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Current Practice Patterns and Educational Needs of Immunocompromised Infectious Diseases Physicians in Australia and New Zealand

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ABSTRACT

Introduction: The Australasian Society for Infectious Diseases (ASID) Immunocompromised Host Special Interest Group conducted a survey of the immunocompromised host (ICH) infectious diseases (IDs) workforce in Australia and New Zealand (ANZ). The primary aim of the survey was to characterise the current working environments and training of ANZ ICH ID clinicians and to better understand the education and research needs.

Methods: A four-part questionnaire was developed based on a survey designed by the European Society of Clinical Microbiology and Infectious Diseases Study Group for Infection in Compromised Hosts. A REDCap survey link was distributed by ASID email distribution lists and local networks. The survey collected anonymous data on respondents' demographic and practice setting, pathway to current position, educational needs, and research interests.

Results: Thirty-five ID clinicians who self-identified as ICH ID clinicians completed the survey, with respondents distributed across ANZ. Respondents provide care for a wide spectrum of ICH patients, often with no specific institutional funding and concurrent clinical duties beyond ICH ID. Respondents identified limited local opportunities for dedicated ICH ID training. There was enthusiasm for more local educational opportunities and formal training.

Conclusion: Immunocompromised IDs is a relatively new subspeciality in ANZ with a growing need for ICH ID specialists given the enlarging ICH population. This survey highlights many ANZ region-specific challenges faced by ICH ID clinicians in relation to ICH ID training, service provision, and research.

1 | Introduction

In Australia and New Zealand (ANZ), the number of patients receiving solid organ [1, 2] and bone marrow transplants [3] is increasing year upon year. Most recent annual data indicates

that there were 1387 solid organs transplanted in Australia [1] and 279 in New Zealand [2], with 2205 bone marrow transplants performed across ANZ. There is an ever-burgeoning list of conditions for which immunosuppressive and immunomodulatory therapy is becoming the standard of care. In the United

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States, it is estimated that 6.6% of the population is immunosuppressed [4], and although these data do not exist locally, it is reasonable to assume a similar rate in ANZ. Immunocompromised patients are at increased risk of infection, which is often specific to the underlying immunocompromising condition and its treatment. Infectious disease (ID) physicians are playing a crucial role in the prevention and treatment of infection in immunocompromised hosts (ICHs).

As such, ICH ID, commonly known as transplant infectious diseases (TIDs), is an emerging subspecialty of ID. In 2010, the American Society of Transplantation Infectious Diseases Community of Practice developed a formal curriculum for training in TID [5], and many transplant centres in the United States of America offer fellowship training in TID. In ANZ, ICH ID training is integrated into the Royal Australasian College of Physicians (RACP) ID advanced training (AT) curriculum; however, exposure and experience are highly dependent on the training site, with some fellows seeking additional subspecialty training overseas. Similarly, there is significant variation in the breadth and depth of experience in ID specialists managing infections in ICH. At this point in time, there are no data on the training experience or practice of ID ATs and specialists in ANZ with regard to ICH ID. Such data are needed to guide the development of training resources, including the potential establishment of a formal training pathway in ICH ID.

In 2023, the Executive Committee members for the European Society of Clinical Microbiology and Infectious Diseases (ESCMID) Study Group for Infections in Immunocompromised Hosts (ESGICH) developed a survey to develop an understanding of its members, particularly their career pathway, current clinical practice environment, participation in research, and educational needs. While this survey was open to Australian members of ESGICH, it was recognized that this is a small group; thus, the Australasian Society for Infectious Diseases (ASID) Immunocompromised Host Special Interest Group (ICH-SIG) partnered with ESGICH to conduct the survey in ANZ.

2 | Material and Methods

2.1 | Study Design

An exploratory cross-sectional multi-center study on all ASID members who self-identified as having a special interest in infections in ICHs.

2.2 | Survey Instrument

A 69-item survey was developed based on the ESGICH member survey and adapted to the local setting. The survey consisted of four sections (File S1):

1. Demographics and Practice Setting – details about current working conditions and practices with ICH.
2. Pathway to Current Position – details regarding sub-specialty training and training opportunities in ICH-ID.

3. Educational Needs – details current education activities and desire for additional ICH-ID training opportunities.
4. Research interests – details current research activities and challenges.

The ASID is the peak member organization for ID in ANZ with over 1200 members, including 497 ID physicians. The survey was constructed as a RED-Cap survey, and a link was sent to all ASID members via email distribution list ‘OzBug’, the ASID member-access only online forum ‘The Circle’, and via electronic communication. Responses were gathered anonymously with the option to include the name of the hospital that is the principal place of practice.

3 | Results

3.1 | Demographics and Practice Setting

3.1.1 | Respondents’ Demographics and Practice Setting

The survey was open for response from February 18 2025 until March 11, 2025. Thirty-five clinicians completed the first section of the survey, and 29 completed the final three sections. The largest number of respondents is from Victoria (31%), followed by New South Wales (20%). New Zealand and all seven Australian States but no Australian Territories were represented (Figure 1). A Principal Referral Hospital [6] is the primary place of practice for most respondents (34/35, 97%), and all but one respondent undertakes most of their clinical work in a public hospital.

Most respondents (25/35, 71%) care for adults only, 9% (3/35) care for pediatric patients only, and 20% (7/35) care for both. All respondents identified as Infectious Diseases Physicians. Additional specialist qualifications and appointments of respondents include Clinical Microbiology (7/35, 20%), General Medicine (3/35, 9%), Public Health Medicine (3/35, 9%), Sexual Health Medicine (2/35, 6%), and Clinical Immunization (1/35, 3%). Half of respondents (18/35, 51%) completed their specialty training 10 or more years ago, and 8/35 (23%) are within 5 years of completing their training. The median number of years that respondents have been employed at their current job is 6.5 (interquartile range [IQR] 4–10).

Almost half (16/35, 46%) of respondents spend 50% or more, including 3/35 (9%) who spend 100% of their clinical time focused on ICH ID, and 17/35 (49%) have been specifically working with ICH patients the whole time they have been employed in their current job. The median number of other clinicians providing ICH ID at the respondents’ primary place of practice is 5 (IQR 3–8), and three respondents are the sole ICH ID providers at their center.

The main specific immunocompromised populations attended include oncology patients (30/35 (86%), kidney transplant recipients (30/35, 86%), autologous haematopoietic stem cell transplant recipients (29/35, 83%), allogeneic haematopoietic stem cell transplant recipients (25/35, 71%), patients with primary immunodeficiency (20/35, 57%), chimeric antigen receptor T-cell (CAR-T) treated patients (19/35, 54%), liver transplant recipients



FIGURE 1 | Map demonstrating the geographic distribution of survey respondents.

TABLE 1 | Immunocompromised host infectious disease (ICH ID) patient groups attended by survey respondents' centers.

ICH-ID patient cohort	Number of respondents who care for this ICH-ID patient group, N (%)
Primary immunodeficiency	20/35 (57)
Oncology	30/35 (86)
Allogeneic stem cell transplant	25/35 (71)
Autologous stem cell transplant	29/35 (83)
Non-transplant hematology	29/35 (82)
Chimeric antibody receptor therapy	19/35 (54)
Kidney transplant	30/35 (86)
Liver transplant	13/35 (37)
Pancreas transplant	3/35 (9)
Small bowel transplant	3/35 (9)
Heart transplant	13/35 (37)
Lung transplant	11/35 (31)
Uterine transplant	1/35 (3)
Composite tissue transplant (face, arm/leg, and abdominal wall)	0/35

(13/35, 37%), heart transplant recipients (13/35, 37%), and lung transplant recipients (11/35, 31%) (Table 1).

Most respondents (31/35, 89%) have colleagues outside of their institution with whom they can discuss ICH ID cases, and 18/35 (51%) are active participants in a regional/national ICH ID group. Sixty percent of respondents are members of a relevant ICH ID society, most commonly the International Immunocompromised

Host Society (16/30), The Transplantation Society, Transplant Infectious Diseases Section (11/30, 37%), the European Society of Clinical Microbiology and Infectious Diseases Study Group on Immunocompromised Hosts (11/30, 37%) and the American Society of Transplantation (33%). Membership of local societies was less common (Table S1).

3.1.2 | ICH ID Service Provision

Most respondents (22/35, 63%) reported that their institution has a dedicated ICH ID inpatient consult service, but fewer (16/35, 46%) have dedicated ICH ID outpatient clinics. Vaccination administration to ICH patients is in the community for 15/35 (43%), in an ICH-specific vaccination clinic for 10/35 (29%), and in the general hospital-based vaccination clinic for 10/35 (29%).

Multi-disciplinary meetings are the core business of an ICH ID service. Eighty-three percent (29/35) of respondents participate in meetings with the ICH teams (clinical care ± education) with a median of 1.5 meetings per week (range 1–5). Slightly more respondents (30/35, 86%) conduct a median of two “paper rounds” with ICH teams per week (range 1–5).

Specific funding for ICH ID service is lacking for 63% of respondents (22/35), and the service is delivered using existing ID department resources. Other sources of funding include fixed funding from the solid organ transplant (SOT) service (4/35, 11%) or hematology/oncology services (4/35, 11%), and 6% (2/35) receive specific funding from their institution for ICH ID.

3.1.3 | Pathway to Current Position

Eighty-three percent (29/35) of respondents completed this section of the survey. Most (27/29, 93%) completed IDs AT in Australia, 3/29 (10%) in New Zealand, and 4/29 (14%) undertook

AT overseas (USA $n = 3$ and Thailand $n = 1$). The median combined number of years of ID AT, fellowship, and/or research training completed prior to attaining the first ID/microbiology consultant appointment was five (range 3–9). Additional subspecialty training in ICH ID was undertaken by 8/29, 28%, most being completed in North America (6/8, 75%) with 2/8 (25%) in Australia for a median of 24 months (range 12–40). Most ICH ID subspecialty training involved a combination of clinical work and research (7/8, 88%). Of those who did not complete additional ICH ID training, 20/25 (80%) would have liked to. Reasons for not pursuing ICH ID fellowship training included a lack of opportunities for training locally, barriers to relocating overseas, including cost, visa issues, family considerations, lack of funding, and the coronavirus disease 2019 pandemic.

3.2 | Research Experience

Eighty-three percent (29/35) of respondents completed this section of the survey, most of whom (24/29, 83%) have participated in ICH ID research during the past 5 years. Most respondents (22/29, 76%) had enrolled patients in ICH ID clinical trials, and the same number had contributed patients to a registry outside of their institution. Fifty-five percent (16/29) had contributed patients to an ASID-endorsed study. Translational research was undertaken by 16/29 (55%) and basic science/bench research by 14/29 (48%). Twenty percent of respondents (6/29) receive support from their centers' transplant, hematology, and/or oncology service(s) for research, two (7%) respondents stipulated that they receive financial support, and one (3%) that they receive access to services such as study coordinators and data curation. Only 10% of respondents (3/29) feel that they have adequate support at their center to conduct research in ICH ID.

3.3 | ICH ID Meetings

Attendance at local rather than international ICH ID meetings is more common (Table S2). Most respondents (23/29, 79%) prefer to attend a combination of in-person meetings and webinars, 4/29 (14%) and 2/29 (7%) prefer in-person and webinar attendance only, respectively. All respondents stated that if there were a local, multi-day, in-person ICH ID meeting, they would attend and encourage their ID advanced trainees to attend, and there was a broad range of desired topics (Table S3). A preference was expressed for ICH ID educational meetings to be attached to another, related meeting, and it was noted that such meetings provide a good opportunity to share and learn from challenging cases.

3.4 | Training the Future ICH ID Workforce

Sixty-nine percent (20/29) of respondents felt that there are inadequate opportunities for dedicated ICH ID training within ANZ. Most respondents (28/29, 97%) have ID advanced trainees at their current center, for whom a median of 25% (range 10–100%) of their training time is dedicated to ICH ID. Just 6/29 (21%) of respondents identified that their center has an option to complete dedicated training in ICH ID. While it was noted that ICH ID exposure is stipulated in the RACP ID AT curriculum, to achieve

adequate experience in managing all ICH groups, trainees would need to rotate across centers, usually requiring relocation to a different region, which may not be practical to achieve in RACP AT. Additional challenges identified include the relatively low volume of local transplant centers, particularly for pediatrics, and the lack of specific funding for ICH-ID fellowships and staff specialists to provide training. Only one respondent identified that their center could offer an ICH ID training experience to trainees from non-ID specialties.

If a formal ICH ID qualification, for example, a diploma, existed in ANZ, 24/29 (83%) stated that they would seek to be certified.

4 | Discussion

This survey is the first insight into the ICH ID workforce in ANZ and provides an overview of the settings in which the ICH ID workforce works, ICH ID subspecialty training, education, and research needs. The survey highlights the challenges faced by the current and future ICH ID workforce in both training and practice.

Subspecialty training in ICH ID is a challenge in ANZ. While ICH ID training opportunities exist, there is no single institution in ANZ that offers training in all SOT groups, and the relatively low volume of patients in many centres may limit clinical exposure within the defined training period. International fellowships provide a solution to this training deficit and allow trainees to develop international connections; however, they are not a feasible option for many owing to cost, visa, and medical license requirements, and personal reasons for not being able to relocate overseas. The development of formal training pathways with international centers, particularly with formal RACP accreditation of training time, may help to fill the gaps in ICH ID training for ANZ trainees. Access to fully funded local and international ICH ID fellowships may improve access to ICH ID training. Providing RACP ID training sites with specific accreditation for ICH-ID training may improve visibility of local training opportunities and assist trainees in meeting minimum training requirements.

The amount of clinical time spent managing ICH ID patients varies, but for most is not 100% and many respondents have a secondary specialist qualification. The ability to exclusively work in ICH ID may be related to the relative novelty of ICH ID as a subspecialty in ANZ, low volume transplant centers and the need to share care of patients with other interested clinicians, and, crucially, the funding models under which ICH ID clinicians are employed, which was largely by the general ID department funding. Respondents identified services such as inpatient consults and multi-disciplinary meetings as being a primary part of their role. However, Australian public hospital activity-based funding models do not currently provide funding for this type of work undertaken by ICH ID physicians. As ICH ID patient cohorts continue to expand, the models under which ICH ID clinicians provide care and how they are funded need to evolve to ensure consistent provision of specialized ICH ID services and the ability to train the next generation of ICH ID clinicians.

All but one survey respondent currently works in the public hospital system, unsurprisingly, as this is the setting where almost

all transplants and cellular therapy occur. However, with the ever-burgeoning use of particular immune therapies, the private hospital system will manage increasing numbers of patients with specific or more generalized immune deficits. Further work is required to understand how the private ID workforce is prepared to manage these patients and what support they need.

Most survey respondents are engaged in research activities, but few feel supported by their institutions to conduct research. Barriers to research participation might include limited research funding and infrastructure. As a region with a relatively small ICH population size, collaboration is important to produce high-quality research, although this poses additional challenges such as cross-jurisdictional ethics approval and data management.

While survey respondents encompassed clinicians from all Australian states and New Zealand, most work in a Principal Referring Hospital; thus, it's likely that the survey did not encapsulate clinicians working in rural and regional areas. Most of the complex care for ICH patients is carried out in Principal Referral Centers; however, much of the ongoing care (i.e., post-transplant) is provided in smaller referring centers. It is likely that many patients outside of major centers do not have ready access to specialized ICH ID services. Further research is needed to understand how ICH ID is being provided to patients, particularly in rural and remote areas, and the education and clinical support needs of the clinicians providing this care.

Being a part of a community is essential to the practice of ICH ID, where the patients are complex, and the field is ever changing. Most respondents to this survey do feel like they have local ICH ID support networks, but engagement in local specialist societies was far below engagement with international societies. Conversely, attendance was higher at local compared to international ICH ID meetings. Momentum towards formalizing networks and activities within the ICH ID space in ANZ is building with the recent addition of the ICH-SIG to ASID and the Transplant Infectious Diseases Special Interest Group to the Transplant Society of ANZ. This survey indicates that there is a demand to increase local educational opportunities and offer formalized training and a qualification in ICH ID.

Author Contributions

Tina Marinelli: conceptualization, survey adaptation, writing – original draft, formal analysis, and data curation, **Benjamin Teh:** survey adaptation and writing – review, **Maddalena Giannella:** survey construction and writing – review, **Michael G. Ison:** survey construction and writing – review, **Matthew Blake Roberts:** survey adaptation and writing – review, **Olivia Bupha-Intr:** survey adaptation and writing – review, **Monica Slavin:** conceptualization, survey adaptation, and writing – review,

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Conflicts of Interest

Professor Michael G. Ison is the Editor-in-Chief, and Associate Professor Benjamin Teh is an Editor of the *Transplant Infectious Diseases Journal*.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.

Table S1: Relevant ICH Society Memberships. **Table S2:** Relevant ICH-ID Meetings attended by respondents. **Table S3:** Suggested topics for future ICH-ID education sessions.