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‘I think we've had a health screen’: New offshore screening, new refugee health guidelines, new Syrian and Iraqi cohorts: Recommendations, reality, results and review

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MAIN TEXT

Abstract:

- **Aim:** To examine refugee health assessments in Syrian and Iraqi children in the context of changes to offshore immigration screening, updated Australian refugee health guidelines, and the primary care refugee health model in Victoria.
- **Methods:** Retrospective audit of Syrian and Iraqi children aged 0 to 17 years attending a specialist Immigrant Health Service, January 2015-September 2017.
- **Results:** We saw 128 children (7 months-16 years, 64.8% male). Prior to arrival, 58.9% of children had experienced trauma, and 67.9% had missed at least 1 year of school. Almost all children (93.3%) were linked with a regular general practitioner in Australia, 23.6% children were linked with a refugee health nurse; offshore health records were infrequently available. 25% of school-aged children were not enrolled in school 3 months after arrival. Only 2/113 (1.8%) children had completed a recommended refugee health assessment and 55.1% had commenced appropriate catch-up vaccination in primary care. After screening completion, the most prevalent conditions were low Vitamin D (63.6%), growth/nutrition (24.2%), neurological/metabolic (16.4%), learning/behaviour (15.6%), and mental health (12.5%) concerns; latent tuberculosis infection (11.8%) and developmental delay (10.2%). Sixteen children required surgery after arrival and 6 children had life-threatening medical conditions on arrival - only 1 had an offshore critical alert; care for the other 5 children resulted in 133 unanticipated hospital admission days.
- **Conclusion:** There are substantial challenges with the current primary care screening model in Victoria. Disability, developmental and mental health concerns were prominent in this cohort and many children had delays in education access, compounding prior disadvantage.
- **Key words:** refugees, Syria, Iraq, public health, health assessment, delivery of health care, paediatrics

- **What is already known on this topic:**

1. Australian guidelines (updated April 2016) recommend a comprehensive post-arrival health assessment for people arriving in Australia as refugees or asylum seekers.

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2. Syrian and Iraqi humanitarian arrivals are likely to have different health needs compared to previous resettled refugee cohorts arriving from African and Asian source countries.
3. Offshore Australian immigration health screening protocols (Department of Home Affairs - DHA) and the Humanitarian Settlement Program (HSP, Department of Social Services - DSS) have recently changed, with the intention of improving health screening and delivery of settlement support services.

- **What this paper adds:**

1. There are substantial challenges with implementing current refugee health screening guidelines in primary care in Victoria, despite an extensive State Government funded refugee health program (RHP).
2. Disability, developmental, mental health, learning and behavioural concerns were prominent in this cohort; delayed school enrolment emerged as an issue.
3. There are challenges with information transfer between and within offshore and onshore health systems, causing substantial system inefficiencies, and contributing to risk at individual and group level.

Introduction

Armed conflict began in the Syrian Arab Republic (Syria) in March 2011, escalating quickly to civil war.[1] Over half the population have subsequently been displaced: more than 5.3 million Syrians are registered as refugees,[2] and a further 6.5 million are internally displaced.[3] In neighbouring Iraq, 3.2 million people have been internally displaced after prolonged conflict and a further 220,000 people have been recognised as refugees.[4]

In September 2015, the (then) Department of Immigration and Border Protection (DIBP, now DHA) announced an intake of 12,000 refugees from Syria and Iraq,[5] in addition to Australia's annual humanitarian intake of 13,750 people (which also includes people from these countries). The DIBP indicated priority groups as those assessed to be most vulnerable – women, children, and families with the least prospect of returning safely; located in Lebanon, Jordan, and Turkey. A range of physical and mental health issues related to forced migration are described for these cohorts,[6,7] and many children have had interrupted schooling.[8] In Australia, there was extensive planning at national and state level to support settlement, healthcare, and education access for these cohorts. Increasing numbers of

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Syrian and Iraqi refugees arrived from mid-2016, particularly to existing communities in south-west Sydney and northern Melbourne, reflecting a high proportion of 'linked' visas (where new arrivals are sponsored by family in Australia).[9,10]

Offshore (pre-migration) screening protocols were updated for these cohorts in November 2015, combining the immigration medical examination (IME) mandated for all permanent migrants to Australia and the departure health check (DHC) offered to refugees travelling under the Humanitarian Programme (Table 1); Updated protocols include extending tuberculosis (TB) screening to children aged 2-10 years; additional hepatitis B, developmental and mental health screening, and implementing a more comprehensive vaccination program - in effect administering a complete first set of catch-up vaccines.[11] DIBP use a sophisticated electronic record (HAPlite) to manage offshore health screening; individuals (and settlement agencies) were previously given a copy of their offshore health assessment summary.[11,12] Children (and adults) with evidence of active TB disease are treated prior to travel, and those with prior TB or latent TB infection (LTBI) are referred to State/Territory TB services for follow-up after arrival through a separate Health Undertaking (HU) process.

Updated Australian refugee health guidelines (April 2016)[13] recommend that all refugee and asylum seeker arrivals should have a comprehensive health assessment within one month, incorporating universal, risk-based and country-based health screening and catch-up vaccinations (Table 1).[13,14]

In Victoria, refugee health assessments are usually completed in primary care, with support from RHP nurses, although there are no data on the proportion of these communities receiving the recommended health assessments or completing catch-up immunisation, and no prospective data on service delivery and education placement. From late 2016, RHP nurses have been co-located with settlement service providers in new roles as Settlement Health Coordinators (SHC), to facilitate the new cohorts' access to healthcare.

At the Immigrant Health Service (IHS), we have seen increased referrals of Syrian and Iraqi children, and we run an outreach service in the Craigieburn Health Service (CHS) in northern Melbourne that offers direct access to paediatric care (without medical referral). Where refugee health screening results are not available, we make every attempt to obtain results and immunisation records from

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primary care; we also check the Australian Immunisation Register (AIR) for all children. Our service completes missing tests and undertakes catch-up vaccination.

Monitoring post-arrival screening is a key component of refugee health given ongoing demographic changes, noting that Syria is a new humanitarian source country for Australia. This study examines the implementation and outcomes of post-arrival refugee health assessments in new arrival Syrian and Iraqi children, in the context of changes to offshore screening, updated Australian refugee health guidelines, and the primary care refugee health model in place in Victoria for the last decade.

Materials and Methods

We audited the medical records of all Syrian and Iraqi refugee children attending the Royal Children's Hospital (RCH) IHS or outreach clinics. Participants were identified for inclusion using the following criteria: country of birth or country of origin recorded as Syria or Iraq; arrival in Australia under the offshore Humanitarian Programme from January 2015 to September 2017 inclusive; and aged 0-17 years at the time of first clinic visit.

We had developed a standardised clinic reporting form prospectively, collecting information on pre-migration experience, offshore and onshore health screening, and healthcare/service access post arrival. The primary paediatrician for each child completed this form within CAReHR; the electronic record used by the RCH IHS and outreach clinics. Referral reasons and parent concerns were recorded as provided. Clinic lists were reviewed to ensure eligible children had been included, and we reviewed hospital admissions data for the cohort. A single investigator (RH) checked forms for consistency and retrospectively updated missing information from clinic records in September 2017, comparing screening tests to the relevant assessment guidelines.[13,15] Aggregated, de-identified data were extracted from CAReHR and analysed in Microsoft Excel (Microsoft Corporation, Redmond, WA™). Age and gender-specific ranges were used to evaluate test results. We obtained approval from the RCH Human Research Ethics Committee (HREC) to audit clinic data in August 2017 (HREC 37161A).

Results

Demographics and pre-arrival information

Demographics and pre-migration experience are shown in Table 2. 128 children (7 months - 16 years) were included, with approximately equal proportions from Syria and Iraq, and equal proportions on

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refugee and sponsored 'Global Special Humanitarian Visa' subclass 202. More than a quarter of the cohort (25/90, 27.8%) were living in a single postcode in Melbourne's northern suburbs. Most children (117/128, 91.4%) arrived after the April 2016 release of the new refugee health assessment guidelines.

Many children had experienced significant adversity pre-arrival, including exposure to trauma (53/90, 58.9%); parent mental health concerns (31/78, 39.7%); concern for other family overseas (50/73, 68.5%); and separation from family members (43/75, 57.3%). Two-thirds of school-aged children had missed at least 1 year of school overseas (38/56, 67.9%), and a third (18/56, 32.1%) had missed 3 years or more.

Post-arrival healthcare and service access

Almost all children (113/121, 93.3%) were linked to regular general practitioner (GP) care at the time of first specialist visit, and most children (104/113, 92.0%) were seeing GPs who were language congruent. In contrast, only 21/89 (23.6%) children had been in contact with the RHP, with no difference between the population seen at RCH or CHS. Most families reported they had met their settlement caseworker at the time of first visit (75/90, 83.3%).

Around two-thirds of children (84/128, 65.6%) were seen in the central RCH clinic, with the remainder seen at CHS. As expected, CHS had a higher diversity of referral pathways; where referral information was available, almost half (12/27, 44.4%) were referred by sources other than a GP (compared to RCH where most children were referred by GPs, 67/84, 79.8%). Referrals came from GPs (82/111, 73.9%), other hospital teams/emergency departments (9/111, 8.1%), Foundation House (6/111, 5.4%), settlement health coordinators and settlement services (5/111, 4.5%), via family/sibling referral (4/111, 3.6%), refugee health nurses (3/111, 2.7%), and schools (2/111, 1.8%). The median duration between arrival in Australia and referral to our services was 6.2 weeks (IQR 2.9-11.5, n=96); the median duration between referral and first outpatient visit was 4.6 weeks for RCH (IQR 3.3-7.6; n=76) and 2.4 weeks (IQR 2.3-15; n=19) for CHS.

Offshore paperwork was infrequently available at the first specialist visit. While most parents recalled their children had pre-departure vaccinations (64/84, 76.2%) and health screening (62/79, 78.5%) - reflecting updated offshore health screening for these cohorts, only one quarter (23/91, 25.3%) of

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children had any paperwork reflecting offshore healthcare (i.e. overseas medical records or settlement health reports). Less than a third of children (31/99, 31.3%) had a written record of any overseas-administered vaccines, although a higher proportion (77/94, 81.9%) had been vaccinated overseas on parent report.

Reasons for referral

Reasons for referral and final diagnoses are shown in Table 3, there were 153 referral conditions for 119 children. Parent-reported concerns were frequent; most commonly around development (48/116, 41.4%), sleep issues (38/105, 36.2%), disability (26/92, 28.3%), behaviour problems (25/97, 25.8%), anxiety (21/90, 23.3%), visual concerns (19/99, 19.2%), post-traumatic stress disorder (PTSD) symptoms (13/89, 14.6%), and hearing concerns (11/102, 10.5%).

Delayed school enrolment in Australia was a substantial issue in clinical practice; more than one third of school-aged children (29/82, 35.4%) were still not enrolled in school at the time of the first specialist visit. The median time between arrival in Australia and school enrolment was 11.0 (IQR 8.0-16.8 s), at least 21 children were still not enrolled in school 3 months after arrival. School type was available for 80/82 school-age children over the course of their care at RCH; 17/80 (21.2%) enrolled (appropriately) in specialist education, 63/80 (78.8%) enrolled in mainstream school, and 30 children had attended intensive English Language School (ELS)/classes after arrival.

Refugee health screening - quality

Only 2/113 (1.8%) children linked with a regular GP had completed a refugee health assessment in primary care that was consistent with relevant refugee health guidelines. For the remainder, 68/113 (60.2%) had incomplete screening investigations, 32/113 (28.3%) had not had any screening investigations, and we were unable to ascertain investigation status in 11/113 (9.7%) children, despite requests. None of the children linked with the RHP had completed screening. Most children (22/34, 64.7%) referred for refugee screening had already had some blood tests in primary care. The most commonly omitted tests in primary care included TB screening, *Strongyloides* serology, schistosomiasis serology, and recommended hepatitis B screening; completion rates were: 8/112 (7.1%); 7/112 (6.3%); 9/112 (8.0%) and 12/112 (10.7%) respectively.

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At least 70/115 (60.9%) children had extra investigations in primary care, noting that we could not establish the clinical indication for testing. The most common were liver and renal function tests; and urine microscopy/culture; completed in 55, 52 and 23 children respectively. Thyroid function tests were abnormal in 4/40 (10%) children tested; vitamin B12 levels were low in 4/38 (10.5%) children tested. At least one of measles/mumps/rubella serology was tested in 30 children, and varicella serology (recommended ≥14 years if no clinical history) was checked inappropriately in 20/64 (31.3%) younger children. Assuming a cost of 85% of the Medicare rebate,[16] the estimated cost of additional tests was $6418 in total, or an average of $91.69 per child.

At the time of the first specialist visit, most children (68/96, 70.8%) were not up to date with recommended Australian vaccinations, and only 15.5% (16/103) had an Australian written immunisation record available at the first visit. Of the children linked to a GP where vaccination information was available, only 43/78 (55.1%) had started appropriate catch-up vaccination as per Australian guidelines.[17]

Refugee health screening - results

Results from refugee health screening investigations (with missing tests completed at the specialist visit) are shown in Table 4. Low vitamin D was the most common finding, and TB screening (using either the TST or Interferon Gamma Release Assay (IGRA)) was positive in 11/93 (11.8%) children. Only 3/94 (3.2%) children had positive *Strongyloides* serology, and no cases of chronic hepatitis B infection, hepatitis C infection, human immunodeficiency virus (HIV), schistosomiasis, or pathologic faecal pathogens were identified.

Many children had complex medical and/or developmental issues (Table 3). Sixteen children required surgical admissions after arrival - including dental surgery/extraction (n=3), cardiac surgery, botulinum toxin injections, ophthalmologic surgery, ENT surgery, and percutaneous endoscopic gastrostomy insertion (all n=2). We managed 6 children with life-threatening medical illness on arrival in Australia. Only 1 of these 6 children had an offshore critical medical alert, and their care was coordinated with liaison across the SHC, the settlement workers and the DIBP. Four of the other 5 had offshore recommendations for medical follow-up (between 72 hours and 1 month after arrival; information was not available for the other child). These children were seen in primary care within the recommended timeframes, but experienced delays in definitive care. Their conditions included:

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status epilepticus during travel; 2 cases of malignancy, one with interruption of chemotherapy; and 2 cases of severe acute-on-chronic malnutrition in the setting of complex disability. Two were routine referrals to RCH outpatients after GP review (without direct contact from the GP), one child was referred by GP phone call urgently to RCH, one child was an emergency transfer, and one was called into emergency by RCH after a caseworker raised concerns. These 5 children accounted for a total of 133 unanticipated hospital admission days (including 20 intensive care bed days and one air retrieval).

Discussion:

This study examines the implementation and outcomes of post-arrival refugee health assessment in recently arrived Syrian and Iraqi children in Victoria. We focus on two domains: the health system (pre- and post-arrival) and settlement services, highlighting real-life challenges and exploring gaps between policy and practice.

The impact of updated offshore immigration health screening for these cohorts appears to have been mixed. The absence of faecal parasites, which have been prominent in previous Australian refugee cohorts,[18,19] suggests universal pre-departure albendazole may have been effective, corresponding to existing evidence of benefit and cost-effectiveness from large American studies.[20-22] However, offshore screening results and health information were generally not available for post-arrival healthcare, raising questions around the utility and purpose of extended pre-departure screening and vaccinations. Despite procedures for individuals to receive a copy of their offshore health assessment summary at the time, only 25-31% of children had any offshore information available and generally this information was also not available to SHC or primary care providers. Although children with positive TB screening offshore are followed up through the HU process, we found it difficult to clarify HU status due to the separate HU referral process and difficulty obtaining HAPlite identification numbers. Most of the clinicians within our service have access to the HAPlite system through their work in TB clinic, providing a mechanism to access offshore health records/HU with consent, however access to HAPlite records is not possible without individual HAPlite numbers. There are no current mechanisms to transfer offshore health information directly to AIR, or 'My Health Record', therefore ensuring HAPlite information is available to onshore health providers is essential to inform post-arrival care and maximise the benefits of extended offshore screening and vaccination.

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Offshore screening that is not available results in tests and vaccinations being repeated after arrival in Australia. These duplications result in avoidable tests, costs, inefficiencies and possible clinical consequences, although the scale is difficult to quantify. Undocumented vaccinations may result in confusion around hepatitis B status (detecting HBsAb from vaccination) or false negative TB screening (using the TST) after live viral vaccines; additional doses of vaccines may result in adverse effects; incorrect vaccine dosing intervals (too close together) may reduce efficacy, and delays entering offshore vaccines into the AIR may reduce welfare benefits through the 'No Jab, No Pay' legislation.[23]

In a number of cases, serious medical conditions had not been identified, or had not generated appropriate alerts for travel/follow-up after arrival. For other children where critical medical conditions had been identified prior to travel, the lack of offshore-to-Australia communication, questionable recommended timeframes for review, and lack of direct communication from primary care led to significant delays in care after arrival, substantial risk for individual children, and prolonged hospital admissions. We suggest that all children requiring a medical escort for travel should have specialist review shortly after arrival.

Our findings suggest there are substantial challenges with implementing post-arrival refugee health assessment and catch-up vaccination in primary care in Victoria. Victoria has promoted a primary care screening model since 2005, supported by the RHP.[24] While access to primary healthcare was in place for this cohort, this appeared to have occurred through the settlement providers/sponsors; most children (76.4%) had not been seen by the RHP.

Almost no children had recommended health screening; core tests, including screening for TB, *Strongyloides*, *Schistosoma* and hepatitis B, were completed in less than 10% of children, although more than 50% of children had blood tests in primary care. Incomplete post-arrival health screening also results in a layer of avoidable tests, costs, inefficiencies and inconvenience for children and families. From a child's perspective, extra needles (vaccinations or blood draw) have major impact, and should be avoided wherever possible.

Overall results suggest post-arrival refugee screening remains important in this cohort, 11.8% of children had LTBI, 63.6% had low vitamin D (22.2% with moderate-severe deficiency, 7.1% with biochemical rickets (i.e. raised alkaline phosphatase (ALP)), and 3.2% had *Strongyloides* infection. The

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prevalence of both anaemia (5.2%) and iron deficiency (4.6%) were low compared to other Australian child refugee cohorts, and screening for hepatitis B, hepatitis C, schistosomiasis, and faecal parasites in this cohort (no cases identified) perhaps warrants reappraisal if more Australian data are available to confirm our findings. Studies of Syrian refugees in Germany[25] and Canada[26] have also noted low prevalence of infectious diseases.

The range of other issues identified and complexity within this cohort provides additional support for a comprehensive post-arrival refugee health assessment. We found a higher prevalence of neurodevelopmental and disability-related diagnoses compared to previous Australian child refugee cohorts.[13,19] Referral bias is an obvious contributor, however other possible factors include changes to the Migration Act in 2012 (waiving health requirements for Humanitarian entrants)[27,28] and the explicit prioritisation of vulnerable groups, for which the DHA should be commended. Exposure to trauma (58%) and mental health concerns (12.5%) were also prominent, noting that these figures represent disclosures at the first clinic visit, and are likely to be an underestimate.

Delayed school enrolment in Victoria was a new and unexpected finding. Many families reported they could not access places at ELS; this is likely to be a contributing factor to the low proportion of children who had attended ELS. In some cases, children had arrived just before, or during the 6-week summer holidays, but enrolment was delayed for months in many children, despite a known intake and defined geographic settlement. Many Syrian and Iraqi children have experienced significant schooling interruptions due to conflict.[7,29] Missed school and lack of ELS in Australia will exacerbate pre-existing educational disadvantage, and are urgent areas for attention at State government level, especially as Australia's Humanitarian Programme increases.[5]

Most families were well engaged with primary care, largely seeing language congruent GPs, and in most cases, the quality of GP referrals (related to general child health issues) was excellent. The discrepancy between GP engagement/quality of care and refugee health screening/vaccination completion therefore warrants careful examination. Several factors are plausible contributors to difficulties implementing post-arrival health screening. These include changes to offshore screening, new post-arrival screening guidelines, translation of the new guidelines into clinical practice, shifts in the location of settlement (to the northern metropolitan area), the role of the RHP, and the practical aspects of completing screening in primary care.

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Expanded offshore health screening did not appear to be a reason for incomplete post-arrival testing; offshore information was generally not available and therefore could not be incorporated into decision-making. Other factors are more likely to be relevant. Updated 2016 post-arrival refugee health guidelines[14] require consideration of universal, risk-based and country-based screening, and are arguably more complicated to implement than the previous (2009) recommendations,[30] particularly in a busy GP environment. The updated guidelines were only recently available when these cohorts arrived, and the new area of settlement (i.e. less prior screening experience) and delays in training and dissemination could also be factors. Access to testing in primary care can be complex: TST availability for TB screening is extremely limited in Victoria, and Medicare restrictions on IGRA testing may restrict access, or lead to patients being billed for IGRA testing. MBS 'episode coning' places an upper limit on GP pathology test rebates,[31] with some pathology services historically declining primary care refugee screening pathology tests. Finally, there was little evidence of the RHP supporting health screening in primary care for this cohort - most children had not had contact with the RHP, and none of the children in contact with the RHP had completed screening. Other Australian studies have also identified difficulties with GP-based refugee health screening,[32,33] and suggested a role for specialised (not necessarily specialist) services.

The major limitation of this study is that the results may not be generalisable to the broader population of Syrian and Iraqi refugee arrivals. Referral bias is likely, as the IHS is a tertiary service requiring medical referral, however more than a quarter of children were referred for refugee health assessment, and the CHS does not require a medical referral. Furthermore, our sample size was limited and data were missing for some children. Nonetheless, incomplete post arrival health screening and vaccination, and limited contact with the RHP are consistent with our clinical experience over the last decade, across various cohorts, and broad areas of settlement. While multiple Australian studies report on prevalence data from post-arrival refugee health screening, (reviewed in [14]) there is little, if any, information on the interface between offshore and onshore screening, the outcomes of a dispersed primary care screening model, or what proportion of Australia's Humanitarian intake receive a recommended post-arrival assessment. In view of these gaps, our findings provide important background to inform health and settlement policy at local, state and federal level.

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We suggest there are a number of areas requiring systemic and policy change. Key elements include: i) ensuring full access to offshore health information for individuals and their health providers with support from the DHA and HSP to ensure this occurs; ii) a robust critical alert system that facilitates offshore-onshore information transfer and allows feedback to DHA/DSS; iii) proactive use of existing Australian data systems for offshore health information - e.g. ensuring vaccines are entered into AIR, considering the use of My Health Record, improving visibility of the HU process; iv) strengthening HSP contract provisions around completion of health screening; v) reappraisal of the role of the Victorian RHP in supporting post-arrival screening - considering a direct clinical role, outcomes-based reporting on screening completion, and ensuring flexibility to adapt to new settlement patterns; vi) training, resources, and evaluation of updated guidelines for primary care; and vii) consideration of a specialised mixed primary care/specialist model to address post-arrival screening and HU, alongside linkages to local primary care.

Finally, in clinical practice when we asked if children had completed health screening, many families were unsure. On review, there was wide variation in what had, or had not, been completed or addressed, and what had been communicated back to children and families. Let's aim to ask the question and receive a definitive answer, such that people know exactly what conditions they have had screening for, what the outcomes are, and what they need to do next.

Conclusion

This audit highlights the complexity of refugee health screening, which sits across DHA (offshore screening, the HAPlite system, and health alerts/undertakings); DSS (through settlement support deliverables including referral for post-arrival healthcare), State-level services (notably the RHP and community health centres in Victoria), and both primary and specialist care. Currently, there is insufficient communication between the offshore and onshore health screening environments, and between the actors in the onshore service delivery system. Despite good access to primary care, health screening and catch-up vaccination for new arrivals in Victoria is inefficient, not consistent with current guidelines, and not well supported by the RHP.

Disability, developmental and mental health concerns were prominent in this cohort and despite a known intake and defined geographic settlement, many children had delays in education access, and were unable to access ELS, compounding prior disadvantage. Our findings support the need for robust

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and holistic post-arrival screening in newly arrived refugee children, addressing their physical and mental health, developmental and educational needs, and forced migration experience; in order to facilitate their lives in, and contribution to Australia.

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Conflict of interest:

GP has provided advice to the DIBP/DHA through the Independent Health Advisor's Panel (from 2014), was involved in planning discussions around offshore screening protocols in these cohorts in September 2015, contributed to the updated post arrival screening guidelines, and chairs a working group on immunisation in refugee and asylum seeker populations for the Victorian DHHS (from 2015).

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Table 1: Pre- and post-migration health assessment for Humanitarian Program arrivals to Australia

Standard offshore screening	**Extended offshore screening for Syrian and Iraqi cohorts**	**Post-arrival health assessment**
Step 1: IME[1]† (mandatory, 3-12 months prior to travel): • History and physical exam • Urinalysis ≥ 5 years • HIV‡ • HBsAg§ • HCV Ab¶ • Syphilis ≥ 15 years (VDRL, RPR or equivalent) • TB screen (TST or IGRA) 2 - 10 years (or <2 years if close household TB contact or TB symptoms) • CXR ≥ 11 years	***Combined* IME & DHC:** Comprises the IME, with the addition of: • Hepatitis B screen - HBsAg • Albendazole • (Mental health and developmental screening) • Additional vaccinations (polio, MMR, and DT-containing vaccines for all ages, using hexavalent or pentavalent vaccines in children less than 10 years)	**Recommended by the ASID guidelines (2016)[2]:** • FBE and film • Ferritin (in children, women, and men with risk factors) • Hepatitis B serology (HBsAg, HBsAb and HbcAb) • *Strongyloides* serology • TB screening (TST or IGRA;TST preferred if <5 years) • Faecal OCP (if no pre-departure albendazole, or persisting eosinophilia) • Vitamin D (if risk factors, also Ca, PO4, ALP in children) • Varicella serology (if ≥ 14 years & no history disease) • Schistosoma serology (endemic countries) • Malaria (arrival <3 months from endemic area or arrival <12 months if fever) • HCV Ab (endemic countries) • HIV serology (if ≥ 15 years, UHM, and/or risk factors)
Step 2: DHC[3] (voluntary, 3 days prior to travel,		

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refugee entrants only) • Physical exam • Malaria RDT & treatment if positive (location dependent) • CXR (if history of TB, signs/symptoms TB or HIV positive) • Albendazole dose ≥ 1 year • MMR 9 months - 54 years (unless written evidence previous vaccination or pregnant) • +/- Yellow fever vaccine, +/- polio vaccine • Other as clinically indicated		• STI screening (if risk factors) • Syphilis serology (if UHM, and/or risk factors) • Rubella serology (in females of childbearing age) • Nutrition screening including B12 (if low weight for age, food insecurity, vegan) • TFT and blood lead (in children with developmental issues) • Helicobacter pylori faecal antigen (if upper GI symptoms, or gastric cancer family history) • Catch-up vaccinations • Others (based on clinical findings)

Non-test screening components have been excluded from the table for brevity

ALP, alkaline phosphatase; CXR, chest x-ray; DHC, departure Health Check; FBE, full blood examination; GI, gastrointestinal; HCV Ab, hepatitis C virus antibodies; HbsAg, hepatitis B surface antigen; HbsAb, hepatitis B surface antibody; HbcAb, hepatitis B core antibody; HCW, healthcare workers (refers to physicians, nurses, paramedics and dentists in this context); HIV, human immunodeficiency virus; IGRA, interferon gamma release assay; IME, immigration medical exam; IVDU, intravenous drug users; MMR, measles, mumps and rubella vaccine; OCP, ova, cysts and parasites; RDT, rapid diagnostic test; STI, sexually transmitted infection; TB, tuberculosis; TFT, thyroid function tests; TST, tuberculin skin test; UHM, unaccompanied humanitarian minor

† The IME is compulsory for all Permanent Resident entrants. There are extra tests for certain groups, e.g. intending HCW.

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‡ Permanent applicants ≥ 15 years, non-migrating relatives of permanent visa applications ≥ 15 years, children being adopted, UHM, children <15 years with clinical suspicion of HIV, a history of blood transfusions or haemophilia, or if mother HIV-seropositive; persons with active TB, intending HCW, persons with hepatitis C infection, or previous/current IVDU

§ Pregnant women, children being adopted, UHM, high risk applicants, intending HCW, or current/previous IVDU

¶ High risk, intending HCW, or current/previous IVDU

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Table 2: Demographic characteristics of 128 children attending the Royal Children's Hospital Immigrant Health Service and outreach clinics, January 2015 – September 2017

Characteristic	*n*† (%)
Age at arrival in Australia (years)	
• < 6	54 (42.2%)
• 6—11	53 (41.4%)
• 12—17	21 (16.4%)
Gender	
• Male	83 (64.8%)
• Female	45 (35.2%)
• Ratio (M:F)	1.84:1
Country of Origin	
• Syria	63 (49.2%)
• Iraq	65 (50.8%)
Preferred language	
• Arabic	76 (59.4%)
• Assyrian or Chaldean	47 (36.7%)
• Kurdish	5 (3.9%)
Year of arrival	
• 2015	11 (8.6%)
• 2016	81 (63.3%)
• 2017 (to 30th September)	36 (28.1%)
Time spent in a refugee camp (n=95)	
• No	93 (97.9%)
• Yes	2 (2.1%)
Transit country (n=122)	
• Lebanon	66 (54.1%)
• Jordan	36 (29.5%)

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• Turkey	19 (15.6%)
• >1 transit country	1 (0.8%)
Visa type (n=98)	
• 200 Refugee visa	46 (46.9%)
• 202 Global special humanitarian visa	52 (53.1%)

† *n* = 128 unless otherwise specified (*n* may be less than 128 due to missing information)

All values represent status at time of first visit unless otherwise specified. Percentages may not equal 100 due to rounding.

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Table 3: Reasons for referral and final diagnoses

Condition		Number of children referred for this condition (n=119)	Number of children diagnosed after specialist visit/s (n=128)	Prevalence of final diagnoses
Related to screening investigations	Refugee health screening †	34	126	98.4%
	Latent tuberculosis infection (or tuberculosis screening)	3	11‡	8.6%
	Infectious diseases (excluding LTBI)	0	5	3.9%
	Anaemia or other haematologic conditions	2	11	8.6%
Developmental, neurological, learning or mental health concerns	Developmental delay (includes language/speech delay)	17	13	10.2%
	Autism	5	5	3.9%
	Learning or behaviour concerns	9	20	15.6%
	Intellectual disability	1	10	7.8%
	Neurologic and metabolic (includes cerebral palsy, syndromes)	15	21	16.4%
	Epilepsy	6	8	6.3%
	Sensory impairment (including hearing or visual acuity issues) §	8	13	10.2%
	Post-traumatic stress disorder, trauma, or other mental health conditions	12	16	12.5%

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Other medical conditions	Growth or nutrition concerns, including overweight	12	31	24.2%
	Continence issues	7	10	7.8%
	Dermatologic conditions or allergy	4	8	6.3%
	Surgical conditions	8	12	9.4%
	Constipation	0	5	3.9%
	Ear, nose, throat or respiratory conditions	4	4	3.1%
	Endocrine conditions	1	4	3.1%
	Cardiac conditions	5	3 ¶	2.3%

Each child is only counted once within each category of conditions, but can be counted multiple times across different categories (reflecting multiple reasons for referral or multiple diagnoses). Only 119 children (of the total cohort of 128) had a reason for referral recorded.

† Refugee health screening referral includes referrals for vitamin D deficiency, oral health concerns, and/or settlement assistance, as well as all referrals for general screening/Refugee Health Assessment

‡ 93 children had completed TB screening at the time of audit; for the remaining patients screening results were pending, noting access to TB screening was difficult at CHS (IGRA and/or TST). This figure is reported as the proportion of referrals diagnosed with LTBI - prevalence is shown in table 4.

§ Two of the children in this category had profound hearing impairment requiring cochlear implantation (processor for one and implants for the other)

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¶ All three of these children had cardiac surgery (two after arrival in Australia, one prior to arrival)

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Table 4: Refugee health screening results

Health screening results	Prevalence abnormal
TB screening positive†	11.8% (11/93)
25-hydroxy vitamin D deficiency	
Mild (<50nmol/L)	63.6% (63/99)
Moderate-severe (≤ 25nmol/L)	22.2% (22/99)
Biochemical rickets (elevated ALP)¶	7.1% (6/84)
Hepatitis B	
HbsAg positive	0% (0/95)
HBsAb ‡ positive	70.3% (71/101)
HbcAb present	0% (0/67)
Hepatitis C antibody positive	0% (0/65)
HIV serology positive	0% (0/19)
Strongyloides serology positive	3.2% (3/94)
Schistosoma serology positive	0% (0/73)
Faecal parasites §	0% (0/39)
Anaemia	5.2% (6/116)
Abnormal MCV	18.1% (21/116)
Eosinophilia	0.9% (1/116)
Iron deficiency (low ferritin)	4.6% (5/108)

Fewer than 5 children were tested for: malaria, syphilis, chlamydia and gonorrhea; there were no positive results for any of these tests. Note: screening was in progress for some children at time of data collection.

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† Positive tuberculin screening test (TST) and/or Interferon Gamma Release Assay (IGRA)

‡ Frequency of HbsAb>10IU/L, indicating immunity

§ Only pathologic parasites reported here; *Blastocystis hominis* is excluded

¶ Defined as: ALP above upper limit of normal for age and sex, in presence of 25-hydroxy vitamin D deficiency

ALP, alkaline phosphatase; FBE, full blood examination; HBsAb, hepatitis B surface antibody; HBsAg, hepatitis B surface antigen; HBcAb, hepatitis B core antibody; HIV, human immunodeficiency virus; MCV, mean corpuscular volume; TB, tuberculosis

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TITLE PAGE

Title: 'I think we've had a health screen': new offshore screening, new refugee health guidelines, new Syrian and Iraqi cohorts - recommendations, reality, results and review.

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