Future of Irish Healthcare:

Developing an Academic Health Science System to Underpin Sláintecare

Chief Academic Officer Group | November 2021

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1 MESSAGE FROM THE CHIEF ACADEMIC OFFICERS (CAOS)

Worldwide research and innovation are improving healthcare at an extraordinary pace. However, rapid access to medical knowledge via the internet and social media, personalised precision medicine, advancements in technology including machine learning, artificial intelligence and an ageing population are all significant challenges to Irish healthcare. Furthermore, delivery of specialised precision treatments and innovations through the traditional 'Academic Hospitals' model can be costly, and the health system can become overwhelmed.

A key aim of the Hospital Group structure, established in 2013, was to deliver a healthcare system through which the Academic Health Science model was integral to acute hospital care. The appointment of a CAO to each Hospital Group was a formal recognition of this aim and of the need for a stronger relationship between Hospital Groups and their University partners. As CAOs, our primary mission is to ensure that the people of Ireland get optimal healthcare. The CAOs established a national CAO forum early in the SARS-CoV-2 (COVID-19) pandemic to assist the State. The national CAO forum developed a very productive working relationship to facilitate key initiatives in medical simulation education, improve clinical placements and stimulate research and innovation through work on the National Research Governance model and the National COVID-19 Biobank. Now, to ensure the continual development of sustainable quality and safe healthcare in Ireland, the CAOs plan to establish Academic Health Science Systems (AHSS) to aid with the implementation of Sláintecare.

In line with Sláintecare, the Health Service Executive (HSE) corporate plan, and HSE action plan for Health Research, the CAO roles have provided valuable experience in building academic partnerships and inter-professional teaching, training, and research opportunities on our clinical sites. The CAO Group can provide critical guidance to develop AHSSs across our acute and community health sectors.

In this document, we outline our vision to create academic health care in Ireland as a foundation to implement Sláintecare. We describe international best practice of AHSSs that are integral to excellent patient care and to the recruitment and retention of good clinical staff. We highlight the need for a national policy to support the development of academic health science systems, where Universities, Hospital Groups and Community Health Organisations (CHOs) provide better academic clinical care for patients in a top-class work environment for both staff and trainees.

The first step in this process requires the establishment of a national group to engage key minds and interested groups to focus on delivering an academic healthcare model that is internationally accepted as best practice. In these endeavours we want to work closely with Universities, academic hospitals and Hospital Groups, CHOs, the HSE, and Department of Health (DoH), Department of Education (DoE) and Department of Further and Higher Education, Research, Innovation and Science (DFHERIS), to change Irish healthcare and improve patient outcomes. We do not underestimate the challenges facing these plans, but we are committed to make the necessary changes which will enhance the core tenets of Sláintecare and the Hospital Groups to develop world-class health and social care services in Ireland.

'Start by doing what is necessary, then do what is possible, and suddenly, you are doing the impossible.'
- St Francis of Assisi 1182-1226

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2 EXECUTIVE SUMMARY: DEVELOPING AN AHSS TO UNDERPIN SLÁINTECARE

This document aims to provide the reader with information on what an AHSS is, the benefits of such a system, how it can be introduced in Ireland, and how the additional resources required for its introduction will add value and provide a good return on investment. An Academic Health Science System embeds learning and research in the service of patient care. Many elements of such a system are already in operation at the HSE/University interface and we provide evidence of their success and their positive impact on patient outcomes and quality of life in the Appendix.

2.1 WHAT IS AN AHSS?

An AHSS is a fully coordinated partnership between a university and a healthcare system, designed to deliver quality care hand-in-hand with teaching, training, research and innovation incorporating the full spectrum of the health care workforce. AHSSs provide high quality healthcare across the world achieving high standards of clinical care, educating health professionals and leading health care research and innovation. Ireland lags significantly behind its international counterparts with regard to AHSSs.

2.2 WHY AN AHSS?

1. Provide better outcomes for patients;
   International examples of best practice demonstrate that integrating teaching, training, research and innovation into all aspects of patient care results in better outcomes for the patient.

2. Ensure a stepwise improvement in staff recruitment and retention;
   Developing AHSSs will reverse emigration of many highly trained Irish healthcare professionals resulting in a significant saving to the Irish economy. It will provide highly trained healthcare staff with attractive jobs that incorporate teaching, training, research and innovation that will improve job satisfaction, recruitment and retention of staff.

3. Achieve cultural change by creating a learning organization to ensure the continual development of sustainable quality and safe healthcare in Ireland.
   An environment of learning and enquiry will support staff through change processes and accelerate the implementation of new initiatives.

2.3 IS THIS ANOTHER NEW STRUCTURE?

No. An AHSS is a way of aligning current structures and using a governance model to achieve better outcomes for patients and staff. It requires little additional administration but rather harnesses the current inputs to work together. At present, healthcare, education and research are aligned as they all aim to provide the best outcomes for patients. However, the absence of a unifying governance structure means that at the decision-making and operational processes are misaligned, the administrative overhead is too burdensome and opportunities for change initiatives are lost.

2.4 WHY NOW?

Sláintecare presents a unique opportunity to align Irish healthcare with its partners in education, clinical research, informatics, innovation and healthcare delivery. This will allow healthcare professionals, from a wide variety of disciplines, to come together with scientists and clinical researchers to deliver consistent high quality, evidence-based, safe healthcare, research and innovation.

2.5 WHAT IS REQUIRED TO DELIVER THIS AHSS?

- An accountable and integrated system incorporating a joint approach to administrative, clinical, training and research governance linking Universities, Hospital Groups and CHOs underpinned and determined by government policy and aligned to Sláintecare.
- Clinical academic posts with an explicit contractual remit for clinical service, research, and education to support a high-quality evidence-based learning health system, and also to provide leadership to develop and adopt new technological advances to address health challenges and deliver health gains.
- Infrastructure development to provide up to date and fit-for-purpose facilities to enable state-of-the-art education, training, and research for Interprofessional learning, collaboration, and teamwork.
- The development of a comprehensive electronic patient record, with associated data analytics capability and underpinned by a universal identification number (ID number).
- Appropriately designed and integrated Information Technology which will enable data sharing, machine learning, use of artificial intelligence and will support cross-functional learning and collaboration.

2.6 WHAT ARE THE NEXT STEPS?

The CAOs will support and help set up a forum to formulate a policy document on the development of AHSSs in Irish healthcare. The forum will be developed in partnership with the stakeholders and might include representatives from the DoH, DoE and DFHERIS, CAOs, Minister for Health's Office, Universities, Hospital Groups, CHOs and a patient representative. A definitive mandate and timeline are required for the creation of this policy by the forum.

3 CAOs' Bridging Role between Universities, Hospitals and Community

The CAOs play an important role in facilitating the interaction between the hospitals, the Hospital Group and their affiliated University partners. The linking of academic health science education to health service delivery is the most effective way of ensuring high standard healthcare.

3.1 Hospital Group Academic Structure

The structure of the Hospital Groups with respect to specific academic partners establishes the basis of strong engagement and interaction. Each of the six Hospital Groups serves a designated geographic region, except the Children's Health Ireland which has a different structure and is linked with one of the six Irish Medical Schools. Each of these Universities, Schools of Medicine, Nursing and Allied Health are closely aligned to their Hospital Group's University teaching hospitals for clinical teaching and training of their students. In addition, the establishment of Hospital Group Boards with representation from the Universities has strengthened the relationship between the Universities and the Hospital Groups.

3.2 The Benefits of an AHSS Model of Healthcare

The HSE Corporate Plan (2021-2024) (https://www.hse.ie/eng/services/publications/corporate/hse-corporate-plan-2021-24.pdf), states that we must "achieve better health outcomes for everyone". By adapting the principle of AHSSs, one accepts that the standard of healthcare delivered by all health professionals will be under the scrutiny of the Hospital Groups' academic health structures and national professional organisations. The AHSS model supports a consistent high standard of care, based on best practice and clinical evidence, for the entire population. As illustrated in the COVID-19 pandemic, the use of evidence-based data and facilitating greater communications with the public allows more transparent explanations for different health processes and supports a strong patient and service user voice in healthcare. The ongoing acceptance of the scientific evidence by the public is an example of effective engagement on the basis of best scientific evidence and standards.

3.3 Integrated Community and Acute Care

Major investment in integrated care is a priority, as outlined in the HSE Service Plan 2021. There is emphasis on supporting people to receive their care closer to home and avoiding hospital admission. The integrated care programmes for older people (ICPOP) and integrated care for chronic diseases (ICCD) are to be implemented using common treatment pathways, agreed and shared community and acute services. Linking the community services to the Hospital Group structure is key to the success of Sláintecare as staff will maintain standards of care by partaking in continuous professional development. This transition will require the recruitment of hundreds of clinical staff across all professions and grades. Extending excellence in clinical care into the community is what the evolution to an AHSS will achieve for both education of health professionals and for the delivery of exemplar healthcare. It will support the achievement of "a Healthier Ireland, with the right care, at the right time and in the right place"- HSE Corporate Plan (2021-2024).

Currently, the designated CHO catchment areas do not correspond with the designated catchment areas of the acute teaching hospitals. The only exception to this rule is the UL Hospitals Group, which has only one CHO region that is totally co- terminus with the acute catchment area. Consideration must be given to aligning the CHO regions to coincide with the catchment area of the relevant model four University teaching hospitals in its region. This will facilitate integrated care, more effective working between acute and community colleagues and fairness of services for the population. The resulting continuity of care across the hospital and community health systems, alongside the ability to engage actively with the University educationalists, will promote a culture of research, excellence in health care delivery and continual improvement based on evidence. Ultimately, patients and service users will benefit from enhanced outcomes and clinical care experience.

3.4 Role of Universities and Postgraduate Training Bodies in Healthcare Provision

The key to the consistent delivery of high standards of treatment and care, as found in these integrated pathways, is an educated and highly motivated workforce engaged with the health science educators to access the most up-to-date evidence-based information. Students, teachers and practitioners can have a much greater collaborative understanding and influence on all clinical care, from general practice through the CHOs and into the acute hospital system. The University Schools and Postgraduate Training bodies have a responsibility, monitored by the respective national regulatory authorities, to ensure that teaching standards are maintained at the highest standard. This approach can then impact more readily on the quality of health care delivered to patients.

AHSS networks require close cooperation between health care budget-holders, clinical educationalists and researchers. Moreover, industry has an important and symbiotic role in this relationship, supporting researchers working in the clinical area, bringing advances in research to fruition and stimulating innovation in healthcare. The role of the University in service provision calls for further analysis, with potential input from departments of economics and business to oversee the financial models of healthcare being delivered.

4 ALIGNMENT WITH SLÁINTECARE

Health care academics, health care workers, Hospital Groups and CHOs share the common goal of enhancing the health and quality of life of patients and the population at large. Research shows that health care systems which are research active with a strong research culture, deliver better outcomes for patients engaged in research and for the wider patient pool. Research is heavily referenced in the Sláintecare strategy which recognises that "all of this data integration, aligned management systems, research literate healthcare professionals etc., needs the support of a culture that offers opportunities for creating effective knowledge and better understanding."

4.1 IMPACT OF COLLABORATION/PARTNERSHIP

The establishment of Hospital Groups with explicit partnering with Universities has advanced a research culture in our hospital system. Although much has been achieved through partnership, joint appointments, and collaborations with the Health Research Board (HRB), Universities and the Wellcome Trust, there remains a huge potential to leverage such partnerships to deliver further improvements in patient focused research, increased grant funding and novel innovations to benefit the population.

The current partnership between Universities and Hospital Groups can be built upon to address the research and training needs of Sláintecare. The Universities are positioned to add significant value to the health service and to assist with the integration of clinical services across the hospital to the community. The clinical research facilities and research networks are wonderful examples of academic-led supports to enable and empower clinicians to carry out the appropriate and timely research. Universities capability in Data Analytics, Machine Learning and Artificial Intelligence can substantially support developments in healthcare. In summary, there are many impressive examples of health care informing research and research informing health care (See appendix).

Strong research infrastructural supports allow clinicians in Ireland to compete internationally for large scale research grants from Wellcome Trust, National Institute of Health USA, and Horizon Europe. Success in attaining grants brings greater research focus, intensity and skills to bear upon our national health challenges such as ageing, obesity and recreational drug abuse. A robust research culture enhances staff recruitment and retention. The ultimate beneficiaries are patients.

The rollout of Sláintecare presents a unique opportunity to build upon, and extend, this productive and beneficial partnership between Irish Healthcare and its partners in education, clinical research, informatics, innovation and healthcare delivery.

4.2 LEADERSHIP OPPORTUNITIES

The current partnership between the Universities, Hospital Groups and the evolving closer interaction with the CHOs provides a strong foundation to develop integrated care, the backbone of Sláintecare. The Irish hospital system is close to capacity due to the increasing demand of an aging population with more complex health needs, the COVID-19 pandemic and higher patient expectations. The complexity of integrating care cannot be overstated but using the umbrella of the AHSS provides many tangible solutions. It is timely to extend the role of the CAOs to the CHOs as this will generate a valuable bridge across the health service and academic institutions resulting in a platform for future growth and development in Irish healthcare towards a Population Health management model.

5 CLINICAL GOVERNANCE

Realisation of the benefits for patient care from AHSS depends on partnerships between university healthcare schools, teaching hospitals and other health care systems. Presently academic relationships in Ireland are characterised by a model where Universities and clinical centres are neither fiscally nor structurally linked resulting in variable accountancies to government departments. The CAO Group has explored the comparative effectiveness of integrated models based on best international practice. While the North American model is the most integrated, it is often based on university ownership of hospitals and clinical practices. This will never be the case in Ireland as we evolve toward a Sláintecare model. However, Sláintecare strives to address separate governance models between secondary, primary, and community care, and is an opportunity to reassess the overarching role of AHSSs.

5.1 OPPORTUNITY TO STRENGTHEN CLINICAL GOVERNANCE

The present governance relationships between Hospital Groups and their academic partners are predominantly linked by undergraduate medical, nursing and allied health are professional (AHCP) education and clinical research. There is significant variability across the Hospital Groups but, with few exceptions, partnerships are informal and lack clear memoranda of agreement. While Sláintecare represents an opportunity to progress integrated governance, this opportunity requires an acknowledgement and acceptance of the bidirectional benefits of this engagement from, and for, both Universities and healthcare systems. In particular, the government departments that, at present, separately oversee each sector must place a priority on integration reflecting the positive impact on patient care, academic outputs, innovation opportunities, staff recruitment and retention. It is noted that financial challenges present a major barrier now, and into, the future.

The CAOs can bridge those governance divisions by providing the knowledge of hospital reporting structures and directorates with those of University Deans and Heads of School. In addition to the CAO development, the avenue to integration is bolstered by the understanding of academic systems by doctors trained in Ireland with experience of working and training overseas. The essential requirement for effective integrated governance is underlined by a new focus on the importance of clinical sites in medical and health sciences education due to the COVID-19 pandemic, integrated models of infrastructure development triggered by simulation education, and the combined roll out of biobanks and research governance models. Good academic clinical governance is also key to patient quality and safety via understanding of scientific evidence, mentorship, audit and quality improvement, as well as continual professional development with performance review.

The CAO Group proposes, for the first time in Ireland, the development of a working group/forum to explore and progress a pathway to integrated governance and AHSSs. This group/forum should combine the experience and knowledge of Hospital Group CAOs, Chief Executive Officers, Deans of medical schools, Chief Officers of CHOs, representatives from the DoH, DoE, DFHERIS and a patient representative, under the guidance of appropriate leadership, and be tasked with developing a stepwise model to integrated governance.

5.2 THE PIVOTAL ROLE OF CAO

The CAO should have appointments to the hospital system, CHO and university to act as a bridge between the clinical healthcare system and academia. The CAO should sit on the Management Team of the Hospital Group, community healthcare management team and also the management Board of the university to enhance close communication between the clinical Hospital Group and university. The CAO will then be in a position to advise on key areas in health care and health sciences that need resourcing and development, along with workforce planning. They will be able to influence the future teaching and training requirements of the healthcare workforce, the needs and requirements for clinical placement for staff across healthcare, and the need for interdisciplinary training opportunities such as simulation and data analytics. The CAO will

be highly connected and will be able to use their international contacts to develop international collaboration in education of Irish healthcare staff and in research.

6 STAFF RECRUITMENT AND RETENTION

6.1 STAFF RETENTION

Our Health Sciences Schools and postgraduate training programmes produce some of the best health professionals in the world. A combination of bedside teaching with a strong emphasis on clinical examination skills and apprentice-based learning has led to Irish health professional graduates being sought after by major international centres. However, one major weakness of our current system is the failure to attract many of these highly talented professionals back to Ireland after they have completed their postgraduate education abroad. It is recognised that working conditions, contract issues and a focus on service rather than academic healthcare delivery are major barriers to retaining high quality graduates.

Adapting the international academic model of health care delivery, with emphasis on evidence-based best practice and continual research, is ideally suited to the Irish Health service and the objectives of Sláintecare. Having a health system that incorporates research into best practice will help to attract back our best graduates, who in turn will contribute to a thriving and innovative healthcare environment.

Ireland must strive to retain the majority of graduates who qualify every year. Workforce planning has demonstrated a significant need for additional healthcare providers. For example, the Irish College of General Practitioners estimated that an additional 2,500 general practitioners will be required in the next seven years if the current level of health service is to be maintained. Among nursing and midwifery, there is a huge desire for academic advancement and enhanced career opportunities. Ireland's continual need to attract nurses from abroad is troubling and highlights the unsatisfactory appeal of an Irish nursing career for many of our young graduates. The appointment of advanced care clinicians to integrated community hubs requires urgent consideration of how academic and continuous professional development will be delivered in an accountable manner.

Retaining highly skilled staff is critical to the successful implementation of the current community-based integrated model of health care to sustain a high-quality health service. The CAO Group believes that the AHSS model will lead to staff retention through an improved and integrated access to teaching and training, continuous professional development, mentorship and a clearer career pathway. Moreover, the clinical impact for people with chronic illnesses will be improved care, greater responsiveness to their needs and enhanced collaborative working between professions in an integrated way, keeping the needs of the patient at the centre of decision-making.

6.2 STAFF ROLES JOINT APPOINTMENTS: A KEY COMPONENT OF THE AHSS MODEL

While many consultant posts are designated exclusively service-focused, some are combined posts involving a hospital or community and a university/medical school with service, education/training and research commitments. Typically, although not always, these roles are a 50:50 split of duties between the academic and clinical. This arrangement has mutual benefits for the hospital/service provider and the university as education enhances service quality and brings the results of research to the bedside.

A clear focus on developing Clinician-Scientists and Clinician-Educators, is essential for an effective AHSS, especially as translational research is now more focused on collaboration across multiple disciplines and national and international research teams. Future appointments must include Clinician Scientists and Clinician Educators to ensure that teaching, training, research, and innovation are integral to clinical service. These appointments should be under a joint governance model allowing integration across university and clinical sites. Several groups have initiated work in this model with clear benefits. The Education and Training Strategy of the Forum of Postgraduate Medical Training Bodies specifically identifies the key role of Clinician Educators in Ireland, and this is supported by the National Doctors Training and Development organisation. The development of the action plan for health research emphasises the need for clinician scientists to deliver embedded clinical research into day-to-day clinical care. This includes access to clinical trials (e.g.,

cardiovascular medicine, neuroscience, cancer) and clinical research utilizing electronic patient record systems and information technology.

The appointment of a Director of Education & Training, a Director of Research and Innovation in all the Hospital Groups and partner CHOs will facilitate the development of academic medicine with robust governance. The value of appointments between the hospitals, community health and their aligned University will be that new science is brought quickly to the bedside and new clinical observations will be brought quickly to the bench, both at the patient's home and in the hospital.

6.3 Recognition and Enshrining Academic Activity for Work Practice in Clinician Contracts

In addition to the clearly identifiable joint service/academic consultant positions, there is a need to recognise the obligation on all medical consultants to contribute to teaching, training and research. This obligation and health system commitment needs to be in the new consultant contract, even for posts where the focus is largely on service delivery. A starting point of one sessional commitment recognises the importance of including these activities in the work plan for each individual consultant. This currently exists for some consultant posts in the Royal College of Surgeons (RCSI) Hospital Group. Healthcare delivery is never static but evolves over time with changing knowledge and new technologies constantly advancing patient care. Hence, irrespective of the location of the hospital or community, a commitment to education, training, research and innovation is essential to healthcare now and into the future.

6.4 Benefits of International Experience and Collaboration

Traditionally, many hospital doctors, nurses and AHCPs have travelled abroad to enhance their training, carry out research and develop expertise not available in Ireland. On returning to Ireland, they bring back this valuable international experience and medical expertise to benefit Irish patients. In addition, they develop international contacts for subsequent training and clinical and research collaboration. Given that Ireland is a small country of approximately 5 million people, the population of many conurbations in larger countries (e.g., greater Manchester in the UK), that small size together with being an island means that it is easy to become insular and unaware of, or have access to, the latest medical and scientific developments. Irish doctors training abroad, or undertaking fellowships in sub-specialty areas, do so under considerable pressure and have to overcome many logistical challenges. While Ireland needs to maximise the training opportunities and experiences for all its trainees, medical or otherwise, international contacts and horizons need to remain open with a more structured and efficient system for the placement of some trainees abroad who will then return with new ideas, concepts and skills to assist in the renewal and ongoing development of Irish healthcare. Considerations include workforce planning, proleptic appointments, and funded international fellowships in specific clinical areas of national priority. Finally, Ireland does, and should, train international doctors in the basics of good medicine availing of our excellent bedside teaching and apprenticeship model of education.

6.5 Engagement with Department of Health Workforce Planning

An AHSS model inherently works on a model of workforce planning, staff appointment to suit specific needs, and promotion. Such principles can be better developed and applied in a combined model as outlined in this document. Streamlining and improving coordination between the various bodies to anticipate better future needs based on national healthcare policy is necessary, and ongoing dialogue with the Department of Health is a key. For example, the epidemic of obesity, and the likely trajectory of conditions associated with obesity, should be linked with an assessment of the need for increased numbers of diabetologists and bariatric surgeons and subsequently increased numbers of these disciplines in the respective training schemes. Moreover, the ageing population will result in increased prevalence of neurodegenerative disease such as Alzheimer's disease and Parkinson's disease. One in three women develop stroke, Alzheimer's disease or Parkinson's disease in their lifetime. These clinical problems will require increased numbers of neurologists,

Old Age Medicine physicians, Advanced Nurse Practitioners in neurology, AHCPs with expertise in neurology. All of these posts will need to be integrated across the hospital groups and the community.

7 RESEARCH FOR PATIENT BENEFIT

Science and data drive new approaches to medicine and healthcare. The COVID-19 pandemic demonstrated that data can guide a clearer approach to managing the healthcare problems and that the focused application of science resulted in the fast tracked development of life-changing vaccines using novel mRNA technology. The application of research and new science to the care of the patient can result in huge benefits to the patient (see Appendix).

7.1 THE IMPACT AND ECONOMIC VALUE OF HEALTH RESEARCH

Provision of the most effective care, based upon the best available evidence, requires ongoing investment in and appraisal of clinical research. Clinical research carried out in Irish healthcare settings provides evidence on the efficacy of new healthcare treatments. Although it helps the HSE to improve the care given to patients, the infrastructure for clinical research is underdeveloped in comparison with other developed health care systems. Therefore, patients in our health care system do not enjoy the same opportunities to participate in clinical trials of new therapies as found in other countries.

Patients benefit from research intense clinical settings, through receiving the most effective care in a quality system underpinned by a learning culture. In addition, they benefit through the additional treatment options that it makes available to them.

Investment in research support is a win-win proposition for the health service, for example, a KPMG commissioned report (https://www.nihr.ac.uk/documents/impact-and-value-report/21427) estimated that in financial year (FY) 2014/15, an investment of €324M (equivalent pro rata to €28M pa in Ireland) in the National Health Service (NHS) Clinical Research Network to support clinical research activity generated £2.4 billion of gross value added and almost 39,500 jobs in the UK. GVA is a measure of the contribution of an individual investment, producer, industry or sector to the economy. It is the value of outputs from production minus intermediate consumption (the value of the goods and services consumed as inputs to the production process). Within these figures, for commercial studies, NHS Trusts received an average of £6,658 in revenue from sponsor companies, and a pharmaceutical cost saving of £5,250 per patient recruited to each clinical study. The figures indicate that focused and appropriate investment in support for clinical research not only yields patient benefit and supports the recruitment and retention of ambitious and high achieving staff, but also provides an extraordinary return on investment.

7.2 FUTURE PROOFING OUR HEALTH CARE

The landscape of health and wellbeing is being transformed through basic and clinical science developments, especially in genomics, molecular biology, digital health and data analytics. As a result, we are witnessing the rapid arrival of a new era of healthcare changing from a curative paradigm, where the emphasis was on managing disease, to a pre-emptive paradigm, where the emphasis is on predicting and pre-empting disease using data analytics, genomic information and molecular technologies. For example, it is now possible to identify an individual's genetic inheritance and the molecular biological basis of disease which in turn greatly facilitates the personalisation of medical care by predicting the disease predisposition of individual patients, tailoring medical treatment to these predispositions, and customizing disease management to achieve optimum medical outcomes. This new paradigm will in time reduce the burden of disease, as well as the personal and societal costs of healthcare, by detecting and treating disease at earlier stages and pre-empting more serious consequences. The development of specific programmes in clinical genomics, precision medicine, bioinformatics, data analytics, machine learning and artificial intelligence illustrates the key requirement to integrate clinical and academic developments in AHSSs.

7.3 BENEFITS FOR PATIENTS

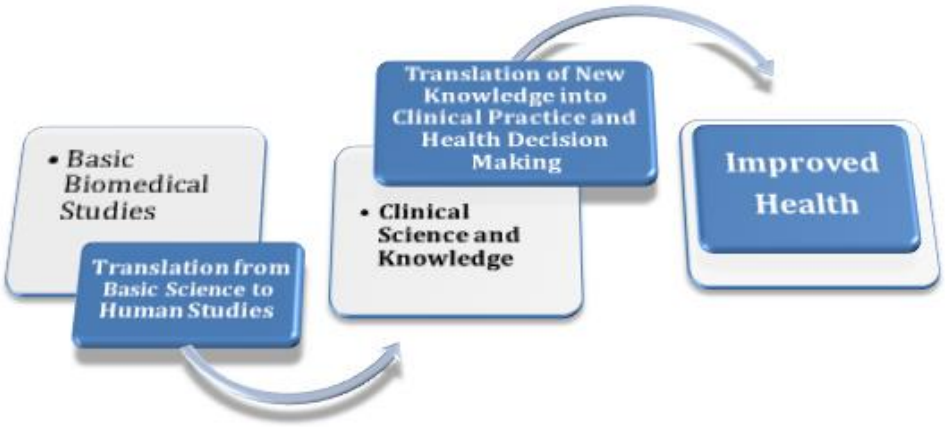
The primary mission of an AHSS is to ensure that Irish people receive a level of healthcare that meets, or surpasses, international best practice. It must offer highly developed tertiary and quaternary services across

a broad range of sub-specialities, so that people with life-threatening and complex chronic medical and surgical conditions can access the best possible therapeutic interventions to deliver best clinical outcomes. Such excellence in modern clinical practice cannot be provided except in the context of discovery-focused translational research. The balance of focus, emphasis, and support for education, research, and innovation will need to be appropriate to allow the AHSS is to become a "research-intensive" network. The very essence of this translational research is a bidirectional path between the patient and the laboratory, the so-called 'Clinical Research Continuum' (Fig 1). Thus, in order to conduct high-impact translational research, it is vital that we not only have the infrastructure to carry out such research but also the investigators who will straddle the arenas of clinical practice and scientific research. Therefore, we will need to:

- educate and train future healthcare professionals;
- conduct biomedical, translational, clinical, population-level, and health services research; and
- translate research discoveries into improved approaches into disease, health and wellbeing.

So, within this context, an AHSS construct for Ireland will need significant investment in clinical education and research infrastructure as well as appropriate training programmes of clinicians, clinical educators and clinical researchers. In doing so it will be in a strong position to train the next generation of healthcare professionals who will be sufficiently equipped to meet the challenges, opportunities and paradigm shift that is occurring now.

Clinical Research Continuum (Fig 1)



7.4 Laboratory-Based PhD Level Research Opportunities

The Irish health service is replete with research opportunities to meaningfully impact patient care. The Irish healthcare patient cohort are well educated and enthusiastic about partaking in teaching and research. Equally the staff cohort are intelligent, enthusiastic and have high future promise as investigators of merit. Our weakness is that our percent investment in research falls significantly short compared to our peers in other European countries. Denmark, a similar population to Ireland, spends >3% Gross Domestic Product (GDP) on Research and Development whereas Ireland spends <1% of GDP.

There is a terrific opportunity to educate our young and upcoming workforce in research methodology through PhD thesis work. They will acquire the skills that bring rigor and critical thinking to clinical practice for the benefit of the patient. This has been well proven by the small number of health care professionals who have completed PhDs. This qualification can drive the values of the Academic Health Sciences System. The actual number of PhD places available to graduates has diminished through the re-creation of HRB programs dating back to the National SpR Academic Fellowship Programme, to the HRB clinician scientist award, to the current iteration – the Irish Clinical Academic Training awards. Addressing this diminished

number of places for PhDs by supporting PhD opportunities will encourage the whole group and codifies our standing as a health care system, based on strong evidence and not provider bias.

Our health care workers are clever, well-educated, and ambitious. We have an opportunity in our re-created health service (Sláintecare implemented via the AHSS) to resource and make space for them to undertake PhDs. This will embellish the whole service, which benefits greatly from the rigor of science informing patient care.

Whilst the health service is correctly focused on many operational matters such as long waiting lists, it is too easy to ignore or cut funding for teaching, training and research. Indeed whenever a new clinical service is developed the teaching, training, research and innovation aspect of the service should be considered and resourced at the same time. Research should continue as 'business as usual' notwithstanding the periodic crises which set upon our system. Because research is often considered an afterthought, it is easily neglected. To do so will interrupt our evolution as a caring system, diminish our standing as a healthcare organization, and serve our patients very poorly.

8 ELECTRONIC HEALTH RECORD (EHR) SYSTEMS /EHEALTH

Electronic health record systems (EHRs) are becoming ubiquitous in hospitals and clinic settings across North America, EU, UK (including Northern Ireland) and Australia. Effective and user-friendly EHRs improve care outcomes, patient safety, operational efficiencies and care coordination with more effective use of key resources. Fully functional EHRs are capable of collecting and synthesizing data, representing knowledge and returning the data to the clinician and other healthcare professionals at multiple locations, and provide point-of- care education and clinical decision support.

8.1 DEVELOPMENT IN THE IRISH CONTEXT

The development of an easy-to-use and efficient national electronic patient record would greatly assist patients in Ireland. However, implementation of a universal patient identifier is required. National Integrated Medical Imaging System has shown how a well-planned, resourced and implemented electronic service can work – it is a critical part of patient care in Ireland allowing easy access to imaging with comparison of sequential imaging across the country.

The HSE is currently set on an ambitious journey to reform healthcare, to radically transform healthcare provision, and to deliver sustainable high-quality care for the entire population. The EHR programme is in development. A national EHR was identified by HSE National Directors and clinical leaders as a key capability requirement for the future of Irish healthcare. It is considered a cornerstone of the eHealth Strategy (http://www.ehealthireland.ie) and a key component of the Knowledge and Information Plan. A national EHR can create a future environment that is information rich and support improvements in care and care processing. It will significantly improve access to patient information across the various HSE organisations and be General Data Protection Regulation compliant.

Although EHRs contain a wealth of information, this information is frequently not in a readily minable format. Therefore, an efficient national AHSS will need to be constructed with the appropriate careful thought and domain knowledge invested from the start. For example, a national EHR must have a built-in consent to undertake precision medicine translational research with an opt-out consent system if the potential benefit of genomic medicine is to be realised. A national EHR should also have natural language processing pipelines and text mining techniques built in to allow narrative data scanning for pertinent keywords. In doing so, this will greatly expand the usefulness for planning treatment regimens as well as for valuable research projects, such that patients can be nominated for cohort studies to understand the prevalence of genomic variation in various child, adolescent and adult disease states that will ultimately allow rare disease reclassification to become the norm. This potential illustrates the benefits of jointly considering and resourcing research and patient care.

In terms of clinical research, a national EHR will have a dramatic positive effect on how we will deliver genetic and genomic healthcare into the future. Not only will the patterns of care change radically but also there will be a rebalancing of the role of clinical geneticists, genetic counsellors, paediatricians, physicians, obstetricians, surgeons, general practitioners, nurses, pharmacists and other healthcare professionals. A significant amount of genetic/genomic counselling that is presently delivered by clinical geneticists and genetic counsellors will be provided by other healthcare professionals who have been adequately educated about genetics and genomics via secure access to the patient's record and recommended pathways for diagnosis, treatment and follow-up care.

The implementation of EHRs will need to address a number of aspects to ensure the end solution support academic developments and research to its fullest potential. These include:

- Interoperability of systems to facilitate optimal sharing of data;
- Integration of other clinical and corporate systems and data not contained within an EHR;

- The development of an Enterprise Data Warehouse capability that support service and research needs;
- Appropriate and comprehensive data and information governance capability;
- Adoption of coding standards at a national basis.

Lastly, smartphones have been shown to have the fastest uptake of any new technology in the history of humankind, and the global transition from ordinary mobile phones to Web-enabled ones is occurring faster than anyone predicted. The use of apps on smartphones providing information such as wireless physiological monitoring, genomics, anatomical imagining and electronic data storage will greatly advance the development of a medical home for Sláintecare and thus move healthcare upstream, i.e., closer to the patients. Indeed, Action 10 in the Sláintecare implementation plan specifically addresses the need for a robust and comprehensive eHealth system that would support the academic requirements outlined in this position statement.

9 CONCLUSION

Health provision in Ireland is at a critical juncture, with the slow implementation of Sláintecare policy against the background of the pandemic. Sláintecare aspires to fully integrate hospital and community care through a universal health system that is free to all at point-of-care in the community and remove private practice by the introduction of a "single tiered" public hospital system. More complex care and continuous professional development of healthcare staff will continue to reside within the hospital and Hospital Group. The AHSS can be the model that links service delivery and academia, supporting healthcare education as a career choice and enabling translational research and innovation. This will support excellence in healthcare and lead directly to benefit to the patient and the State. Implementing Sláintecare via the AHSS is the best option to develop and improve Irish healthcare. There is a need for government policy to underpin the AHSS model of care.

- Collaboration and partnership are key words when considering implementation of the Sláintecare Policy. Critical to achieving these objectives will be two major steps:

    1. effective reorganisation and full integration of CHOs with the university teaching hospitals and Hospital Group in their region.
    2. successful contract negotiations to achieve "buy in" by medical practitioners and other participating health care providers, both in primary care and in hospitals.

- The CAO role presents a unique opportunity to strengthen the academic structures with clinical practice, by going beyond the Hospital Groups and embracing community services. This would strongly support the Sláintecare vision through the academic model.

- Academic clinical governance will have spill-over benefits in workforce planning, teaching, training, innovation and simulation. A dynamic and responsive health service relies on the recruitment and retention of good staff.

- AHSS will bring research, innovation and education closer to clinical practice with positive impact on patient care, staff careers and student education.

10 APPENDIX: EXAMPLES OF AHSS SUCCESS ACROSS THE HOSPITAL GROUPS

Research collaborations between University and HSE staff has led to many improvements in health services locally, nationally and internationally. Here we present a few examples of the impact on services and patient outcomes of collaborative work between Irish Healthcare staff and University research partners. Establishment of an AHSS would support these productive collaborations, increase the volume of research and innovation and accelerate the rate of safety and quality enhancement.

- Ireland contributes substantially to translational research to transform patients' lives.
- Studies of radiation accumulation among Cystic Fibrosis patients prompted research to reduce the exposure. HSE/University staff developed ultralow dose Computerized Tomography (CT) which reduced exposure by 98% and was more sensitive.
- Research on prescribing practices has produced internationally adopted guidance (National Institute for Health and Care Excellence (NICE) guidelines) for the safe and effective use of medicines for older people.
- Research in dementia in Ireland has informed the National Dementia Strategy, developed a nationally implemented audit tool and led to new pathways for patients with dementia and delirium in all acute hospitals.
- Education and training research has led to the development of proficiency- based training which has reduced epidural failure rate by half among our trainee anaesthetists.
- Working with a start-up company to tackle waiting lists, a region reduced the 'Did not attend' level from 27% to 3% of appointments for Gynaecological services by allowing patients to manage their bookings online.
- The rapid administration of intravenous thrombectomy treatment in patients with ischaemic stroke has reduced deaths by almost half and led to improved outcomes overall.
- Irish academic medicine was a major contributor to the major thrombectomy (clot removal) Endovascular treatment for Small Core and Anterior circulation Proximal (ESCAPE)trial in acute stroke which revolutionised patients' outcome following stroke and completely changed how we manage acute stroke for the better (Goyal M et al. NEJM 2015; 372:1019-30).
- A new "take-over-of-care" pathway in acute neurology patients (stroke, delirium, epilepsy, coma, head injury etc) resulted in a length-of-stay reduction of 3 days in an acute hospital for all acute patients admitted directly to neurology rather than under general medicine
- New treatments approaches to cancer, such as ovarian cancer, are leading to better outcomes for women.
- Using a Lean approach, women with cancer now avail of a new rapid access Lean system and are seen by an expert quicker.
- Cancers are studied using molecular techniques in collaboration with the University to check for specific genetic mutations to guide targeted precision chemotherapy.
- Among the truly great success stories of modern medicine are the striking improvements in survival and cure rates for children with leukaemia over the past 5 decades.
- Specific refinements in anti-leukaemia therapy have been guided by enhanced biological insights into these diseases.
- Genomic interrogation of leukaemias will continue to yield insight into the molecular causation of cancer. Translating such scientific discovery to clinical application is done through clinical research and the conduct of controlled clinical trials, leading to greater than 90% of children and young adolescents being cured.
- A prediction model has been developed that can provide expectant mothers with valuable personalised information on the anticipated course of their labour. This can also assist in informing individual mothers about how likely they are to need a Caesarean section.
- Women with cystic fibrosis are more likely to develop exacerbations of respiratory tract infections with Pseudomonas aeruginosa because of the hormonal effect of estradiol on bacterial biofilm.

- A novel audio-based inhaler compliance assessment device improves the detection of errors in technique amongst patients with asthma in the community. By providing feedback on this, it optimises the management of asthma and improves the overall health status of these patients.
- The Global Intensive Care study which demonstrated how clinical sites can rapidly adjust to support unique clinical trial design, a Meta-Trial, even during a global pandemic. It showed that treating patients in a prone position, while they received high flow nasal cannula oxygen, reduced death and the need for invasive mechanical ventilation.
- A drone, using autonomous beyond-visual-line-of-sight technology, successfully delivered was used to deliver diabetes medication to the Aran Island, the first time in the world that the technology has been used for diabetes management.
- A new model of multidisciplinary care for managing low acuity elderly in a busy emergency department (ED) proved that early assessment and intervention by dedicated health and social care professionals (HSCP) reduced length of stay in ED by 50% and hospital admissions from 56% to 19%.
- Researchers have illustrated that passive transfer of blood through delayed cord clamping is a safer practice than the practice of milking the umbilicus for extremely premature infants.
- An algorithm has been developed and is licenced to assist clinicians to optimise the management of new-born infants at risk of seizures.

11 GLOSSARY

AHCP	Allied health care professional
AHSS	Academic Health Science System
CAO	Chief Academic Officer
CHO	Community Health Organisation
COVID-19	SARS-CoV-2
EHR	Electronic Health Record
GDP	Gross Domestic Product
HRB	Health Research Board
HSE	Health Service Executive
NHS	National Health Service