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On behalf of the Tuning Project (Medicine) Steering Group and Task Force 1 of the MEDINE Thematic Network

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Executive Summary

The Tuning Project began in 2000 as an initiative funded by the European Commission to develop common core learning outcomes/competences for degree programmes in Europe. It aimed to promote harmonisation in the Higher Education sector in support of the Bologna Declaration and subsequent developments.

Beginning in 2004, the Tuning (Medicine) Task Force has now generated and gained widespread consensus on a set of learning outcomes for primary medical degree qualifications in Europe. The work has been done under the auspices of the MEDINE Thematic Network for Medical Education in Europe, and was funded by the European Commission. The outcomes take account of previous work on learning outcomes in medicine. They have been generated through an extensive iterative process of expert review and development, and have been the subject of a Europe-wide internet-based opinion survey and subsequent detailed analysis. These have now been approved by the MEDINE Thematic Network and validated by an Expert Panel of the European Commission.

The outcomes are expressed as a two-level model, with 12 major 'Level 1' outcomes, each being further defined by a set of more detailed 'Level 2' outcomes. A further set of outcomes has been defined under the heading "Medical professionalism" – many of which are common to graduates of other disciplines in Higher Education. The Level 1 outcomes and 'Medical professionalism' are suitable for implementation as "curriculum themes", and applications such as blue-printing of assessment programmes. The Level 2 outcomes may be used to determine discrete items of teaching, learning and assessment.

The outcomes are available for use by educational managers in curriculum planning, or as part of quality enhancement or quality assurance processes. These would provide the core learning outcomes of a primary medical degree programme, although each country, medical school and student would also be expected to achieve additional learning outcomes tailored to their local and individual needs. If applied appropriately and linked to effective assessment, this approach allows each school or country to have a distinct profile and to focus on particular areas of strength (e.g. research, professionalism, patient safety) while still ensuring that all of their graduates are fit for practice as a doctor in Europe.

Background

Medical education within the European community is regulated by EU Council Vocational Directives. Primary medical degree qualifications and postgraduate specialist qualifications obtained anywhere within Europe must be formally recognised in all other European countries (*EU Parliament and Council Directives 81/1057/EEC, 1981; 2005-36-EC, 2007*). Despite this legislative framework, there is a scarcity of data on the comparability and standards of such qualifications. For example, the Directive concerning primary medical degree qualifications states that the graduate must have spent 5,500 hours or 6 years under instruction at an accredited medical school; but contains only a very basic statement about the subjects to be studied (*EU European Parliament and Council Directive 2005/36/EC, 2007*).



The Bologna Declaration

The issue of 'Freedom of movement' for graduates applies not just to medicine, but across all of European Higher Education and postgraduate vocational training. Such concerns led to the Bologna Declaration (European Ministers of Education, 1999) and the ongoing 'Bologna Process' which seeks to create a system of easily readable and comparable degrees and the establishment of a European Higher Education Area. Action lines of the Bologna Process include:

1. A three-cycle system of higher education degrees - Bachelors, Masters and Doctorate - normally equating to two or three years of study each. The "Dublin Descriptors" are generic outlines of the level of academic achievement for each cycle (Joint Quality Initiative informal group, 2004).
2. A qualifications framework describing the typical learning outcomes/competences for each cycle and discipline.
3. A European Credit Transfer System (ECTS).
4. The Diploma Supplement (a common format for documenting degrees).
5. The development of European quality assurance standards for Higher Education.

Implementation of the Bologna principles across Europe has been variable. Some countries declare their Higher Education provision "Bologna compliant". In others, the Bologna Process has not yet had a significant impact.

The Tuning Project

Making vocational degree qualifications comparable and easily readable is at the heart of the Bologna Process. Methods of achieving this based purely on duration of study are fallible and give little information as to how graduates will perform in the workplace. A more robust outcome-based approach was developed by the Tuning Project (<http://tuning.unideusto.org/tuningeu>), a sector-wide project to agree learning outcomes/competences for all disciplines in Higher Education in Europe. Initiated in 2000, the Tuning Project is led by Julia González (University of Deusto) and Robert Wagenaar (University of Groningen). Several disciplines, including nursing, developed learning outcomes during the initial phases of the Tuning Project (*Tuning Educational Structures in Europe. Final Report, Phase 2, 2005*).



Definitions - Learning Objectives, Outcomes and Competences

For the purposes of the Tuning Project, the following definitions are used:

Learning objectives are specified by teaching staff. They describe particular items of learning related to a component of a degree programme, such as a lecture, tutorial, module or attachment.

Learning outcomes are also set and described by teaching staff, but refer to the whole degree programme and relate to the point of graduation. They are usually specified with a hierarchy of levels, with a top level consisting of large domains of learning. Within each of these domains, subsidiary outcomes are described, with increasing levels of granularity (Harden RM, 2002).

Competences are acquired by, and belong to, students or graduates, rather than teachers. For a graduate who has successfully completed the degree programme, their competences should be at least equivalent to the prescribed learning outcomes (although they are very likely to have developed further in particular areas of learning). In that sense, when referring to the point of graduation, specified learning outcomes can be viewed as equivalent to core graduate competences, and the same descriptors can be used. In the Tuning Project the terms are often used interchangeably.



The Tuning Project (Medicine)

The Tuning Project (Medicine) began in 2004, under the auspices of the MEDINE Thematic Network for Medical Education in Europe, coordinated by the University of Bristol (<http://www.bristol.ac.uk/medine>). The Tuning Project (Medicine) is led by the University of Edinburgh, with a local steering group and a European Task Force (Appendix C).

Previous work

A great deal of work has already been done to define curriculum-level outcomes/competences for medical education. Some well-known examples are “Tomorrow’s Doctors” (UK General Medical Council, 2003); the “Scottish Doctor” document (Scottish Deans Medical Curriculum Group, 2002); the Global Minimum Essential Requirements (Institute for International Medical Education, 2005); guidance issued by the Association of American Medical Colleges (1998); and the CANMEDS Competency Framework, designed primarily for postgraduate medical training (Frank JR, 2005). Many other national and institutional outcomes frameworks have been developed in Europe and elsewhere.

Process and methods

The Tuning Project (Medicine) was funded by the European Commission on the basis that the methodology would be similar and results comparable with the “parent” Tuning Project (*Tuning Educational Structures in Europe. Final Report, Phase 2, 2005*).

It involved the following procedures:

- 1. Review of existing frameworks.** Existing learning outcomes/competency frameworks were reviewed by the Project steering group.
- 2. Development of draft framework.** A preliminary draft learning outcomes framework for Tuning (Medicine) was generated by the Project steering group.
- 3. Tuning workshops.** In a series of European workshops, members of the Tuning

(Medicine) Taskforce sequentially reviewed and refined the draft document in the light of expert opinion and the Internet opinion survey (see below). Workshops were held in Budapest (April 2005), Amsterdam (September 2005), Edinburgh (February 2006), Prague (May 2006), Genoa (September 2006), Oslo (May 2007) and Antalya (September 2007). In addition, presentations of the draft framework were made and feedback obtained at numerous other meetings in Europe and elsewhere.

- 4. Web-Based Opinion Survey.** Tuning methodology specifies an opinion survey, to include academics, graduates and employers, who are asked to rate learning outcomes in terms of their importance for graduates. Ratings were averaged and the outcomes arranged in rank order. These rankings inform the formulation of the final outcomes framework by the Task Force.

For Tuning (Medicine), a detailed questionnaire was created using an online survey instrument (www.surveymonkey.com) in English and translated into German and French. The survey asked respondents to rate 115 learning outcomes as *essential*, *very important*, *quite important* or *not important* for a primary medical degree qualification.

The first section consisted of twelve **Level 1 outcomes** which together were felt to encompass the competences required of medical graduates.

The second section included, under each Level 1 outcome, a series of **Level 2 outcomes**.

The third section consisted of the generic outcomes for Higher Education degrees previously agreed by the main Tuning Project. It was found that these generic outcomes encompassed many aspects of **professionalism**, as understood in medical schools.

Respondents were also asked to rate the importance of 39 **knowledge domains** related to medical practice, and 14 **practice settings** in which students might gain experiential learning.

The online questionnaire was open from March to October 2006. 1302 responses were obtained, with responses from all European member states with medical schools. Ranking of the outcomes and detailed statistical analysis of the responses was carried out looking for cluster effects such as national influences and differences between categories of respondents. Free text comments underwent

qualitative analysis using the NVivo7 software tool. All data and analyses were evaluated and interpreted in Tuning taskforce workshops.

- 5. Approval by the MEDINE Thematic Network.** The ranked outcomes/competences, outputs of statistical analysis and qualitative analysis of free text responses, were presented to the MEDINE Thematic Network meeting, Oslo, May 2007. The outcomes framework was approved at the Final Meeting of MEDINE, Antalya, Turkey, September 2007.
- 6. Validation by European Commission Expert Panel.** The final outcomes framework, as part of a "Tuning Brochure" for medicine, was presented at a Sectoral Validation Conference, Brussels, June 2007. An Expert Panel, external to the Tuning Task Force and invited by the European Commission, reviewed the outcomes framework and met with members of the Task Force. The Expert Panel endorsed the approach of the project and content of the outcomes framework.
- 7. Final report to the European Commission.** The final report and outcomes framework were presented to the European Commission in January 2008.

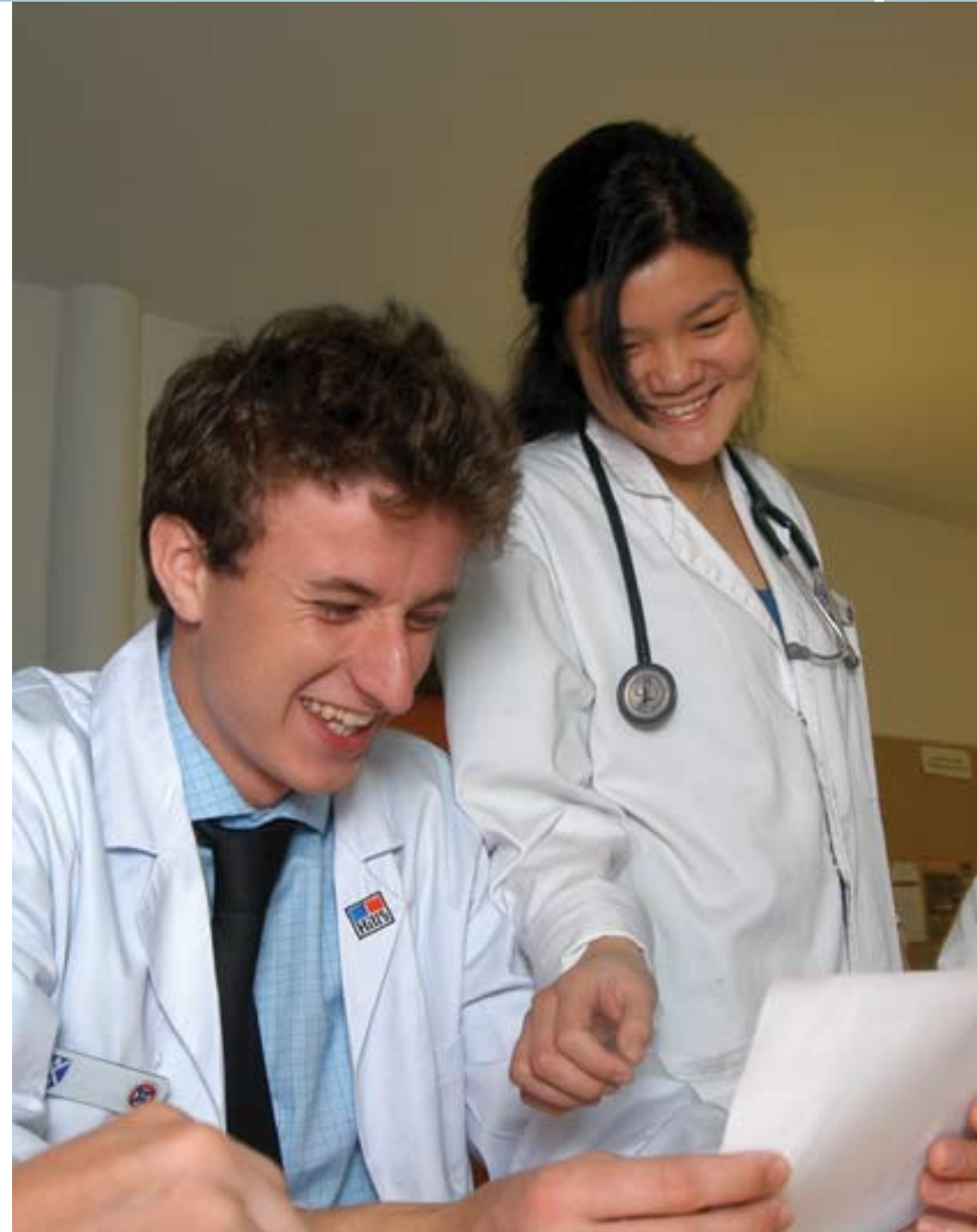


The Tuning Learning Outcomes/ competences for Primary Medical Degrees in Europe

Level 1

Graduates in medicine will have the ability to:

- carry out a consultation with a patient (history, examination ...)
- assess clinical presentations, order investigations, make differential diagnoses, and negotiate a management plan
- provide immediate care of medical emergencies, including First Aid and resuscitation
- prescribe drugs
- carry out practical procedures (e.g. venepuncture)
- communicate effectively in a medical context
- apply ethical and legal principles in medical practice
- assess psychological and social aspects of a patient's illness
- apply the principles, skills and knowledge of evidence-based medicine
- use information and information technology effectively in a medical context
- apply scientific principles, method and knowledge to medical practice and research
- work effectively in a health care system and engage with population health issues



Level 2 (the relevant Level 1 outcomes are shown in bold parenthesis)

Graduates in medicine will have the ability to:

'Carry out a consultation with a patient'

- take a history
- carry out physical examination
- make clinical judgements and decisions
- provide explanation and advice
- provide reassurance and support
- assess the patient's mental state

'Assess clinical presentations, order investigations, make differential diagnoses, and negotiate a management plan'

- recognise and assess the severity of clinical presentations
- order appropriate investigations and interpret the results
- make differential diagnoses
- negotiate an appropriate management plan with patients and carers

'Provide immediate care of medical emergencies, including First Aid and resuscitation'

- recognise and assess acute medical emergencies
- provide basic First Aid
- provide Basic Life Support and Cardio-Pulmonary Resuscitation according to current European guidelines
- treat acute medical emergencies
- provide Advanced Life Support according to current European guidelines
- provide trauma care according to current European (ATLS) guidelines

'Prescribe drugs'

- prescribe clearly and accurately
- match appropriate drugs to the clinical context
- review the appropriateness of medication and evaluate the potential benefits and risks
- prescribe drugs to treat pain and distress

'Carry out practical procedures (e.g. venepuncture)'

- measure blood pressure
- venepuncture
- cannulation of veins
- administer IV therapy and use infusion devices
- subcutaneous and intramuscular injection
- administer oxygen
- move and handle patients
- suturing
- blood transfusion
- bladder catheterisation
- urinalysis
- electrocardiography
- basic respiratory function tests

'Communicate effectively in a medical context'

- communicate with patients
- communicate with colleagues
- communicate in breaking bad news
- communicate with relatives
- communicate with disabled people
- communicate in seeking informed consent
- communicate in writing (including medical records)
- communicate in dealing with aggression
- communicate by telephone
- communicate with those who require an interpreter

'Apply ethical and legal principles in medical practice'

- maintain confidentiality
- apply ethical principles and analysis to clinical care
- obtain and record informed consent
- certify death
- request autopsy
- apply national and European law to clinical care

'Assess psychological and social aspects of a patient's illness'

- assess psychological factors in presentations and impact of illness
- assess social factors in presentations and impact of illness
- detect stress in relation to illness
- detect alcohol and substance abuse, dependency

'Apply the principles, skills and knowledge of evidence-based medicine'

- apply evidence to practice
- define and carry out an appropriate literature search
- critically appraise published medical literature

'Use information and information technology effectively in a medical context'

- keep accurate and complete clinical records
- use computers
- access information sources
- store and retrieve information

'Ability to apply scientific principles, method and knowledge to medical practice and research'

- no specified level 2 outcomes

'Work effectively in a health care system and engage with population health issues'

- provide patient care which minimises the risk of harm to patients
- apply measures to prevent the spread of infection
- recognise own health needs and ensure own health does not interfere with professional responsibilities
- conform with professional regulation and certification to practise
- receive and provide professional appraisal
- make informed career choices

Outcomes for Medical Professionalism

Professional attributes

- probity, honesty, ethical commitment
- commitment to maintaining good practice, concern for quality
- critical and self-critical abilities, reflective practice
- empathy
- creativity
- initiative, will to succeed
- interpersonal skills

Professional working

- ability to recognise limits and ask for help
- ability to work autonomously when necessary
- ability to solve problems
- ability to make decisions
- ability to work in a multidisciplinary team
- ability to communicate with experts in other disciplines
- ability to lead others
- capacity to adapt to new situations
- capacity for organisation and planning (including time management)

The doctor as expert

- capacity for analysis and synthesis
- capacity to learn (including lifelong self-directed learning)
- capacity for applying knowledge in practice
- ability to teach others
- research skills

The global doctor

- appreciation of diversity and multiculturalism
- understanding of cultures and customs of other countries
- ability to work in an international context
- knowledge of a second language
- general knowledge outside medicine



Comment

During the Tuning workshops the outcomes were extensively discussed and debated, latterly informed by the results of the opinion survey. This process of discussion and agreement was at the heart of the Tuning (medicine) project. For example, “Ability to provide evidence to a court of law” was rated very low by respondents as a core outcome and so was removed as a Level 2 outcome. “Ability to provide care of the dying and their families” and “Ability to manage chronic illness”, originating in the analysis of free text response, were added.

Particular mention should be made of research and research skills. The original draft included the following Level 2 outcomes:

- Ability to design research experiments
- Ability to carry out practical laboratory research procedures
- Ability to analyse and disseminate experimental results

These were rated very low by respondents in terms of importance for all graduates as core outcomes of the primary medical degree. This gave rise to vigorous debate in the workshops and the MEDINE network. The conclusion was that under the Level 1 outcome ‘Ability to apply scientific principles, method and knowledge to medical practice and research’, no specific Level 2 outcomes should be included. Similarly, “Research skills”, with no further specification, is included as an outcome under Medical professionalism. This leaves it open to individual countries, schools or students to decide how to prioritise practical research experience, in keeping with their profile, educational philosophy or career intentions.

The final output of the Tuning (Medicine) Project is a set of learning outcomes/competences which draws on previous work on learning outcomes in medicine, has been generated through an iterative process of expert review and refinement, has been the subject of a Europe-wide internet-based opinion survey and subsequent analysis, and which has been approved by the MEDINE Network and an Expert Panel of the European Commission.

Using The Tuning (Medicine) Learning Outcomes

Curriculum development

Tuning is not an attempt to achieve rigid curricular uniformity – indeed one advantage of an outcomes-based approach is that diversity in educational process and curriculum structure can be preserved. Individual schools can also select additional learning outcomes in order to develop or preserve a distinct educational profile – for example, a specific emphasis on research-related experience and skills - without compromising the essential competence of their graduates and their fitness to care for patients.

The structure of the outcomes framework has been chosen to be useful to those involved in planning and designing new undergraduate medical degree programmes. The Level 1 outcomes describe domains of teaching, learning and assessment that lend themselves to becoming “curriculum themes”, with defined academic leadership and dedicated resources. The Level 2 outcomes can help to define the content of such themes in terms of teaching, learning and assessment. The Professionalism outcomes are relevant when addressing the personal and professional development and fitness to practise of medical students. In future work we aim to document best practice in learning, teaching and assessing these outcomes. Meantime useful information on outcome-based assessment can be accessed through the Scottish Doctor website (<http://www.scottishdoctor.org>).



Collaborative working

Previous outcomes statements such as the “Scottish Doctor” (Scottish Deans Medical Curriculum Group, 2002) have proved to be a useful framework and stimulus for collaborative working between institutions, for example on the use of shared assessment items. Similar collaborations will be possible using the Tuning (Medicine) outcomes.

Mobility

It seems likely that schools which share a common set of graduating learning outcomes will find it much more straightforward to exchange students and staff, particularly in the later parts of the curriculum. Similarly, assurance that graduates have achieved the necessary learning outcomes is likely to facilitate mobility of doctors in Europe and provide reassurance to employers and patients.

Quality enhancement and quality assurance

Consideration of a medical school’s graduating outcomes in relation to an agreed framework should be an integral part of quality assurance and accreditation, sitting alongside evaluation of education process and infrastructure. Recently developed methodologies permit systematic mapping of one outcomes framework against another, so that a school’s learning outcomes could simply be cross-referenced against the European framework (Ellaway, R et al, 2007). Although it is likely that national systems of quality assurance and accreditation will continue to predominate in Europe, the Tuning outcomes can support a developing European dimension in medical education as part of a harmonisation process.

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Appendix A: Knowledge Outcomes

Although not formally part of Tuning methodology, the web-based questionnaire survey also sought opinion about important areas of knowledge for medical graduates. The ranked results are shown below. In general, the highest scores and rankings related to knowledge of traditional scientific disciplines which underpin medical practice, such as physiology, anatomy, biochemistry, and immunology, together with clinical sciences such as pathology, microbiology and clinical pharmacology. The lowest ranking related to knowledge of “different types of complementary / alternative medicine and their use in patient care”.

Graduates from medical degree programmes in Europe should be able to demonstrate knowledge of:

‘Basic Sciences’

- Normal function (physiology)
- Normal structure (anatomy)
- Normal body metabolism and hormonal function (biochemistry)
- Normal immune function (immunology)
- Normal cell biology
- Normal molecular biology
- Normal human development (embryology)

‘Behavioural and social sciences’

- Psychology
- Human development (child/adolescent/adult)
- Sociology

‘Clinical Sciences’

- Abnormal structure and mechanisms of disease (pathology)
- Infection (microbiology)
- Immunity and immunological disease
- Genetics and inherited disease

‘Drugs and prescribing’

- Use of antibiotics and antibiotic resistance
- Principles of prescribing
- Drug side effects
- Drug interactions
- Use of blood transfusion and blood products
- Drug action and pharmacokinetics
- Individual drugs
- Different types of complementary / alternative medicine and their use in patient care

‘Public Health’

- Disease prevention
- Lifestyle, diet and nutrition
- Health promotion
- Screening for disease and disease surveillance
- Disability
- Gender issues relevant to health care
- Epidemiology
- Cultural and ethnic influences on health care
- Resource allocation and health economics
- Global health and inequality

‘Ethical and legal principles in medical practice’

- Rights of patients
- Rights of disabled people
- Responsibilities in relation to colleagues

‘Role of the doctor in health care systems’

- Laws relevant to medicine
- Systems of professional regulation
- Principles of clinical audit
- Systems for health care delivery

Appendix B: Clinical Attachments and Experiential Learning

Although not formally part of Tuning methodology, the web-base questionnaire survey also sought opinion about which areas of clinical medical practice were most important to be included as part of the core undergraduate medical school programme. The ranked results are shown below. In general, the highest rankings related to acute medical and surgical care settings, with community and primary care also ranking highly. The lowest rankings related to areas of specialised surgical and medical practice.

Medical graduates should have experienced clinical work in these areas:

- Care of acutely ill patients in Casualty / Accident and Emergency units
- Care of general (internal) medical patients in medical admission units
- Care of general surgical patients in surgical admission units
- Care in the community/family practice/primary care
- Care for elderly patients
- Care for sick children
- Care for the dying, palliative care
- Care for mentally ill patients
- Obstetric and gynaecological care
- Care for critically ill patients in Intensive Care Units
- Care of patients with specialised medical conditions (eg haematology, renal)
- Anaesthetic care
- Rehabilitation medicine
- Care of patients with specialised surgical conditions (eg cardiac surgery, urology)

Appendix C

Membership of Steering Group, Tuning Project (medicine), 2004 - 07

Allan Cumming (Chair)	Gaynor Lloyd-Jones (2004-5)
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Membership of Task Force, Tuning Project (Medicine), 2004 – 07

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