**Evidence-Based Medicine curriculum (2013-2014)**

The core teaching for evidence-based medicine occurs in the following areas:

* Year 1 & 2: Stats
* Year 2: Preclinical & FHS
* Year 4:
* Laboratory Medicine
* Surgery
* Year 5: Public Health – (
* Graduate Entry Year 1

**Global Competencies for EBM:**

The core competencies for Evidence-Based Medicine that may appear in many parts of the course include:

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| Principles and Basic Practices of Evidence Based Medicine |
| 1. Describe and apply to a clinical case the basic principles of EBM. |
| 1. Describe how EBM, clinical experience and individual patient issues interact. |
| 1. Describe the limitations of EBM. |
| 1. Describe the interaction of EBM and health care policies. |
| **Question formulation** |
| * + 1. Describe how to formulate an answerable, searchable question. |
| * + 1. Identify the type of clinical question (e.g. treatment, prognosis, aetiology). |
| * + 1. Describe where and how to look for information to answer different types of clinical questions at the point of care (when answers are needed quickly). |
| * + 1. Describe where and how to look for answers to different types of clinical questions when clinical decisions can wait. |
| **Critical Appraisal** |
| 1. How to read a scientific paper - what are the component parts of a basic scientific paper \*\* |
| 1. Assess the primary literature - how to retrieve primary studies and how to design studies of effectiveness for basic sciences. |
| 1. Distinguish relevant from irrelevant evidence. |
| 1. Define and apply criteria to medical information to determine relevance when answering clinical questions. |
| 1. Describe a hierarchical approach to levels of evidence specific to types of conclusions. |
| 1. Identify the most valid study design for studies of therapy, prognosis, and diagnosis. |
| 1. Determine methodological quality of evidence, assessing the following types of studies for validity (identify important threats to validity and identify critical flaws in study design): |
| * + - a therapeutic study |
| * + - a prognosis study |
| * + - a diagnostic study |
| * + - a clinical prediction guide study |
| * + - a practice guideline |
| * + - a systematic or meta-analysis review |
| * + - a health economics study |
| * + - a case-control study |
| **Determining the clinical significance of results.** |
| 1. Clinically interpret the results of an RCT, including concepts of RRR vs. ARR, how to determine NNT, p values, confidence intervals, risk/benefit analysis, and balancing NNT and NNH. |
| 1. Calculate and interpret pre-test and post-test probabilities, (sensitivity, specificity, PPV, NPV, likelihood ratios), test/treatment thresholds. |
| 1. Describe and distinguish between statistical and clinical significance. |
| 1. Describe criteria for what makes a good screening test and apply the criteria to screening tests. |
| **Implementing Evidence for patient care** |
| 1. Communicate evidence to patients, describing how values can introduce appropriate and inappropriate biases into patient-physician communications. |
| 1. Integrate evidence into common clinical presentations |
| 1. Use the information in relation to patient care, health promotion, giving advice and information to patients, and research and education |
| 1. Understand and have experience of the principles and methods of improvement, including audit |
| 1. Access information sources and use the information in relation to patient care, health promotion, giving advice and information to patients, and research and education |

**The core competencies for EBM map to the GMC tomorrow’s doctor in the following areas:**

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| **Outcomes 1: The doctor as a scholar and a scientist** | |
| **Domain 11** | **Apply to medical practice the principle, methods and knowledge of population health and improvement of health and healthcare** |
| c | Describe measurement methods relevant to the improvement of clinical effectiveness and care |
| d | Discuss the principles underlying the development of health and health services policy, including issues relating to health economics and equity, and clinical guidelines. |
| **Domain 12** | **Apply scientific methods and approaches to medical research** |
| a | Critically appraise the results of relevant diagnostic prognostic and treatment trial and other qualitative and quantitative studies as reported in the medical literature |
| b | Formulate simple relevant research question on biomedical sciences, psychosocial science or population science, and design appropriate studies or experiments to address these questions |
| c | Apply findings from the literature to answer questions raised by specific clinical problems |
| **Outcomes 2: The doctor as a practitioner** | |
| **Domain 14** | **Diagnose and manage clinical presentations** |
| **f** | Make clinical judgments and decisions based on the level of evidence, in conjunction with colleagues and as appropriate for the graduate’s level of training and experience, this may include situations of uncertainty |
| **Domain 19** | **Use information effectively in a medical context** |
| d | Access information sources and use the information in relation to patient care, health promotion, giving advice and information to patients, and research and education |
| **Outcomes 3: The doctor as a professional** | |
| **Domain 21** | **Reflect, learn and teach others** |
| a | Acquire, assess apply and integrate new knowledge, learn to adapt to changing circumstances and ensure that patients receive the highest level of professional care. |
| c | Continually and systematically reflect on practice and, whenever necessary, translate that reflection into action, using improvement techniques and audit appropriately for example, by critically appraising the prescribing of others. |
| **Domain 23** | **Protect patients and improve care** |
| e | Understand and have experience of the principles and methods of improvement, including audit, adverse incidence reporting and quality improvement, and how to use the results of audit to improve practice |

**Public health learning objectives 2013-14**

**Public health practice**

*By the end of course, you should be able to:*

* Define public health, and outline the scope of public health in the UK (public health practice, occupational health, communicable disease control, environmental health, population screening, and health promotion).
* Describe where public health specialists work, including health protection and occupational health, at what level, and their career structures and regulation.
* Define the essential public health responsibilities of all clinicians and in what clinical circumstances you would make contact with a public health agency.
* Outline the role of hospitals and primary care in the delivery of public health functions and programmes.
* Demonstrate the ability to record a patient’s history that considers the relevant features of workplace, environment, social and family that may influence risk of disease or prognosis.

**Epidemiology and evidence**

*By the end of the course, you should be able to:*

* Outline the principles and purpose of disease surveillance.
* Describe the sources of routine information about population health and illness, how these data systems are maintained, the role of the clinician in their maintenance and their strengths and weaknesses applied to public health issues
* Describe the main features, advantages and limitations of key epidemiological study designs (case-control, cohort, cross-sectional and ecological)
* Recognise the dangers of false inference from naïve interpretation of data, and explore alternative explanations for research findings (chance, bias, confounding)
* Calculate and interpret measures of disease occurrence (incidence, prevalence, odds) and exposure effect (ratios, risk differences, attributable fractions and number needed to treat /prevent).
* Calculate and interpret measures of the accuracy of diagnostic tests (sensitivity, specificity, predictive values)
* Interpret confidence intervals and p values.
* Appraise the quality of epidemiological studies in the medical literature to a high standard.
* Interpret and communicate the results of research evidence in clinical practice
* Outline objective criteria to establish causality

**Health promotion and disease prevention**

*By the end of the course, you should be able to:*

* Identify the broader determinants of health (the causes of the causes).
* Understand the role of the social determinants in generating health inequities at the global and local levels.
* Apply the concepts of the social determinants of health to diseases and their aetiology.
* Consider integrated, inter-sectoral and participatory approaches to address the social determinants of health, including the role of doctors.
* Discuss examples of public health activities that address health inequalities, with reference to topics encountered in the public health course
* Define the different levels of prevention, and where they are encountered in clinical and public health practice.
* Describe the basic principles and models of health promotion, and apply these concepts to common clinical problems
* Describe the specialist areas in which practitioners carry out health promotion, and outline the doctor’s role in health promotion
* Outline the evidence for effectiveness and impact of individual and population dietary interventions upon health, and how this evidence is reflected in current policy in the UK
* Outline the principles of population screening
* Critique the rationale and schedules for current NHS cancer screening services.
* Outline approaches to monitor & evaluate the performance of a screening programme.
* Explain the relevance of work and the wider environment to health and disease.
* Outline the role and organisation of health protection in the UK.
* Explain when and how to notify or report the occurrence of specific infections and diseases, and outline the types of public health response that may result from notification.
* Identify sources of advice about health protection and occupational health issues and when to contact a regulatory agency about specific workplace or environmental health risks to a patient in clinical practice
* Recognise when to contact a regulatory agency about specific workplace or environmental health risks to a patient in clinical practice.
* Define and apply the key measures used in infectious disease epidemiology (including incubation period, infectious period, latent period, attack rate, herd immunity threshold, basic reproductive number, epidemic, endemic and pandemic)
* Outline the underlying determinants and effective opportunities for control of infectious disease transmission and discuss the influence of these upon their epidemiology and control
* Outline the fundamental concepts of communicable disease control
* Describe the steps in the investigation of outbreaks, disease clusters and contamination events, and know the clinician’s role in this
* Outline key environmental / occupational hazards and the health risks associated with them

**Health services**

*By the end of the course, you should be able to:*

* Define and discuss the concepts of need, demand and supply in relation to population health services.
* Design an approach to summarise population health, disease and health determinants from relevant information in assessing community need for health services.
* Outline the key functions and structures of the health service in England, including primary, secondary and tertiary level care, Clinical Commissioning Groups, NHS Commissioning Board, Public Health England, Health & Wellbeing Boards and the Health & Safety Executive.
* Discuss some of the recent changes in the organisation of the NHS and public health in England.
* Outline the funding of the NHS, consider how decisions on health policy & resource allocation are made at national and local levels, and describe the public health role in this.
* Define and discuss the concepts of equity, equality, opportunity cost, QALY, DALY.
* Compare the main characteristics and measures of key types of economic evaluation: cost-minimisation, cost-effectiveness, cost-utility and cost-benefit.
* Describe the characteristics of health systems, the principle of access free at the point of delivery, priority setting and approaches to fair provision of services and care
* Consider the advantages and disadvantages of different health systems and their methods of funding.

**Syllabus for statistics in preclinical years 1 & 2,**

**Year 1**

* Principles of graph and table construction.
* Introduction to sampling theory: population vs. sample, frequency distributions, variables and types of data, bias and variation.
* Normal distribution: estimation including mean, standard deviation and normal range, standard error and confidence intervals; inability of the normal distribution to describe all continuous data.
* Two-sample analyses: hypothesis testing and confidence intervals for unpaired and paired normal data; chi-squared for proportions, link between estimation and hypothesis testing.
* Dichotomous data: binomial distribution, sampling distribution of proportions including large sample approximations, confidence intervals and hypothesis testing.
* Relating two variables: parametric and non-parametric measures of correlation.

**Year 2**

* Overview of clinical and epidemiological research: clinical vs. statistical significance, iterative loop of research, fundamental equation of error.
* Topics preparatory to critical appraisal: types of observational study; intervention studies including randomized and cross-over trials; introduction to meta-analysis.
* Graphical methods for clinical and biological data including histograms and scatterplots, survival curves, forest plots etc.
* 2 x 2 tables: odds ratios and relative risks and their CIs and interpretation
* Other situations: lognormal distribution, Poisson distribution, use of t-tables for smaller samples.
* Nonparametric statistics: summary measures for non-normal data, introduction to nonparametric hypothesis tests. 11 June 2013 preclin\_stats\_syllabus\_4.0.docx
* Estimation and hypothesis testing in observational studies and trials using normally distributed data, dichotomous data, survival data, linear regression; concepts of adjustment and matching for covariates.

**EBM learning objectives 2013-14**

**EBM thread course**

*By the end of this module students will be able to:*

* Understand the importance of evidence based practice to healthcare and its limitations
* Identify the different type of clinical question (e.g. treatment, prognosis, aetiology).
* Formulate an answerable clinical question
* Search for relevant publications quickly and efficiently
* Describe where and how to look for information to answer different types of clinical questions at the point of care (when answers are needed quickly).
* Access information sources and use the information in relation to patient care, health promotion, giving advice and information to patients, and research and education
* Critically appraise various types of studies relating to treatment, including randomised controlled trials (RCTs), systematic reviews of RCTs, diagnostic studies and systematic reviews of diagnostic studies
* Understand some basic statistical concepts required to interpret studies
* Clinically interpret the results of an RCT, including concepts of RRR vs. ARR, how to determine NNT, p values, confidence intervals, risk/benefit analysis, and balancing NNT and NNH.
* Describe and distinguish between statistical and clinical significance
* Understand how to communicate evidence to patients, describing how values can introduce appropriate and inappropriate biases into patient-physician communications.
* Gain some insight into ethical issues surrounding evidence-based health care
* Describe how EBM, clinical experience and individual patient issues interact.
* Integrate evidence into common clinical presentations and decision making
* Consider translation of evidence into practice.
* Understand use of clinical prediction rules as an aid to diagnosis
* Determine when and how to use NOCE guidance to aid clinical decision making

**Evidence Based Medicine Thread Graduate Entry Medicine Course contents 2013-2014**

* Introduction to course: how to form a question
* Searching for answers
* Study Designs
* Understanding systematic reviews
* Understanding randomised controlled trials
* Statistics 1
* Statistics 2
* Understanding a diagnostic study
* Understanding a data interpretation study
* Evidence based science
* Understanding a prognostic study
* Evidence into practice
* Mock exam: critical appraisal
* Statistics refresher
* Mock exam: data interpretation