Faculty of Clinical Informatics Core Competency Framework

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Introduction and Background

This purpose of this document is to describe the Faculty of Clinical Informatics (FCI) Core Competencies to define the role of a Clinical Informatician.

The Faculty of Clinical Informatics was established in March 2017 to support the needs of Clinical Informaticians (CIs) in the United Kingdom (UK). Two overarching aims for the FCI at its inception were to:

1. Develop professional competencies for clinical informaticians.
2. Provide a process for FCI accreditation of training and education programmes and individuals

The Core Competency Project (CCP) has been able to fulfil these aims through three main phases, and will provide two main outputs: (1) the **Core Competency Framework (CCF)**, which is the focus of this document; and (2) a process and evidence framework by which these competencies can be mapped to educational and professional development initiatives for FCI accreditation.

The **CCF has been developed** in the first two phases, with the first phase informing the second:

Phase 1: To develop, test and define the output core competences required of a professional clinical informatician; and

Phase 2: To define the core skills, knowledge and traits that constitute the core (input) competencies.[1] to enable an individual CI to do the job.

The FCI will **use the framework** to provide accreditation for educational programmes and individuals in the final phase:

Phase 3: To develop a process and define the evidence required for FCI training programme accreditation.

Phase 1 was undertaken directly by the FCI project team, and phases 2 and 3 were undertaken by Professor Georgina Moulton for The University of Manchester.

Core Competency Framework Development Methodology and Approach

The CCF have been devised through: (1) a survey and consultation with the clinical informatics community to define the scope and key areas in the field[2]; and (2) from a systematic protocol[3] that has taken a mixed-methods approach encompassing a systematic review of all literature highlighting key areas, analysis of current job postings for essential and desirable skills, a series of interviews with the clinical informatics community and a wider external community review via a survey. At each stage in the second phase the competency framework was redrafted based on the feedback obtained. In total, the framework outlined in this document has been extensively reviewed by 102 individuals based in the clinical informatics community with clinical, health, social and clinical scientist backgrounds, and will be reviewed on a biennial basis.

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[1] 'Core' in this context denotes the minimum knowledge base that all CIs must have to be eligible to become members of the FCI and excludes further sub-specialist avenues of education.

[2] Phase 1 report, FCI – https://www.facultyofclinicalinformatics.org.uk/projects/core-competencies/

[3] Phase 2 protocol: DOI number for protocol TBC.

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Clinical Informatics Descriptions Definition

In phase one, clinical informatics has been defined by the community as '*the application of data and information technology to improve patient and population health, care and wellbeing outcomes and to advance treatment and the delivery of personalised, coordinated support from health and social care.*'[2]

To be able to work in the field a clinical informatician **"*uses their clinical knowledge and experience of informatics concepts, methods and tools to promote patient and population care that is person-centred, ethical, safe, effective, efficient, timely, and equitable.*"** [2]

It is a dynamic field with a developing knowledge base and with a demonstrable demand of suitably accredited professionals.

The scope of applications in Clinical informatics includes the following **example** areas:

a) How people interface with information technologies in health and social care, including electronic health and care record systems and personal care portals
b) Methods to collect, manage, provide security for, and analyse health data and "big data"
c) Application of informatics across the lifespan in the multi-layered and complex context in which health and social care services operate
d) Interventions for clinical decision support, safety alerts, and data visualisation to facilitate optimal health and social care delivery
e) Innovative communications with those receiving care to facilitate their appropriate and informed use of health and social care provision
f) Ethical and information governance frameworks and data usage policies and procedures for assurance of high-quality ethical use of individuals' data.

The CCF sets out a core common set of competencies required for a clinical informatician to effectively perform, regardless of the health or care background which they have entered the field, or their current area of practice within this diverse field.

To be an eligible as a member or fellow of the FCI a clinical informatician must be a registered health or care professional registered with one of the regulators overseen by the Professional Standards Authority.

Competencies

A competency has been defined in terms "*what the individual brings to the job (the input), what the individual does in the job (the process), or what is actually achieved (the output).*" It can be skills, knowledge, or behaviours. [4] A competency framework will show the array of abilities across many domains or aspects in a certain context. Competencies require descriptive qualifiers to define the relevant abilities and context.

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[4] Frank, J. R., Snell, L. S., Cate, O. T., Holmboe, E. S., Carraccio, C., Swing, S. R., ... & Harris, K. A. (2010). Competency-based medical education: theory to practice. Medical Teacher, 32(8), 638-645
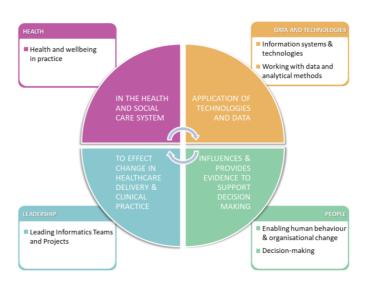
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Competency and Bloom's Taxonomy

The framework has been based on the underlying Bloom's Taxonomy[5,6] that outlines a hierarchical model used to define competencies by complexity. This taxonomy specifies six main levels of cognitive objectives from level 1 in which knowledge is remembered to level 6 that involves evaluation of the knowledge (*e.g.,* defending opinions, making judgements on information or validating ideas). Bloom's taxonomy has been used to write this competency framework. Below is a summary of the level of the taxonomy with associated verbs and meaning used in the framework.

Level Number	Level	Meaning	Verbs/phrases
1	Remembering	Being able to recall information learned previously	appreciate, define, demonstrate knowledge, aware, identify, knows
2	Understanding	Understands the meaning of the information	assess, communicate, defend, discuss, explain, identify, presents, recognise, understand
3	Applying	Applying knowledge to scenarios	adapt, apply, use, manage
4	Analysing	To be able to break down the problem into its constituent parts and understand how they all interact	analyse, identify
5	Synthesising and creating	Taking component parts of knowledge/information/ideas and bringing them together to form a new narrative	create, design, develop, frames, promotes, explain
6	Evaluating	Based on criteria is able to make judgements	appraise, communicate, defend, evaluate, justify

Clinical Informatics Competency Framework Structure

The competency framework has been devised such that we can capture the core competencies that are required to become a clinical informatician, but will also then capture more specific competencies required for specific areas in clinical informatics. The latter will be completed as a separate piece of work.

The competency framework has been structured around four key areas: (1) data and technologies; (2) health context; (3) people and; (4) leadership and management.

[5] Bloom, B.S. (1956). Taxonomy of educational objectives: The classification of educational goals. New York, NY: Longmans, Green
[6] Anderson, L.W. & Krathwohl, D.R. (2001). A taxonomy for teaching, learning, and assessing: A revision of Bloom's taxonomy of educational objectives. New York, NY: Longman.

Figure 1: Overview of the core competency framework structure

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Each area has associated domains and each of the domains is further separated into categories, with each category[7] representing a theme and a set of related competencies. This is shown in figure 1.

Distribution of Competencies across Framework

The core competencies described across all levels demonstrate the breadth and depth of knowledge a clinical informatician is required to know. In total there are 111 competencies described across a total of 36 categories across the six domains: five domains have an even distribution, but with 34 competencies in domain 2 that focusses on information systems and technologies. Across all domains 67% fall into the lowest two levels of the Bloom's taxonomy recognising that these are the minimum required knowledge and skills for a clinical informatician to be able to then apply them in their roles. It also demonstrates the variety of backgrounds of individuals that were consulted and fall within the clinical informatics family including clinical scientists, medical, nursing, pharmacy and social care. The distribution of Bloom's levels across the domains can be seen in figure 2.
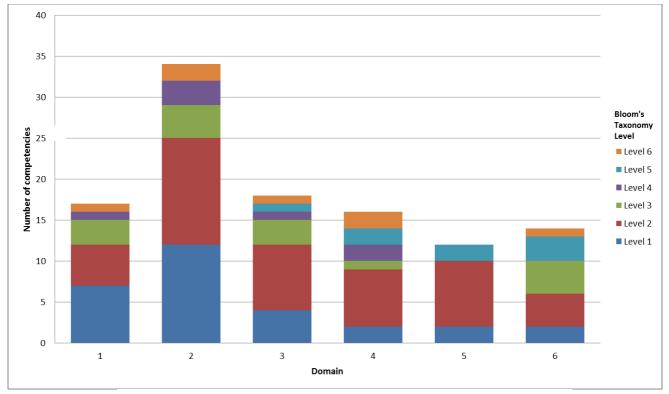

Figure 2: Distribution of core competencies over domains and Bloom's taxonomy levels

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[7] Identified in the initial work of phase 2 through a full systematic literature review

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Domain 1: Health and Wellbeing in Practice

Description: This domain refers to the underlying health sciences knowledge and scientific/research skills that allow clinical informaticians to understand and continuously improve the quality of health and social care services and safe guard standards of care using informatics as an enabler. To be able to identify problems and develop solutions to clinical informatics problems, there must be an understanding of the health and social care system structure including the organisational, economic and political context, processes and data flows, and current challenges across the wider health and wellbeing field.

Categories

1.1 Clinical Concepts and Language

a. Uses clinical, social, biomedical (including genomics) terminology, language and abbreviations appropriately when contributing to informatics projects and programmes to be able to facilitate accurate and appropriate communication across clinical informatics projects and/or teams

1.2 Clinical Governance

a. Understands the main components (including clinical audit, clinical risk management, quality assurance, clinical effectiveness and staff development) of the clinical governance framework
b. Understands how informatics can assist in the monitoring and implementation of healthcare services and standards
c. Be able to use data and information effectively in clinical audit to identify service improvements

1.3 Models of Care Delivery

a. Demonstrates an understanding of the UK care delivery models, organisations and governance involved across the care pathway and their inter-relationships (*e.g.,* GP practices, hospitals, ambulance services, care homes, community services) and how they influence the delivery of informatics projects/programmes
b. Can identify and address the challenges related to using information systems in the health and social care sector for health care and/or research
c. Is aware of the latest initiatives, drivers and constraints affecting health and social care planning and service delivery to make sure that informatics plans are shaped accordingly

1.4 Health Administration and Services

a. Demonstrates knowledge of how resources, information flow and quality metrics are used through the UK Health System structure, administration and services (*e.g.,* healthcare planning, service commissioning, delivery of health, social care and pharmacy)
b. Demonstrates knowledge about the social determinants of health (*e.g.,* environment, socio-economic, genetics), and their influence on the delivery of healthcare and informatics services and work

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c. Recognise how UK and international health policies can change and how they impact on system and organisational informatics delivery, strategies and plans

d. Shows knowledge of clinical and business processes, indicators and reported outcomes for healthcare delivery and systems management and their role in the quality assurance of healthcare

1.5 Informatics Strategies

a. Has knowledge of the UK and international informatics strategy landscape including which organisations develop and deliver them, their similarities and differences and the stakeholders involved in influencing and/or funding them, and how they influence your informatics priorities, strategies and work

1.6 Informatics in Health

a. Has awareness of the role of health informatics and information systems in the health and social care systems, and understands lessons learned from previous programmes to prevent replicating mistakes, promote best practice and ensure improvement of future informatics project implementations for healthcare practice and/or research

1.7 Scientific and Research Skills

a. Is able to perform searches and critically appraise literature to support evidence based decision making

b. Knows about hierarchies of evidence and appropriately applies them to evaluate informatics interventions

c. Defends methodologies and approach for a defined clinical informatics proposal and/or project

d. Understands research governance frameworks and guidance to ensure that informatics research projects/programmes are conducted to the appropriate standards including safeguarding of safety, wellbeing and rights

Domain 2: Information Technologies and Systems

Description: Health and social care is delivered across multiple organisations and settings, and there are a variety of health information systems and technologies used to support this.   It is important that clinical informaticians have knowledge of current and emerging systems/technologies and be able to think about how they can be used to improve decision-making and communication between healthcare professionals, patients and citizens, and how they can improve delivery of health and social care in their own practice, local and national levels.

Clinical informaticians often bring together colleagues and stakeholders (including the patient and public) from a range of backgrounds listening to their needs and being able to recognise the systems and technologies that can deliver informatics projects. To do this requires knowledge not only about how the technology is procured and data/information processed, but also how it is designed, implemented and maintained. This domain focusses on the key concepts, methods and tools to be able to create, represent

and access data, and the range of health technologies and systems that cover the spectrum of the health system and informatics fields.

Categories

2.1 Information Systems and Technologies Concepts and Development

a. Analyse key information technology components including hardware and software, and how they can be used in health and social care settings
b. Is able to demonstrate knowledge of computer science principles and terminology including modelling data and systems using appropriate representations (*e.g.,* UML, BLMN, MDA)
c. Discusses the range of health information systems and technologies available and how they can be or are used in the delivery of health and social care and research (*e.g.,* medicines management, telehealth, imaging, test requests and reports, electronic patient records, mobile-health)
d. Understands the qualities of a system/technology and the trade-off between them when developing/deploying them (*e.g.,* maintainability, scalability, performance, recovery)
e. Discusses systems and technologies in relation to current and future thinking around health systems, especially with technology providers to drive innovation to address health and care delivery
f. Can identify an appropriate technology to resolve healthcare problems and contribute to the development of good practice to do this
g. Applies knowledge of health data, information and workflow models to design and deliver information technology solutions
h. Understands each stage and associated processes of the lifecycle of how an information system is developed including the planning creating, testing and deploying stages, and when clinical engagement is key to a successful informatics project outcome
i. Awareness of the benefits and risks of different project methodologies (*e.g.,* agile, waterfall) when used for software development and is able to employ the appropriate strategies to meet the needs of the project

2.2 Working and Communicating with Project Stakeholders

a. Has a good working knowledge of technical and clinical terminology and can demonstrate how the effective use of both can lead to a common understanding of an informatics project/programme
b. Is able to manage expectations of stakeholders and guide prioritisation toward incremental development that is both clinically useful and/or technically possible within the available resources
c. Awareness of the phenomenon that some problems cannot be solved by conventional requirements gathering and classical product design, and if they are applied will actively make things worse
d. Is able to clearly and effectively communicate clinical and business requirements to technology suppliers, specialists, helping them understand how to align their solutions to health and social care practices and objectives
e. Considers patient safety, usability and cost when specifying requirements for informatics projects and is able to discuss the trade-off between them
f. Be able to highlight and communicate about problems with information systems to technical groups and provide feedback and information for healthcare professionals

2.3 Selecting and Procuring Information Systems &/or Technology

a. Demonstrates knowledge of the procurement framework including teams involved in contract negotiation and management, costs and how to identify return on investment

b. Is able to contribute to the selection and utilization of appropriate information systems and/or technologies to meet clinical and operational requirements through the evaluation of tender responses

c. Is able to identify informatics solutions that guarantee data privacy, patient and user confidentiality, security and integrity following current excepted standards

2.4 Interoperability and Integration

a. Recognise that interoperability is an unresolved problem and the issues surrounding this (*e.g.,* lack of adherence to informatics standards, different processes surrounding informatics system) impact on the delivery of integrated care

b. Demonstrates knowledge of the range of technology for transmitting information (*e.g.,* messaging between systems) and clinical standards (*e.g.,* standards for structuring clinical information) for information needed to support the creation of interoperable systems, and promotes their importance to drive an integrated delivery care model

c. Demonstrates knowledge of the basis, application and limitations of clinical coding systems, terminologies and classifications and understands their purpose in delivering safer health care

d. Is able to discuss the appropriate health informatics standards systems including coding systems, data structures, data security and privacy, and system-to-system messaging to enable system interoperability and procurement/design of future systems

2.5 System Architecture

a. Assesses clinical models and is able to interpret mapping of data relationships and dependencies of health information system architecture (*e.g.,* electronic health records, decision support systems, prescribing systems)

b. Applies information technology best practices (*e.g.,* quality management systems, testing, service level agreements, business continuity and incident management) throughout the system life cycle

2.6 Data security and Cyber Security

a. Demonstrates knowledge of the security and governance of data, systems, devices and networks (*e.g.,* Data Security and Protection Toolkit), and is able to use this to contribute to the development of solutions required to manage data

b. Appreciates the international and national standards and regulatory frameworks for quality management, software deployment, medical devices, clinical safety (e.g., DCB0129, DCB0160) and interoperable systems (*e.g.,* ISO9001, ISO80001 family)

c. Understands what informatics solutions (*e.g.,* current GP systems and/or clinical decision support that includes Artificial Intelligence or any coded algorithms) constitute as a medical device and must adhere to the Medical Device Regulations

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d. Understands the trends in cybersecurity risk in healthcare (*e.g.,* cloud computing, medical physical systems, data confidentiality, malware, app security, insider threats)

e. Knows about cybersecurity capability, countermeasures and risk mitigation strategies (*e.g.,* technological solutions, risk assessment frameworks, regulatory and legislation, healthcare/team education to embed digital security practices, encryption) so as to develop secure systems and team/local policy and protocols to protect patient safety

f. Understands the procedures to report any cyber or data security incident

2.7 Maintaining and Support for Healthcare Information Systems

a. Is able to work with other system developers and healthcare professionals to consider the key qualities of a system (*e.g.,* scalability, maintainability, performance, structure, availability) when designing and developing information systems (*e.g.,* electronic health records), and apply current best practice to these

b. Is able to develop processes and methods with other colleagues to continuously assess the safety and efficacy of information systems

2.8 Evaluation of Information Systems

a. Can use knowledge of key aspects of information systems (*e.g.,* usability, performance, cost effectiveness) to develop evaluation criteria to assess and evaluate digital solutions and information systems in practice settings to make sure they are useful and/or successfully adopted

b. Demonstrates awareness of evidence and regulatory frameworks used to assess digital technologies (*e.g.,* NICE) in order to contribute to discussions of the development of digital health interventions

Domain 3: Working with Data and Analytical Methods

Description: Healthcare is a data-driven activity to inform clinical practice, therefore it is necessary for clinical informaticians to have a working knowledge of the health data landscape and analytical methodologies, and how to translate/communicate the visualisations to a range of non-expert and expert audiences. This domain will focus on health data, its characteristics and uses, as well as the various methodologies and tools available to analyse, interpret and visualise data to drive for example, the redesign of health care delivery models and tailor therapies and medication prescription. This domain also covers categories relating to the management, usage and accessibility of data relating to ethical and legal standards as the public expect their data to be handled in a safe and secure manner. All clinical informaticians need to be aware of up-to-date information governance and adopt these in practice, so as to maintain trust in the use of health data and new methodologies such as Artificial Intelligence for all uses

Categories

3.1 Analytical Methodologies and Applications

a. Is able to use basic descriptive statistics and explain the concepts of probability, predictive modelling and machine learning techniques to discover patterns and knowledge in recorded data, and know when to use them to solve health and social care, clinical practice and research problems

b. Understands what clinical questions can be addressed with different data sources, and working with data custodians and others can understand what data is required and the data analytical methods to be used to address the problem and derive insights

c. Is able to demonstrate how data quality effects analysis, and resulting clinical and healthcare insights, and how important it is to improve to derive maximum potential from its utilisation

d. Understands how technologies (*e.g.,* R, Python, Jupyter notebooks) facilitate the analysis, display of results, and reproducibility of analyses to be able to re-run protocols to verify results and modify for other purposes

e. Is aware of the latest techniques (*e.g.,* AI) and their application to healthcare (*e.g.,* imaging and genomics interpretation, clinical diagnostic evaluations, prediction of readmission risk, extracting semantic information from text) and the challenges in deployment and usage of these in health and clinical settings (*e.g.,* population data and algorithmic bias, explainability of results, robust regulation and quality control, metrics vs clinical applicability, ethics and unintended negative consequences)

3.2 Data Sources and Characteristics

a. Demonstrates an understanding of the key attributes of data and information including quality, integrity, accuracy, timeliness and appropriateness and can discuss their limitations within the context of intended use

b. Understands the variety of data streams and sources that contribute to health decision making including those not necessarily primarily collected for health (*e.g.,* mobile, sensors, phenome)

c. Discusses the opportunities and challenges with using real-world health data for analysis and to drive decision-making

3.3 Data Structure, Standards and Linkage

a. Applies current best health informatics standards for the recording of health data (*e.g.,* classifications, vocabularies) to increase data quality and utilisation for improving healthcare and clinical practice and research

b. Understands the importance of data linkage, record linkage methods, and the relevant strengths and limitations, to be able to conduct or review linked data analysis

3.4 Data Management

a. Demonstrates an understanding of the data inter-relationships and dependencies among the various health information systems (*e.g.,* decision support systems, electronic health records, order entry, registries, *etc.*)

b. Has awareness of the different approaches used to store health data and the pros and cons of using these approaches, and how these effect data accessibility and analyses

3.5 Information Governance, Accessibility and Ethics

a. Explains the ethical, legal and regulatory guidelines to determine the appropriate access, use, disclosure and protection of data to protect patient information and ensure confidentiality, and applies them when processing patient data at all times

b. Demonstrates an understanding of processes, guidelines, and governance structures needed to achieve trustworthy use of methodologies such as Artificial Intelligence, and is able to assess these with others to address health care problems

c. Has some awareness of privacy enhancing technologies (*e.g.,* K-anonymity, homomorphic encryption), and how and what they might be used for

3.6 Data Visualisation

a. Demonstrates an understanding of a range of visualisations used to present data analyses and information so as to be able guide others in their usage

b. Contributes to quality analysis by organizing and transforming data into reliable and meaningful information to support decision making

c. Presents information in a way that is effective for users' decision making, and that takes into account the variability in the user capability to assess methods and draw appropriate conclusions

Domain 4: Enabling Human and Organisational Change

Description: Individuals (professionals and citizens) and organisations are the ultimate users of health information systems, technologies and information. In order for these to be successful, we need to ensure factors such as workflow, needs, culture and organisational strategy are taken into consideration. This domain focusses on the human, socio-technical & organisational factors that need to be considered when working to design and develop usable and effective systems (*e.g.,* electronic health records, systems to manage long term conditions to personal wellbeing applications, or those that focus on data, and its use to develop an improved understanding of healthcare. It draws on many fields including human factors engineering, science of behavioural change and systems science.

Categories

4.1 Quality Improvement and Clinical Safety

a. Applies quality improvement and process engineering to facilitate business and clinical transformation, measuring and analysing appropriate outcomes

b. Appraises patient safety risk in the design and development of information systems and technologies and ensures that all risk is assessed and managed appropriately to minimise or avoid harm

4.2 Change Management

a. Can use change management tools and techniques in the implementation of new processes or informatics systems within clinical practice and/or research and is able to communicate the change effectively to a range of stakeholders

b. Engages with identifying 'best practice' in informatics enabled change across settings and look at translation to a local setting

4.3 Behavioural change

    a. Understands the organisational and human factor challenges to effective use of health information systems and technologies and can apply appropriate methods to address these and ensure maximum user engagement and widespread adoption

4.4 Usability and Design

    a. Appreciates the methods and techniques for requirements gathering, design, and user-centred evaluation and testing for health systems and technologies, understanding their strengths and limitations, and applies these to clinical informatics projects

    b. Demonstrates an understanding of the clinical input, knowledge, workflow and impact when proposing informatics solutions and interventions

    c. Analyses situations critically to address usability and accessibility issues, design problems and use of digital health technologies

    d. Assesses the demand for evolving services in your organisation&/or system, and appropriately present results to various stakeholders

4.5 Patient Involvement and Engagement

    a. Appreciates the range of patient resources providing information on healthcare interventions, public health and engaging with the patient and technology used to deliver it (including the quality of information, type and assessment) to inform patients' decision-making

    b. Discusses the value of technologies that enable co-production of health (*e.g.,* mobile applications, social media, sensors) to improve health and promote citizen (patient) engagement

    c. Demonstrates understanding of the latest developments in patient access to health records and the implications this has on the nature of relationship between healthcare professionals and patient

    d. Discusses the impact of digital interventions (including data sharing and usage) on governance frameworks and public trust

    e. Is able to support patients when accessing and viewing their health data (*e.g.,* access guidance and processes, correction of factual inaccuracies) and other health data sources to empower them to make decisions about self-care and share in the decision-making

    f. Uses appropriate communication strategies and language to effectively present and impart knowledge and explain concepts to non-expert and expert audiences through involving patients in projects, speaking at meetings/conferences, publishing articles etc.

4.6 Evaluation

    a. Is able to contribute to the evaluation of the design, implementation and functionality of systems so that they can evolve to support best practice in clinical care

Domain 5: Decision Making

Description: This domain focusses on how different types of data that health systems collect and process allow informed clinical, health and social care decisions to be made from individuals to populations. Accountable person-centred care that improves quality, effectiveness, safety and accessibility will be the key

indicators on how successful improvements and their value to health and care are demonstrated. Effective use and management of information and knowledge is a key enabler for an on-going improvement across organisations and health and social care economies.

Categories

5.1 Evidence-based Practice

a. Understand the definition, key components and the rationale of evidence-based practice and the application of informatics
b. Develops and assesses evidence-based search strategies and guidelines to support clinical management and decision making
c. Demonstrates an understanding of the different types of clinical knowledge and their sources from across the health system and how they can be applied to make clinical and operational decisions
d. Promote evidence based practice, use of guidelines and care pathways across different healthcare settings and contribute (where appropriate) to the development and use of guidelines

5.2 Knowledge Management

a. Demonstrates understanding of models for effective knowledge acquisition, storage and dissemination, including strengths and limitations
b. Understands how knowledge can be transformed from generation to modelling into a computable form

5.3 Clinical Decision Making and Support

a. Understands the nature of clinical decision making and defines the processes of clinical decision making and diagnostic strategies
b. Demonstrates knowledge of the types of clinical decision support tools (*e.g.,* computer interpretable guidelines), including their strengths and weaknesses
c. Demonstrates understanding of best practice and approaches (including how information is accessed, sources of information, integration into systems) used to construct and translate clinical pathways and guidelines into decision support tools
d. Discusses best practice in the development and application of clinical decision support tools to individuals and/or populations
e. Is able to lead discussions about risk assessment and mitigation, and validation of a decision support system
f. Knows the core concepts to be able to evaluate impact of implementation on behaviour, workflow and decision-making such that these can be understood and used to inform next iteration or usage

Domain 6: Leading Informatics Teams and Projects

Description: Informatics is an enabler of great change in the delivery of health and social care. Often the role of the clinical informatician at both local or national level is to act as the convenor and translator between stakeholders of many backgrounds, and in particular to understand the main concepts of management, how to engage and build relationships and ensure that teams have the appropriate skills mix and professionalism to be able to improve the delivery of care. Clinical informaticians must act with integrity

and be able to recognise the needs and priorities of others, and be able to manage teams and competing priorities effectively. This domain focusses on the skills required to manage and lead clinical informatics projects and develop approaches/strategies that ensure that informatics solutions are aligned with the clinical and business goals/outcomes.

Categories

6.1 Management Principles

a. Applies theories, concepts and practices of management to informatics projects (including: setting clear goals and objectives, developing effective internal and external project communications using clear and unambiguous language to ensure progress is easily understood; financial and budget management; setting up governance structures to ensure clear accountability and management/ownership of risk; building procurement and vendor relationships; recognising the differences in organisational culture, and adopt approaches to manages these whilst being clear of your own values and principles) to develop clear strategies and plans for delivery of clinical informatics projects/programmes

6.2 Professionalism and Education

a. Creates a professional culture & facilitates continuous individual, team and organisational learning and development to ensure thinking is kept up-do-date and relevant for the future delivery of services
b. Defines the needs for good quality training in informatics and knows how informatics can facilitate research and improve digital literacy to be able to embed and increase the knowledge across healthcare professionals and other informaticians

6.3 Multi-disciplinary and Organisational Working

a. Promotes open, transparent information sharing and multi-disciplinary team working to solve clinical informatics challenges through effective communication, development of a supportive network and the recognition of individual and team achievements to increase visibility of individuals and required skills for completion of informatics projects
b. Has awareness of different roles of people working in informatics and the knowledge and skills they should have and is able to identify how they can contribute to the successful delivery of an informatics project/programme through collaborative working

6.4 Project Leadership

a. Has awareness of project management and change management methodologies, tools and techniques considering factors (*e.g.,* team-working and governance, resources, project planning , business cases, monitoring and reporting) and is able to apply them to informatics projects/programmes
b. Is able to contribute to project planning, implementation, monitoring and evaluation of informatics projects, ensuring that programme/project goals remain aligned to clinical and operational objectives where appropriate, to increase project/programme success

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c. Is able to recognise when an informatics project/programme is not going according to plan, and can appraise benefits, risks for continuation, change of direction or stopping, and can communicate these through appropriate governance structures

d. Adapt an appropriate communication style to be able to distil information to deliver key messages to address a range of audiences and stakeholders (*e.g.,* organisational boards, project teams, other healthcare professionals)

6.5 Informatics Strategy and Innovation

a. Have awareness of stakeholders influencing development and funding of clinical informatics projects and/or programmes at local or national level

b. Understand and evaluate local and national health informatics policies and strategies and their key elements of technology, process, clinical engagement and governance

c. Discusses the components for successful innovation and its adoption and/or scalability into other healthcare contexts/organisations

6.6 Planning

a. Creates and assesses strategic, implementation and financial plans for clinical and health information systems to ensure increase chances of a successful deployment

b. Justifies allocation of resources to informatics for service redesign to improve delivery of health and social care and patient safety