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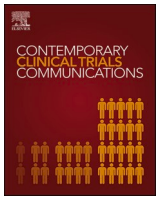

A capability framework to inform the fundamental requirements for clinical trial unit development, growth and long term success in outer metropolitan and rural areas

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ABSTRACT

Background: Participation in clinical trials is linked to improved patient outcomes. Despite this, most trial participants either reside in, or are treated in metropolitan areas. TrialHub developed hub-and-spoke models to support and grow clinical trial units in outer metropolitan and regional/rural centres in order to boost clinical trial engagement and reduce demands of trial participation on patients from outer metropolitan and regional/rural areas. The aim of this project was to establish a capability framework for clinical trial unit growth and development.

Methods: An integrative methods study design was used to inform the co-design and development of the capability framework based on data collected in Victoria during 2020–21. This included reviews of the literature and of existing local resources, infrastructure, and staffing; as well as education, mentoring and support, and a needs assessment through multidisciplinary working groups.

Results: We developed a capability framework based on the level of support required for outer metropolitan and regional/rural centres with diverse existing capabilities across Victoria. The framework applies a maturity model to assess resources, processes and practices which impact the capacity and capability of centres to conduct trials safely and sustainably. Each level of the model uses a consistent set of factors to describe the core elements required for safe clinical trial delivery. This benchmarking allows targeted investment to ensure safe and high-quality delivery of trials at newly establishing trial units.

Conclusion: The capability framework developed by TrialHub provides a basis for staged, planned and successful trial unit development and trial implementation. Further validation of the framework is required.

1. Background

Over 1800 clinical trials to evaluate new treatments, prevention strategies, devices, models of care and procedures are initiated in Australia every year with the vast majority conducted in metropolitan areas [1]. Clinical trials in Australia have increased by more than 22% since 2015 and contributed over 1.1 billion per year of added value to the economy [2]. Although the critical role that clinical trials play in improving health outcomes is well recognised, access to clinical trials in Australia varies significantly depending on geography. Outer metropolitan, regional/rural communities have significantly less clinical trial access, with the rates of cancer trial participation, for example, being 1.2% compared with 6.7% in metropolitan Melbourne [3]. This low trial participation rate may contribute to the already poorer outcomes for patients who are reside in regional/rural areas. The overall life

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Abbreviations

CAPA	Corrective & Preventative Action
CRAFT	Canadian Remote Access Framework for clinical Trials
CT	Computed tomography
CTRA	Clinical trial research agreement
FIH	First in human
GMO	Genetically Modified Organism
HREC	Human research ethics committee
IMP	Investigational medicine product
IT	Information technology
KPI	Key performance indicator
MRI	Magnetic resonance imaging
NCTGF	National clinical trials governance framework
PI	Principal Investigator
SOP	Standard operating procedure
USA	United States of America

expectancy of an Australian in regional/rural Australia is, on average, 2–5 years less than someone residing in a major city, and outcomes are poorer for diseases where clinical trial access might reasonably be expected to improve outcomes. For example, the overall survival rate for all cancers shortens with increasing remoteness [4].

In recognition of the need for developing effective and supportive pathways to ensure trial capability, growth and sustainability, and with a focus on outer metropolitan, and regional/rural areas, the Australian Government Department of Health (the Department) has provided six years of funding to Alfred Health in Victoria to establish the Australian Clinical Trials Network's TrialHub Program [5]. In line with previous findings globally, TrialHub has identified that in Victoria the drivers that hinder access to clinical trials in regional/rural areas are multifactorial. These barriers include inadequacies in infrastructure, workforce, engagement and reduced access to clinical trials including via limited relationships with trial sponsors and potential pharmaceutical industry partners [6,7]. A paucity of clinical academic leadership was also identified as an important contributing factor. On a patient level, the increased time and financial burdens of travel from regional areas to centralised metropolitan trial centres are well-described barriers to clinical trial access [8]. Further, health literacy remains poor in regional/rural areas [9], and poor understanding of clinical trials and their potential to improve health remain challenges [10].

The objective of TrialHub is to improve access and increase participation in clinical trials for people who: (1) live in outer metropolitan, regional, rural, and remote areas, (2) are Indigenous or disadvantaged and (3) have rare cancers and diseases. TrialHub supports clinical trial units to become self-sustainable and financially viable by attracting funding for clinical trials or partnering with other clinical trial units. To date, TrialHub, using Alfred Health as a lead site, has piloted partnerships with health services representing outer metropolitan areas (Frankston Hospital and Rosebud Hospital) and three regional health services (Latrobe Regional Hospital, Bendigo Health, and Mildura Base Hospital), all in the state of Victoria, Australia, with further expansion planned.

Establishing new trial units or expanding the remit of existing units requires resourcing, detailed planning and careful consideration. Clinical trials require institutions with facilities (e.g., clinics, laboratories. pharmacies), infrastructure (e.g., records management systems, financial management systems), and trained research professionals (e.g., physicians, research nurses, clinical trial coordinators, laboratory and radiology technicians, data managers) capable of executing their roles in compliance with regulatory and ethical guidelines [11]. Health service executive teams also require support and mentoring to implement clinical trial programs.

Defining and understanding the requirements to deliver clinical trials in a safe and timely manner is pertinent to success. Less mature sites often lack the knowledge and experience needed to map effectively the required resources, support the clinical trial staff, and confidently select the most appropriate clinical trials within the scope of the site's capability and capacity. These decisions are critical for the sustainable growth of trial units.

The aim of this project was to establish a capability framework for clinical trial unit growth and development. This Capability Framework sets out the essential knowledge, skills, abilities and other attributes needed to work effectively. It was designed to support and align continued growth to deliver clinical trial outcomes by describing capabilities in terms of achievable goals. This article details the process of implementation and adoption of a capability framework for delivery of fully operational and sustainable clinical trial units in outer metropolitan and regional/rural areas.

2. Methods

The TrialHub program (https://www.alfredhealth.org.au/research/research-areas/trialhub) was launched in 2019 with five key pillars underpinning its main aim of improvement in clinical trial access and participation across.

1. Outer metropolitan (the part of the State capital city Statistical Division (using the 2001 Australian Standard Geographic Classification definition [12]) that lies outside the 1991 Urban Centre area of the capital city) and regional/rural (as defined by the Australian Bureau of Statistics Remoteness Areas [13]) geographical regions in Victoria. These pillars include:1.Recruiting and upskilling a multidisciplinary workforce by identifying and providing training needs, coupled with a dedicated mentoring program to ensure retention of a skilled workforce to deliver trials in a safe manner.
2. Building partnerships across industry and research networks to establish a pipeline of trials that foster the co-investment required for long term sustainability.
3. Investing in tele-trials to optimise access to clinical trials. This is especially important in more complex trials that require a metropolitan hub but can accommodate aspects of management at satellite sites with the aid of various digital technologies.
4. Matching trials with patients to ensure that the trial portfolio aligns with the local community resources and population needs.
5. Raising awareness of clinical trials across the cancer sector, to the health services and to the community.

Capability frameworks were initially introduced in the education sector to focus learning from developing functional competencies to the capability to dynamically build, integrate, and reconfigure an individual's or organization's collective competencies to address these rapidly changing environments [14]. In 2021, the Canadian Cancer Clinical Trials Network released the Canadian Remote Access Framework for clinical Trials (CRAFT) [11]. This framework represents a risk-based approach used by site investigators to delegate responsibilities for a given trial to satellite health centres within a hub-and-spoke "trial cluster". The Framework includes specific recommendations to ensure research experience, capacity, regulatory compliance and patient safety. CRAFT's risk-based framework is based on other successful models of remote trial patient management and is in the pilot implementation phase in Canada. We have used this framework to inform the basis of the TrialHub capability Framework.

TrialHub thus convened a multidisciplinary working group from representative partner organisations with expertise in trial implementation and management. An integrative methods study design was used to inform the co-design and development of the capability framework based on data collected in Victoria during the 2020–2021 period. During this time, and subsequently in the March 2021 to March 2022

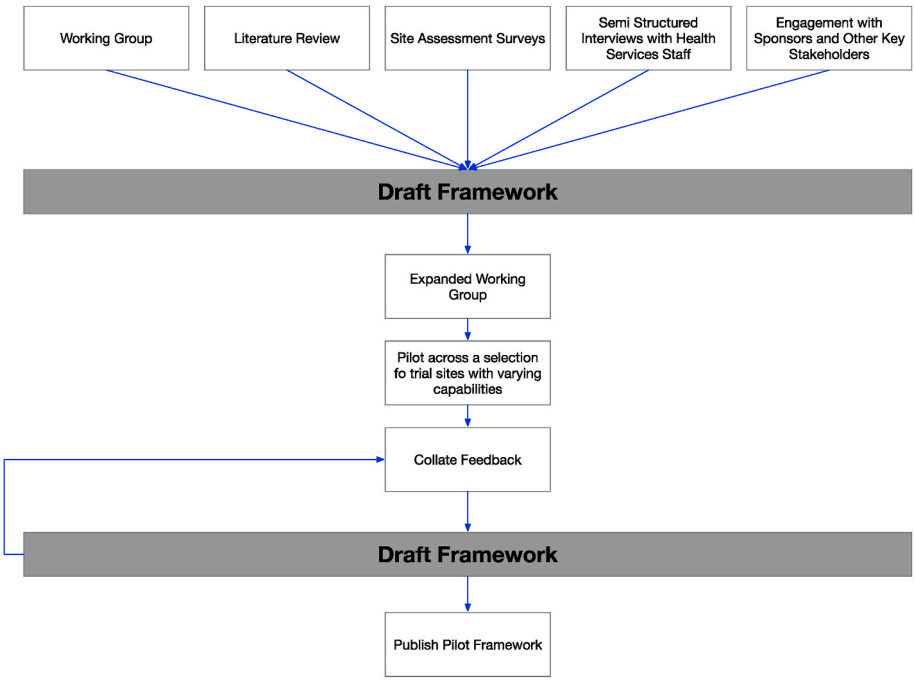

Fig. 1. Schematic of process undertaken.

period the working group reviewed existing models, literature and trial activity at non-metropolitan sites (n = 6), along with infrastructure and staffing, education, mentoring and support, and performed a needs assessment. In particular, we focused on enablers and barriers to clinical trial start up, tele-trial models and sustainability of trial programs in non-metropolitan sites.

The working group undertook a combination of site assessment surveys and semi structured interviews over this 12 month period. These focused on staffing, infrastructure, trial activity, and reporting structures. The site assessment survey tool was based on existing site assessment tools used by a major health services (Alfred Health) and adapted based on tools shared from commercial sponsors and our literature review.

The outcomes from the review process formed the basis of a capacity framework for successful trial implementation that described maturation of sites from formative to leading phasers of development.

A schematic of the process is provided in Fig. 1.

3. Results

Using the framework, Alfred Health's globally recognised clinical trial program, leveraged the trial expertise, leadership and networks to provide professional advice, education and connections to identify and implement both investigator-led and commercially sponsored clinical trials across a mix of outer metropolitan and regional/rural centres.

The Capability Framework was developed following a review of the literature and in consultation with the clinical trial sector. A range of capability frameworks being used by government and non-government organisations in Australia and overseas were examined to determine what features or content may be suitable for inclusion in this framework for the clinical trial sector. People in the sector were consulted widely, through a series of consultations held with metropolitan and regional representatives of the clinical trial sector in Victoria; an online survey; and interviews were used to underpin the enablers and barriers to CT start up, teletrial models and sustainability. This was then cross referenced against the literature. Support for ethical and governance standards was also provided, an important component with the introduction of the National Clinical Trials Governance Framework [15].

The initial partner health services exhibited diverse levels of resources, workforce maturity and clinical trial portfolios.

Each health service participating in the TrialHub program was assessed against the TrialHub framework to understand its initial capability. The framework then monitored the development of each site through engagement with TrialHub. Six core factors were considered to be pivotal for in site development. These included: 1) infrastructure (physical assets and resources), 2) leadership and culture (executive support, professional networks), 3) organisational support (facilities, space and equipment), 4) technologies (IT and clinical management system), 5) staff skills (across all levels from coordinators, ethics and governance, managers and executive), and 6) networks and collaboration (including both financial and skills development support), (see also Fig. 2). Table 1 provides a substantive list of components that sit within each of the six core factors that have been identified as pivotal to site development. These components extend across each site's level of capability in a continuum along the maturity curve and do not sit as discrete unconnected elements.

Based on the core factors a Capability Maturity Model was developed which incorporated the following levels: formative, developing, established, high performing, and leading (Fig. 3). This model describes each capacity level for health services (Level 0 to Level 4), noting that each level builds on the previous. The level descriptions are presented in Box 1. Definitions were based on previously published maturity curves, which were then adjusted for our purpose [15,16]. By mapping a unit's capability to a capability level, support by metropolitan partners such as TrialHub established trial units can be individualised according to the existing capability of sites rather than applying a "one-size-fits-all" approach.

In this model, the key requirement for progression is that both the central hub and the outreach partner site commit and contribute to building capacity and capability. Key elements along the maturity curve are listed in Table 1. Table 2 and Box 1 provide definition and scope of clinical trial practice for each Capability Maturity Model Levels 0 to 4.

4. Discussion

This capability framework aims to provide a pathway for informing

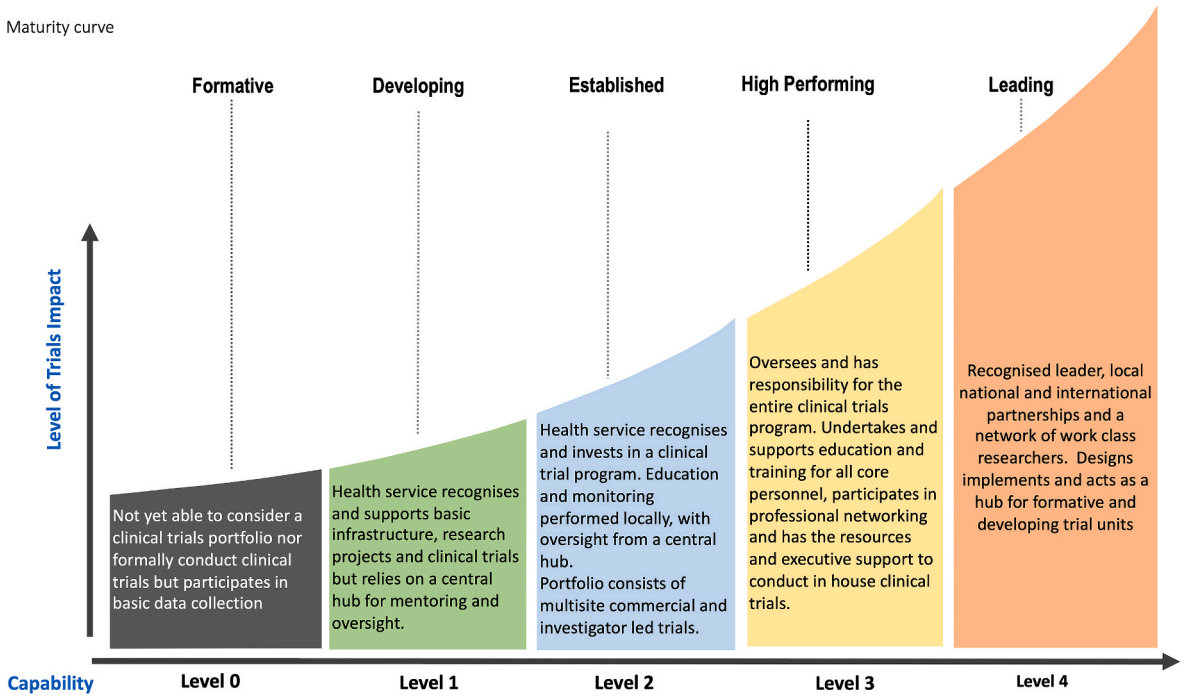

Fig. 2. A Health Service Maturity Curve reflecting the five capability levels for health services (Level 0 to Level 4) conducting clinical trials. Note each level builds on the previous level.

the safe, strategic and sustainable development and growth of clinical trial sites. It highlights the need for investment from a central hub as well as partner organisations at both the executive and researcher levels. An initial, thorough assessment of the health service's capability to conduct or expand the trials portfolio is required to inform additional support needed for future growth. Furthermore, we propose that a shared commitment, and a mutual willingness to invest in the developing clinical trial unit will be essential. A strength of our framework is that it articulates what the commitment required for building clinical trials units, informing researchers about issues for which they need to advocate and executives of the importance of determining their ambitions and evaluating their capabilities.

By focussing on the development of clinical trial capacity in outer metropolitan and regional settings we aim to address two fundamental inequalities in health care associated with the location people live including.

1. **Lack of representation of certain population groups in clinical trials** compromising the broad goals of clinical research such as generalisability to our Australian population; cost savings of delivering optimal health care; and compromising innovation in health deliver as detailed in a recent comprehensive report from the National Academy of Sciences Committee on improving the representation of women and underrepresented minorities in clinical trials and research [17].
2. Opportunities to improvement health service performance through participation in high calibre research and clinical trial activity [18].

Transforming and boosting the clinical trials capabilities has been identified as important for more than a decade [19]. Given the requirements for evidence-based medicine, timely clinical trial completion and reporting are critically important [19]. However, generating evidence is often slow and costly [19], and access to clinical trials for potential participants can be limited for people outside of metropolitan areas [4]. Transition to evidence-based care relies on a 'learning health care system', that requires all health services to have the capacity and capability to conduct or implement the findings of clinical trials [20]. For this, investment in the six key areas identified in our work is critical: infrastructure, leadership and culture, organisational support, technologies, staff skills, networks and collaboration.

One aspect that would increase capacity, but also equity, is the conduct of clinical trials outside metropolitan settings. Rural populations are notoriously underrepresented in clinical trials, however, strategies used to increase access to clinical trials have involved investment only in one or two key elements [21]. For example, in the United States of America (USA) efforts have largely focused on addressing recruitment barriers such lack of clinical trial awareness, and low referral activity [21–25]. Capacity building has been attempted by assessing the research experience and infrastructure of participating sites, including implementing local professional development and capacity building activities [26–28]. Such capacity building and mentoring have been successful in improving recruitment to clinical trials [29, 30].

Similar to our model, the Canadian Remote Access Framework for clinical Trials (CRAFT) recommends a risk-based approach used by site investigators to delegate responsibilities for a given trial to satellite health centres within a hub-and-spoke 'trial cluster' [11]. Large multicentre trials have also been conducted in the USA using a hub-and-spoke model with core centres, and other centres invited as affiliate centres, with trial recruitment rates increased as a result [30]. Neither of these models classifies the 'spokes' by their maturity, and thus does not classify their capacity and capability to take on the increasingly complex studies.

We report for the first time, to our knowledge, a *maturity model* has been applied to the context of evaluating clinical trial capability, and as such provides a unique, much needed, and practical guide to aid health services, governments and those directly involved in the conduct of clinical trials with a practical framework for implementation. The model aims to be flexible enough to be adapted to different contexts while being consistent enough to allow replication across multiple health services organisations. While by no means exhaustive, we provide an example of the scope of trials and trial activities that could be conducted based on the maturity of a given site for conducting such work (Table 2). A strength of our project is the representation and inclusion of multiple

Table 1
Key elements for trial success broken down by maturity curve to categories (formative to leading clinical trial centre).

Element	Capability level[a]				
	Level 0	Level 1	Level 2	Level 3	Level 4
INFRASTRUCTURE rowhead					
Office and clinic space	General office space to facilitate data collection Secure storage of site study files	Dedicated Coordinator desk Locked dedicated site study file repository Participant areas and equipment to oversee treatment study procedures and participant monitoring Space for study monitoring visits			Multi-functional designated office capacity for clinical and non-clinical operations Dedicated office space for on-site monitoring
Pathology	Access to blood collection sampling either off-site or on-site for patients	Standard of care sampling available with off-site &/or on-site processing Refrigerator with temperature monitoring Freezer −20 to −30 Degrees C	Facility for blood and tissue sampling with 3rd party provider or in-house services Ability to collect and store PK/PD specimens, pharmacogenomic samples Freezer −70 to −80 Degrees C Centrifuge	Refrigerated centrifuge facilities Long Day PK/PD sampling capacity	Complex PK, PBMC assay Tissue sampling analysis capability
Pharmacy	No protocol mandated specific pharmacy dispensing required	Standard of Care compounding & dispensing	Pharmacy Train the Trainer Program participation Storage facilities for ambient and refrigerated investigational medical product (IMP) with controlled access Standard Operating Procedures (SOPs) for all trial procedures After Hours on-call pharmacist	On-site destruction of intellectual property (IP)	Complex clinical trial experience with first in human (FIH) and Phase 1 trial expertise Expertise and capacity to provide clinical trial training and mentoring
Diagnostic imaging	No imaging requirements	Standard of care diagnostic services only	Access to 3rd party providers of imaging services or in-house services	On-site foundational (CT, MRI, Ultrasound) On-site staff trained for specific trial reporting (e.g., RECIST) Image transfer and storage capability	On-site complex imaging including Nuclear Medicine Imaging
Specialist services	No protocol mandated specialist services required	No protocol mandated specialist services required	Referral pathways to access specialist services if protocol required e.g., ophthalmology, cardiology 24-h access to emergency care	On-site foundational (radiation oncology therapy, nuclear medicine, ultrasound guided procedures)	Capacity for trial mandated overnight inpatient admission Genetically Modified Organism (GMO) research capacity Office of Gene Technology Regulator-DNIR Licence
Storage and archiving	Access to on-site or off-site document archiving &storage facilities	No storage of laboratory kits and/or trial specific equipment required	Storage space for study related materials-lab kits, patient materials		Storage capacity for multi-study Laboratory Kits with inventory control practices and procedures
LEADERSHIP AND CULTURE rowhead					
Executive support	Untapped executive or site engagement for establishing or prioritising institutional research capacity	Foundational articulated goals and outcomes for the research unit	Organisation chart which identifies roles and responsibilities of individuals which collectively are adequately resourced to achieve research unit/s goals		Established institutional policy to actively pursue research and clinical trials Compliance with national clinical trials governance framework (NCTGF) at advanced level Dedicated executive resources with research responsibilities & quality assurance activities
Organisational structure	Ad Hoc processes and/or informal mechanisms to identify research opportunities	Medical officer contactable/available 24 h a day in the event of an emergency	Research Administrative Management-research units support by shared or discrete Business administration support		Specialised review committees: Institutional Biosafety Committee to evaluate the use of Genetically modified Organisms First Time in Humans clinical trial review committee

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Table 1 (*continued*)

Element	Capability level[a]				
	Level 0	Level 1	Level 2	Level 3	Level 4
Quality assurance & quality measures	–	Clinical Trial research Unit and/or Study specific SOPs	Process for incident identification and CAPA (Corrective & Preventative Action) procedure Institutional SOPs for clinical research including tele-trials	Systems in place to record and capture study metrics and key performance indicators (KPIs)	Systems in place to capture & record site KPIs e.g., actual recruitment v. Target Systems in place to record institutional KPIs e.g., Mean calendar days from Contract (CTRA) fully executed to site activation. Sophisticated and complex SOPs across all areas of research and trial development
TECHNOLOGY rowhead					
Office equipment	Computer access with internet	High Speed Wi Fi	Locally networked IT system		Networked IT systems with remote access for trial staff
Digital technologies	–	Local IT support capabilities Telehealth	Electronic Medical Records capability Electronic Site File storage capability Remote Access monitoring capability		Clinical Trial Management System/s (CTMS) E Consent Electronic signature
Data systems	–	In-house			Multisite CTMS
SKILLED PEOPLE rowhead					
Coordinators	Shared resourcing for roles- clinical trial research nurses and/or coordinators	Provided by a central resource	On-site coordinator with central mentoring	On-site coordinator operating autonomously Dedicated Research Unit manager role	Educator and mentoring responsibilities to emerging clinical trial sites
Investigators	–	Telehealth linked	Sub Investigators (on site)	Principal Investigator (PI)	PI commercial multicentre trials National leadership
Pharmacists	Not required at this level	Provided via a central resource	Pharmacist with Trial support via central resource	Pharmacist trained in clinical trial delivery on site	Mentorship, support of a professional network
Governance officers	None on site	Provided via a central resource	Governance office -conducting Accepting site applications and governance review	Governance office reviewing site for human research ethics committee (HREC) applications and Governance review	Mentorship of formative and developing sites. Participation in national reforms through engagement with Government and national bodies and professional groups
PROFESSIONAL NETWORKS AND COLLABORATIONS rowhead					
Network partnerships	No support or collaborations in place between individuals or institutions	Informal casual communication pathways & patient referral pathways	Patient Referral pathways embedded Formal partnerships established between health service providers Facilitation of partnerships through independently funded entities e.g., TrialHub	Individual and institutional membership of Professional networking groups and industry representative groups	National and international partnerships at institutional levels Oversight of outreach partner sites
Commercial and non-commercial sponsors	Negligible capacity to independently attract clinical trials and research projects	Leveraged via a central nexus which acts as a conduit for the provision of clinical trials to less mature trial sites e.g., TrialHub	Mix of leveraged and independent trials with mentoring	High level of ability to attract clinical research projects independently	Formal partnerships enabled between Institutions and commercial sponsors and/or contract research organisations
Not for profits and philanthropy	Negligible capacity to independently attract clinical trials and research projects				Formal partnerships enabled between Institutions and collaborative research groups
Government	No interactions		Influence is leveraged through partnerships with Government funded research/clinical trial industry and networked entities		Direct interactions between health service providers, TrialHub and Government representatives at both State and Federal levels
ORGANISATIONAL SUPPORT rowhead					
Mentorship and oversight	No mentoring available to site staff at any level	Leveraged mentoring and support from leading health care providers	Mix of leveraged and independent mentoring	Independent mentoring within teams	Formal Mentorship Program incorporating credentialed learning opportunities, Participation in structured learning programs with identified outcomes
Access to resources, templates	No resources available at site	Access to generic online resources and tool kits			Sophisticated resources and templates created by the institution with capacity to share with developing clinical trial sites. Resources available to assist clinical trial sites with the tailoring of resources to meet specific institutional needs

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Table 1 (*continued*)

Element	Capability level[a]				
	Level 0	Level 1	Level 2	Level 3	Level 4
Awareness an advocacy consumer engagement	No consumer engagement	Minimal opportunity for consumer engagement through health service web sites and social media	Consumer advocacy facilitated through a central resource or service provider which supports the development and promotion of all facets of consumer awareness and engagement. Online presence of clinical trials visible and promoted to local community	In-house resource for the promotion of consumer awareness	Opportunity for consumer advocacy and engagement at all levels of the clinical trial process from protocol development through to trial conduct Consumer representation at all levels of trial development

[a] The factors identified in level represent (experientially) the minimum that is needed for sites to operate at each level of maturation. These minimum requirements extend across into following levels.

Fig. 3. The following six key elements for health services that need to be considered with respect to enablers and barriers: technology, trial infrastructure, professional networks and collaborations, organisational support, skilled people, and leadership and culture.

regional sites at varying levels of capacity. Despite being developed using the extensive trials experience of the broader TrialHub team, our model has been informed using data from only a limited number (six) of pilot trial sites. It will be useful to validate the impact of our maturity model in the Australian context, especially with regards to access to and participation in clinical trials for people in regional/rural settings. Moving forward TrialHub intends to use the Capability framework to support clinical trial sites assess and monitor their own growth, development and maturity. True success requires investment and commitment from the health services to identify and address gaps in their clinical trial capabilities.

Through our network of formal and informal partnerships TrialHub will engage with sponsors, regulators, consumers and participating health services to not only promote this framework. We will continue to provide practical seminars, in-services, one on one mentoring and practical tools to support site maturity. Feedback will be used to further refine and assess the value and impact of the framework.

5. Conclusions

After identifying key factors for successful conduct of clinical trials, we developed a Capability Maturity Model including definitions of operation maturity of clinical trials units, and thus a capability framework for considering the ambitions and needs of developing trial units. This model offers an opportunity to improve access to clinical trials by enabling and supporting trials in rural health services. By doing so, we hope to improve clinical outcomes of all Australians, without discrimination by geography. It also further highlights Australia's position as a leader in innovative models for clinical trial initiatives and provide the much needed and structured framework to guide health services, executives and Government, to be verified across the wider clinical trial sector, and internationally.

Box 1
Capability Maturity Model definitions for health services

Formative. The health service is not yet able to consider a clinical trials portfolio nor formally conduct clinical trials but participates in basic data collection to support quality assurance studies and related research, and registries.
Developing. The health service recognises and provides support for basic infrastructure and the conduct of research projects and clinical trials but relies on a central hub for mentoring and oversight of some functions and processes within the trials' portfolio.
Established. The health service recognises and invests in a clinical trial program. Education and monitoring are performed locally, with oversight from a central hub. The clinical trial program consists of a suite of multi-site commercial and investigator-led trials.
High performing. Oversees and has responsibility for the entire clinical trials program. Undertakes and supports education and training for all core personnel, participates in professional networking and has the resources and executive support to conduct in-house clinical trials.
Leading. Recognised leader with local, national and international partnerships and a network of world class researchers. Designs, implements and acts as a hub for formative and developing trial units.

Author contribution

Conceptualization (AW); Data curation (AW, JD, SJ); Formal analysis (AW, JD, SJ); Funding acquisition (SJ); Investigation (AW, JD, JDi); Methodology (AW,SJ, JD, JDi); Project administration(AW); Resources (AW, SJ); All authors contributed to interpretation; Writing - original draft (AW,JD,JDi, SJ); All authors contributed to writing - review & editing.

Table 2
Examples of scope of practices and resources for centres within each level 0 to 4 of the Capability Maturity Model.

	Level	Scope of Practice
FORMATIVE	0	Participation in surveillance and identification of potential patients for clinical trials Observational trials Registries Post therapy Follow up visits Little or no research unit systems in place Little or no site governance processes in place
DEVELOPING	1	(Tele)trial with direct mentoring from the primary site Participating site in Multi-site model (Tele)trial with standard of care medication prepared, dispensed and administered at the outreach partner site
ESTABLISHED	2	Trial with on-site PI and sub investigators (Tele)trial with investigational medicinal product prepared and administered at the outreach partner site Clinical Trial Pharmacy specialist capabilities Trials requiring Pharmacokinetics, Biomarker and/or Immunogenicity samples Phase 1b (cohort expansion)
HIGH PERFORMING	3	Phase 1 trials Device trials and specialised therapeutic intervention or novel diagnostic trials (Radiation therapy, lutetium)
LEADING	4	All phases of clinical trial research including First Time in Human research Leadership and mentoring to establish clinical trial programs in developing trial centres

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

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Fundamental to this success has been the recognition and funding of a central hub with recognised international leadership, the support and knowledge of the Alfred as the host centre for many regional/rural trials and the dedicated capacity and capability funded in TrialHub to build partnerships to drive this program.

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