, patient and family. Crawford et al (2017) suggests that health communication is complex and complicated, but further complicated by linguistic diversity acknowledging that there are variations between language accents, intonation, word patterns and local slang (Crawford et al., 2017). The potential for grave miscommunication is a reality (Crawford et al., 2017; Divi et al., 2007).

Measures to overcome language barriers such as the use of multilingual educational resources, telephone interpreters and interpreters are effective (Granhagen Jungner, Tiselius, Blomgren, Lutzen, & Pergert, 2019), however access to such resources maybe limited in regard to time and the availability of language (Suphanchaimat, Kantamaturapoj, Putthasri, & Prakongsai, 2015). The use of language translation Apps such as 'Google' translate is not recommended or to be used with caution given that these Apps are not validated for medical use (Panayiotou et al., 2019). Representation of languages spoken by more recent immigrants may not be included. Changes in the linguistic profiles of patients has implications for the

demand for and availability of interpreters with expertise in specific languages including recruiting and retaining interpreters. Our findings challenge a common assumption that the use of interpreters is for people born overseas. A small percentage of inpatient families who accessed interpreters reported that their preferred language spoken at home was English highlighting the complexity of health communication and use of medical jargon (Huff, 2011). Despite the increased preference of Chinese languages, Indian, Sri Lankan, Bangladeshi, Khmer and Middle Eastern languages (excluding Arabic) use of interpreter services did not increase. Other studies also point to under use of interpreters in Australian (Taira & Orue, 2019; Taira, Torres, Nguyen, Guo, & Samra, 2020), parents' choice to decline the use of a professional interpreter (Garg P et al., 2017) and a disjunct between healthcare professionals' beliefs about the benefits of and their use of interpreters (de Moissac & Bowen, 2019; Granhagen Jungner et al., 2019; Lundin, Hadziabdic, & Hjelm, 2018). While healthcare providers identify the necessity of professional interpreters to providing safe care to children and family members who do not speak the majority language, they do not always use them, often relying on the children or relatives (Granhagen Jungner et al., 2019). Failure to use professional interpreters has obvious implications for patient safety or to enable meaningful conversations and/or health related decisions about Pediatric care. The use of children as interpreters has been shown to influence power dynamics in families (Banas, Ball, Wallis, & Gershon, 2017). Health services managers and quality and safety officers need to identify with healthcare staff, patients and family members, barriers to using professional interpreters and co-design strategies to address these barriers. Increased diversity in the linguistic profile of patients has implications for the need to develop written information available for an increasing range of different linguistic

groups including discharge letters, fact sheets on patient safety, hospital routines and disease management. The findings of this study and ongoing analysis of local data will be important to identify priorities for translation of health information when limited resources are available.

As the Australian population continues to grow, greater demands on health service and health infrastructure follow. The tertiary based specialist hospital for this study estimate a 40% increase in pediatric populations within in the next 20 years with most of the growth attributed to immigration (Sydney Children's Hospital Network, 2017). Cultural and linguist diversity is now the “norm” in those who use Australian pediatric health services. Given the migration patterns reported in global and Australian data (Australian Bureau of Statistics, 2016; International Organisation for Migration, 2020), and the significant changes in language and in the birth place of pediatric patients observed in this study, measures to address ongoing diversity needs at a local and national level are necessary. Culturally sensitive care in pediatric nursing includes an effective response to the pediatric consumer and family cultural beliefs and characteristics. Care must be perceived by the pediatric patient/family as care that respects their cultural beliefs and is sensitive to the needs of all cultural and linguistic groups to encourage health-care engagement. It is therefore imperative that strategies to support culturally and linguistically diverse populations are flexible and responsive to ongoing changes. The findings of this study are fundamental to understand current and predict future needs of health-care service users. Populations that change over time require that a different set of cultural and linguistic needs are met. To meet the Pediatric health-care needs of this diverse population, health-care providers and institutions will need to strive for high

levels of cultural competency, linguistic access, workforce diversity, and excellence in providing quality care to diverse populations. Achieving these objectives will require frequent review of inpatient utilization data and addressing specific care priorities and unanswered questions in research, clinical care and health systems

Strengths and Limitations

Strengths of this study include the large sample size of electronic admission data. Interpretation of data may be limited by the inclusion of multiple patient admissions and that a maximum number of inpatient beds are available and a single hospital site. Health service data, with the exception of language, collates the child's demographic information providing a more accurate account of changes to patient profile, yet limits interpretation of findings within the context of family centered holistic care. Conversely, the preferred language spoken at home and the language or languages spoken by the child may differ. Self-reported data by parents at the time of their child's admission such as preferred language spoken at home may be influenced by social desirability and therefore biased. Lastly, it is not within the scope of this project to determine cultural differences within and across cultures, however recognition that pediatric patients have stemmed from diverse population is acknowledged.

Conclusion

Australia's population has experienced significant growth in people from non-English speaking countries. Findings from this retrospective review will inform and support health service managers to develop and plan appropriate culturally

sensitive and competent services and workforce that are fundamental for patient engagement and the delivery of safe, high quality care.

References

Ali, P. A., & Watson, R. (2018). Language barriers and their impact on provision of care to patients with limited English proficiency: Nurses' perspectives. *J Clin Nurs, 27*(5-6), e1152-e1160. doi:10.1111/jocn.14204

Araújo Dawson, B., & Williams, S. A. (2008). The Impact of Language Status as an Acculturative Stressor on Internalizing and Externalizing Behaviors among Latino/a Children: A Longitudinal Analysis from School Entry through Third Grade. *Journal of Youth and Adolescence, 37*(4), 399-411. doi:10.1007/s10964-007-9233-z

Australian Bureau of Statistics. (2012). *Cultural diversity in Australia - Reflecting a Nation: Stories from the 2011 Census.* Canberra: Australian Bureau of Statistics.

Australian Bureau of Statistics. (2016). Census of Population and Housing: Reflecting Australia-Stories from the census, 2016. https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/2071.0~2016~Main%20Features~Cultural%20Diversity%20Article~60

Australian Bureau of Statistics. (2017). 2016 Census: Multicultural. https://www.abs.gov.au/ausstats/abs@.nsf/lookup/Media%20Release3

Australian Commmission on Safety and Quality in Health Care. (2013). *Consumers, the health system and health literacy: Taking action to improve safety and quality.* Sydney, ACSQHC.

Banas, J. R., Ball, J. W., Wallis, L. C., & Gershon, S. (2017). The Adolescent Health Care Broker-Adolescents Interpreting for Family Members and Themselves in Health Care. *J Community Health, 42*(4), 739-747. doi:10.1007/s10900-016-0312-5

Carlson, S. M., & Meltzoff, A. N. (2008). Bilingual experience and executive functioning in young children. *Dev Sci, 11*(2), 282-298. doi:10.1111/j.1467-7687.2008.00675.x

Choe, A. Y., Unaka, N. I., Schondelmeyer, A. C., Bignall, W. J. R., Vilvens, H. L., & Thomson, J. E. (2019). Inpatient Communication Barriers and Drivers When Caring for Limited English Proficiency Children. *J Hosp Med, 14*(10), 607-613. doi:10.12788/jhm.3240

Cordova, R. D., Beaudin, C. L., & Iwanabe, K. E. Addressing diversity and moving toward equity in hospital care. *Frontiers of Health Services Management, 26*(3), 19-34.

Crawford, T., Candlin, S., & Roger, P. (2017). New perspectives on understanding cultural diversity in nurse-patient communication. *Collegian, 24*(1), 63-69. doi:10.1016/j.colegn.2015.09.001

de Moissac, D., & Bowen, S. (2019). Impact of Language Barriers on Quality of Care and Patient Safety for Official Language Minority Francophones in Canada. *J Patient Exp, 6*(1), 24-32. doi:10.1177/2374373518769008

Divi, C., Koss, R., Schmaltz, S., & Loeb, J. (2007). Language proficiency and adverse events in US hospitals: a pilot study. *International Journal for Quality in Health Care, 19*(2), 60-67. doi:DO 10.1093/intqhc/mzl069

Flores, G. (2004). Culture, ethnicity, and linguistic issues in pediatric care: urgent priorities and unanswered questions. *Ambulatory Pediatrics, 4*(4), 276-282.

Garg P, Ha MT, Eastwood J, Harvey S, Woolfenden S, & Murphy E. (2017). Explaining culturally and linguistically diverse (CALD) parents' access of healthcare services for developmental

surveillance and anticipatory guidance: qualitative findings from the 'Watch Me Grow' study. *BMC Health Services Research., 17*(1), 228.

Garg, P., Ha, M. T., Eastwood, J., Harvey, S., Woolfenden, S., Murphy, E., . . . Eapen, V. (2017). Explaining culturally and linguistically diverse (CALD) parents' access of healthcare services for developmental surveillance and anticipatory guidance: qualitative findings from the 'Watch Me Grow' study. *BMC Health Services Research, 17*(1), 228. doi:10.1186/s12913-017-2143-1

Goldfeld, S., Mithen, J., Barber, L., O'Connor, M., Sayers, M., & Brinkman, S. (2011). *The AEDI Language Diversity Study Report.* . Retrieved from Melbourne:

Granhagen Jungner, J., Tiselius, E., Blomgren, K., Lutzen, K., & Pergert, P. (2019). Language barriers and the use of professional interpreters: a national multisite cross-sectional survey in pediatric oncology care. *Acta Oncol, 58*(7), 1015-1020. doi:10.1080/0284186x.2019.1594362

Guo, X. Y., Woolfenden, S., McDonald, G., Saavedra, A., & Lingam, R. (2019). Discharge against medical advice in culturally and linguistically diverse Australian children. *Archives of Disease in Childhood, 104*(12), 1150-1154. doi:10.1136/archdischild-2019-317063

Huff, C. (2011). Does your patient really understand? *Hosp Health Netw, 85*(10), 34-35, 37-38, 32.

International Organisation for Migration, U. N. (2020). *World Migration Report 2020* Retrieved from United Nations: https://www.iom.int/migration%20

Jatrana, S., Richardson, K., & Pasupuleti, S. S. R. (2018). Investigating the Dynamics of Migration and Health in Australia: A Longitudinal Study. *Eur J Popul, 34*(4), 519-565. doi:10.1007/s10680-017-9439-z

Kennedy, S., Kidd, M. P., McDonald, J. T., & Biddle, N. (2015). The Healthy Immigrant Effect: Patterns and Evidence from Four Countries. *Journal of International Migration and Integration, 16*(2), 317-332. doi:10.1007/s12134-014-0340-x

Lundin, C., Hadziabdic, E., & Hjelm, K. (2018). Language interpretation conditions and boundaries in multilingual and multicultural emergency healthcare. *BMC Int Health Hum Rights, 18*(1), 23. doi:10.1186/s12914-018-0157-3

Overs, B. J., Woolfenden, S., Williams, K., Jalaludin, B., Axelsson, E. L., Dissanayake, C., . . . Eapen, V. (2017). Predictors of developmental surveillance completion at six months of age in south western Sydney. *Child Care Health Dev, 43*(2), 307-315. doi:10.1111/cch.12425

Panayiotou, A., Gardner, A., Williams, S., Zucchi, E., Mascitti-Meuter, M., Goh, A. M., . . . Batchelor, F. (2019). Language Translation Apps in Health Care Settings: Expert Opinion. *JMIR mHealth and uHealth, 7*(4), e11316-e11316. doi:10.2196/11316

Pottie, K., Ng, E., Spitzer, D., Mohammed, A., & Glazier, R. (2008). Language proficiency, gender and self-reported health: an analysis of the first two waves of the longitudinal survey of immigrants to Canada. *Can J Public Health, 99*(6), 505-510.

Sawrikar, P., & Katz, I. (2008). *Enhancing family and relationship serviceaccessibility and delivery to culturally and linguistically diverse families in Australia*. Retrieved from Sydney:

Shields, L., & Zhou, H. (2011). Family-centred care for hospitalised children aged 0-12 Years: A systematic review of quasi-experimental studies. *JBI Evidence Synthesis, 9*(16), 1-18. doi:10.11124/jbisrir-2011-341

Suphanchaimat, R., Kantamaturapoj, K., Putthasri, W., & Prakongsai, P. (2015). Challenges in the provision of healthcare services for migrants: a systematic review through providers' lens. *BMC Health Services Research, 15*, 390. doi:10.1186/s12913-015-1065-z

Sydney Children's Hospital Network. (2017). *Sydney Children's Hospital Network Strategic Plan 2017-2022*. Retrieved from Westmead: https://www.schn.health.nsw.gov.au/files/attachments/exc4092_schn.

Taira, B. R., & Orue, A. (2019). Language assistance for limited English proficiency patients in a public ED: determining the unmet need. *BMC Health Services Research, 19*(1), 56. doi:10.1186/s12913-018-3823-1

Taira, B. R., Torres, J., Nguyen, A., Guo, R., & Samra, S. (2020). Language Assistance for the Care of Limited English Proficiency (LEP) Patients in the Emergency Department: A Survey of Providers and Staff. *J Immigr Minor Health*. doi:10.1007/s10903-019-00964-9

The Sydney Children's Hospital Network. (2017). *Annual review 2017: Working together for children*. SCHN.

Verdon S, McLeod S, & A., W. (2014). Linguistic diversity among Australian children in the first 5 years of life. *Speech, Language and Hearing., 17*(4), 196-203.

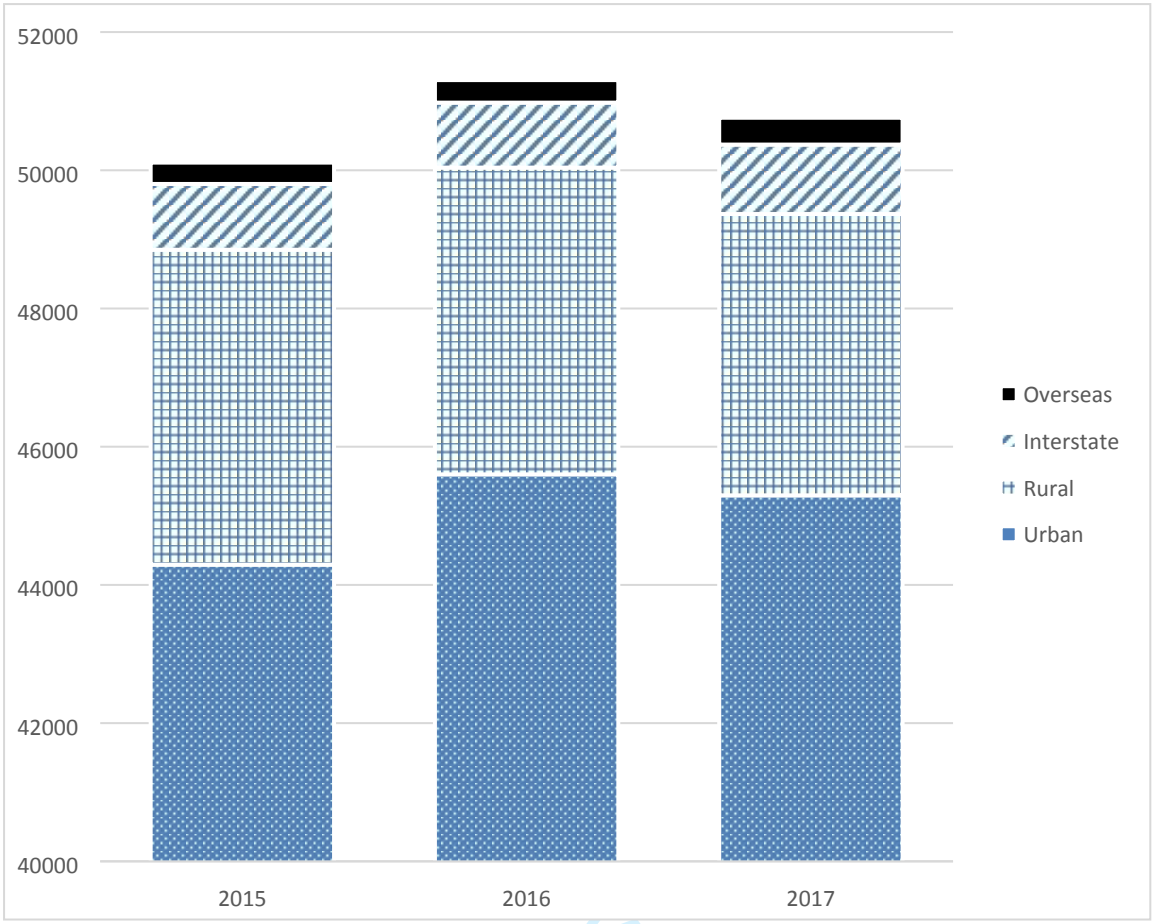

Diagram 1: Patient residence by year of utilisation

Table 1: Demographic information by year of utilisation

	2015	2016	2017	Total
Number of admissions	50,184	51347	50797	152 328
Mean length of stay (SD)	3.2 (20.8)	2.9 (8.9)	2.9 (9.7)	3.0 (14.2)
Mean age (SD)	5.9 (5.1)	6.06 (5.2)	6.08 (5.2)	6 (5.2)
Male gender	29,046	29515	28981	87542
Female gender	21138	21832	21816	
Country of birth (U.N region)				
Australia	47095	48160	47350	142605
Asia	1032	1193	1344	3569
Oceania (exclude Australia)	584	580	546	1710
Middle East	377	378	530	1285
European Union	393	375	357	1125
The Americas	158	172	138	468
Africa	153	125	149	427
Europe	75	49	54	178
Born at Sea	3	4	6	13
Missing data	213	229	212	654
Preferred Language spoken at home				
English	44816	45725	45106	135647
Language other than English	5368	5622	5691	16681
Use of Interpreter	1040	1012	986	3038

Table 2: Incident rate ratio by preferred language spoken at home by family

Preferred Language spoken at home (other than English)	N	IRR	P value	95%CI
Arabic				
2015	1469	1		
2016	1397	0.95	0.18	-0.12- -0.02
2017	1213	0.82	0.001	-0.26--0.11
Indian, Sri Lankan and Bangladesh				
2015	782	1		
2016	933	1.2	0.001	1.08-1.31
2017	999	1.2	≤0.001	1.16-1.40
Chinese languages				
2015	841	1		
2016	903	1.1	0.014	-0.22-0.16
2017	971	1.2	0.002	0.05-0.23
Middle Eastern (not Arabic)				
2015	242	1		
2016	297	1.2	0.018	0.35-0.37
2017	355	1.4	≤0.001	0.21-0.54
Khmer				
2015	59	1		
2016	91	1.5	0.010	0.10-0.76
2017	97	1.6	0.003	0.17-0.82

Table 3: Incident rate ratio by child's country of birth

Country of birth (other than Australia)	N	IRR	P value	95%CI
Middle Eastern				
2015	377	1		
2016	378	1	0.98	0.8-1.15
2017	530	1.4	≤0.001	1.2-1.60
Asia				
2015	1032	1		
2016	1193	1.2	0.001	1.06-1.25
2017	1344	1.3	≤0.001	1.2-1.4
Europe				
2015	75	1		
2016	49	0.65	0.20	0.45-0.93
2017	54	0.72	0.66	0.50-1.02