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## Guest Editorial

# C25 in QUB: a transformed curriculum for a transformed healthcare system

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Queen's University Belfast (QUB) has completed a curriculum review resulting in the most significant revision of the undergraduate medical programme since 1996. The result is 'C25' named to reflect the year (2025) when the first students from this programme will graduate. In this article, we will briefly answer *why* and *how* the review was completed, focussing on the *new components* of C25 and the evidence-base that underpins them.

### Why undertake a curriculum review?

From its origins in 1835, the QUB medical school has sought to shape and reshape its curriculum to be relevant to the practice of medicine both locally and internationally<sup>1</sup>. As society and its needs change, so must medical curricula change to be fit for purpose in both the short and medium term<sup>2</sup>. Nationally, the latest version of *Outcomes for Graduates*<sup>3</sup> published in 2018 recognises the need for doctors to provide integrated care for growing numbers of patients with multiple morbidities in home and community settings, applying their knowledge of behavioural and public health science to individual patients. Locally, *Systems not Structures* (2016)<sup>4</sup> envisages new models of healthcare delivery, a blurring of the primary and secondary care divide, with a focus on quality improvement, preventative medicine and population health. In addition, the medical profession is faced with exponentially increasing amounts of knowledge; the digital transformation has resulted in 'democratisation' of that knowledge, and changed the way that students acquire it<sup>5</sup>. Aware of these trends, the QUB curriculum was comprehensively reviewed to prepare our future graduates with the professional values, behaviours, knowledge and skills required to meet the challenges of healthcare provision in the 21<sup>st</sup> century.

### How was the review completed?

Over 18 months, an extensive stakeholder listening exercise was conducted involving students, recent graduates, medical educators from all disciplines, clinicians in primary and secondary care and public health, members of the public, Department of Health, Northern Ireland Medical & Dental Training Agency (NIMDTA) and colleagues from nursing and pharmacy. Early clinical contact, cadaveric dissection, the final year assistantship and the range of Student Selected Components were highlighted as existing curricular

elements to be retained. We were also told there were things to improve; we needed to integrate teaching of biomedical and public health science with clinical science, both within and between years of the course; we needed to provide more time in primary care and reduce 'silos' of learning and increase active learning opportunities during the first two years. Following review of best practice in other UK medical schools, and with the valued assistance of external facilitator Professor Val Wass, a new curriculum was planned – a transformed curriculum fit for a transformed healthcare system.

### What are the components of C25?

C25 comprises three phases (Table 1) – Foundations of Practice (years 1 and 2), Immersion in Practice (years 3 and 4) and Preparation for Practice (year 5). The need for better integration of learning underpins each of the major curricular developments which the remainder of this article will expand upon: helical themes, case-based learning, longitudinal clerkships, more time in primary care, and progress testing.

### Helical Themes

Cross-cutting or 'vertical' themes are a feature of 'spiral' curricula, serving to integrate and ensure content delivery of concepts such as public health, professional behaviour and ethics within every module and discipline<sup>6,7</sup>. In C25, these themes are:

- **G**lobal and population health
- **C**linical science and practice
- **A**chieving good medical practice
- **T**eamwork for safe care

The 'GCAT' themes are named after nucleotide bases and represented pictorially as helical, serving to emphasise that they represent the 'DNA' of the curriculum and medical practice. Each theme consists of six sub-themes (Table 2).

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**Table 1:** Curricular phases and delivery in C25

Phase (Years of Study)	Curriculum Delivery
Foundations of Practice (1&2)	<ul style="list-style-type: none"> <li>Integrated, systems-based teaching of biomedical, behavioural, public health and social science</li> <li>Case-based learning</li> <li>Early clinical contact in clinical skills centre and primary care</li> <li>Cadaveric dissection</li> </ul>
Immersion in Practice (3&4)	<ul style="list-style-type: none"> <li>Workplace-based learning</li> <li>Longitudinal Integrated Clerkships (LIC):               <ul style="list-style-type: none"> <li>Year 3 – centred on secondary care.</li> <li>Year 4 – integrated primary and secondary care rotations across the life cycle of child health, women's health, ageing and mental health.</li> </ul> </li> <li>Quality improvement project in year 4</li> <li>Case-based learning</li> </ul>
Preparation for Practice (5)	Clinical elective Consolidation of learning through rotations in primary care, acute care, and chronic care Final year assistantship in primary and secondary care

**Table 2:** Helical themes and sub-themes in C25

Helical Theme	Sub-themes
	<div> <b>G</b> <ul style="list-style-type: none"> <li>Public and Population Health</li> <li>Global Health</li> <li>Cultural Competence, equality and diversity</li> <li>Interface between care settings</li> <li>Social determinants of health</li> <li>Social accountability and sustainable healthcare</li> </ul> </div> <div> <b>C</b> <ul style="list-style-type: none"> <li>Clinical reasoning</li> <li>Clinical skills</li> <li>Consultation and communication skills</li> <li>Clinical research and scholarship</li> <li>Prescribing</li> <li>Biomedical and behavioural science</li> </ul> </div> <div> <b>A</b> <ul style="list-style-type: none"> <li>Professional behaviour</li> <li>Ethics and law</li> <li>Raising concerns, safeguarding and duty of candour</li> <li>Self-directed and lifelong learning</li> <li>Self-care, wellbeing and resilience</li> <li>Teaching</li> </ul> </div> <div> <b>T</b> <ul style="list-style-type: none"> <li>Leadership and followership</li> <li>Teamwork and interprofessional education</li> <li>Communication and negotiation skills</li> <li>Quality improvement</li> <li>Dealing with risk and uncertainty</li> <li>Healthcare systems</li> </ul> </div>

Designated academic leads have been appointed for each theme to ensure integration and representation in curriculum content (for example, case-based learning) and assessment (in OSCEs and progress test) throughout the course.

### *Case-based learning*

Case-based learning (CBL) is defined as “preparing students for clinical practice, through the use of authentic clinical cases. It links theory to practice, through the application of knowledge to the cases, using inquiry-based learning methods.”<sup>8</sup> Curricular material (such as biomedical, social, public health and clinical sciences) is integrated within ‘real-life’ clinical scenarios which are studied independently or in groups. CBL is a more guided form of inquiry than PBL (problem-based learning), fostering deeper learning whilst preventing pursuit of unfocussed or unnecessary outcomes.<sup>9</sup>

CBL delivery varies<sup>9</sup>; in C25 CBL is the skeleton anchoring all the other learning material throughout years 1 and 2 of the course. At the beginning of a 2-week-long cycle, groups of 9 or 10 students are presented with a clinical scenario which is aligned with defined learning outcomes. Video clips, animations, dialogue between family members and results of investigations all provide authenticity. Students work together to clarify the issues raised, identify gaps in learning and write learning objectives. A trained, non-expert facilitator who has a list of essential, desirable and less-desirable outcomes, guides discussion to avoid students missing the point or going off on a tangent. Students then work independently on the outcomes, producing shared learning notes which are presented at the second meeting several days later. Further information is provided and the process repeated. Students meet again towards the end of the 2 weeks. Other lecture, tutorial, practical and skills-based teaching throughout the cycle align with the essential case outcomes.

There is good evidence<sup>8,9</sup> that CBL is enjoyed by both learners, who believe it fosters deeper learning, and teachers who appreciate active student engagement. CBL promotes integration of knowledge. Amongst undergraduates, assessment results are similar to those of students taught in traditional, lecture-based courses, although knowledge retention amongst weaker students is improved. Interventions using CBL to deliver continuing professional development have demonstrated improvements in patient care<sup>9,10</sup>. Some studies report student concerns about not covering the core learning outcomes adequately for assessment<sup>8</sup>. In C25, this is addressed by clear facilitator notes, and a final wrap-up lecture by the case-writer to the entire cohort.

### *Longitudinal integrated clerkships (LICs)*

In C25, a series of short discipline-specific rotations in years 3 and 4 of the course are replaced with LICs. LICs emphasise continuity in workplace-based learning; continuity in time (LICs are longer than traditional placements), location (students move around less), supervision (students get to

know their supervisor) and care (students follow patients through their admission). Participation in day-to-day clinical activities is fostered. Students are taught and achieve learning outcomes across multiple disciplines simultaneously<sup>11-13</sup>.

In year 3 (beginning 2022), students will complete two, 14 week-long LICs in both a district and tertiary hospital. They are allocated to base wards in medical and surgical disciplines. Although students are allocated to different wards, they have to achieve the same generic learning outcomes, participating in a coordinated programme of online-learning, and completing a range of clinical task (supervised histories and examinations, clinics and theatre attendances). An average of 1 session per week is spent in primary care, focusing on patient journeys between primary and secondary care.

In year 4 (beginning 2023), students will complete integrated primary and secondary care placements across the life cycle of child health, women’s health, cancer, ageing and mental health.

An extensive literature exists to support the effectiveness of LICs<sup>11-13</sup>. In comparison to students in traditional block rotations, students in LICs have better communication skills and understanding of the biopsychosocial needs of patient. They participate more in care, feel more confident in doing so, and develop a stronger professional identity. Through continuity of supervision, they receive more feedback matched to their developing skills.

Student assessment performance is reported as identical to, or better than traditional rotations<sup>11,13</sup>. Partly this is due to the well-known positive benefits of ‘spaced learning’ and ‘interleaving’. Students in a range of disciplines, including medicine, retain and apply knowledge better if a topic is taught alongside other topics, and revisited several times<sup>14</sup>. LICs counteract the pattern of ‘learn, assess, forget’ associated with medical student learning in block rotations.

It is important to note that students frequently experience a degree of disorientation when first exposed to LICs; student and supervisor preparation is critical to success<sup>11,13</sup>.

### *More time in primary care*

The most compelling reason for increasing placement time in general practice is that it is where 90% of clinical encounters between doctors and patients occur. Therefore training in authentic medical practice requires that students spend substantial time in primary care<sup>3,15</sup>.

In C25, students will spend 25% of clinical placement time in primary care, weighted towards the senior years of the course, achieving the target set by the Royal College of General Practice<sup>16</sup>.

Compared with experience in secondary care placements, students in primary care report a range of benefits including (a) seeing a greater number and range of patients (b) enhanced understanding of patients’ experiences and





feeling of empathy towards them (c) improved confidence in managing complexity and uncertainty (d) excellent opportunities to practise history, examination, and clinical reasoning skills in a range of disciplines, and receiving individualised feedback about them<sup>15, 17</sup>. Primary care placements provide the opportunity to integrate learning, a major aim of C25.

Building placement capacity requires time, funding, and most importantly a change in attitude towards the importance of the task amongst both primary and secondary care doctors<sup>15-17</sup>. QUB is extremely grateful to colleagues in Northern Ireland who are rising to this challenge.

### Progress Testing

Progress testing (PT) is longitudinal assessment of students' knowledge, pitched at final year level, with tests repeated several times per year for each year of the course. Results are accumulated over the year to make progression decisions<sup>18</sup>. Assessment 'growth charts' can be produced, providing excellent feedback to individual students, cohorts and teachers<sup>19</sup>.

In C25, PT comprises the main element of written summative assessment. Students will sit one formative test in year 1, and a series of summative tests in years 2-4. Written finals, the Acquired Knowledge Test (AKT) element of the GMC Medical Licensing Assessment, are held a year before graduation. All students in each year take the same test at the same time. The tests will be tagged and weighted to AKT domains. Approximately 20% of the questions will cover biomedical and public health science.

There is evidence that PT integrates learning, reduces exam stress, encourages deeper and consistent learning, primes students for future learning and focuses teaching for lecturers<sup>18, 19</sup>. The domain-focused feedback generated by each test has been shown to improve performance in licensing examinations<sup>18</sup>.

Generating high-quality questions is facilitated by collaborative arrangements with other medical schools<sup>20</sup>. QUB has entered a consortium with this purpose with several other UK universities.

### CONCLUSION

C25 represents a step-change in curriculum delivery in QUB. We thank all colleagues who have helped us get this far, and welcome future involvement in the delivery of this innovative, relevant and integrated curriculum.

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