

## Appendix 1.

### Methodological framework for clinical audit project scores validation study

Stages in the chain of assessment cycle	Inferences/assumptions in need of close scrutiny in validation	Potential threats to validity	Methodology of validation
Design phase of CAP VQ1	<p>Clinical audit project (CAP) is fit for purpose, i.e. it is aligned with MBBS curriculum outcome statements and externally aligned with AMC Graduate Outcome statements;</p> <p>CAP project is underpinned by sound educational and lifelong learning principles for medical practitioners;</p>	Misalignment	<ul style="list-style-type: none"> <li>- Document analysis to map clinical audit project to learning outcomes in MBBS curriculum and AMC graduate outcome statements</li> <li>- Conceptual analysis; - linking and documenting theoretical foundation for clinical audit and its relevance to lifelong learning and development of medical professionals</li> </ul>
Planning and development phase for CAP in the curriculum and assessment program VQ2	<ol style="list-style-type: none"> <li>1. Students provided with sufficient information about the CAP; they are well motivated; working conditions are fair for all students;</li> <li>2. Sufficient constructive scaffolding activities for students;</li> <li>3. Practicality of CAP project – health services and CQSCs need empirical evidence for service quality improvement</li> </ol>	<ol style="list-style-type: none"> <li>1. Construct-irrelevant variance (CIV) due to lack of information;</li> <li>2. CIV - Lack of consistent scaffolding</li> <li>3. Unintended consequences</li> </ol>	<p>Audit /document analysis of CAP handbook; CAP program timeline (2013-2014)</p> <p>Clarification of how CAP relates to outcomes that are authentic/relevant to clinical practice</p> <p>Analysis of feedback from student surveys; alumni feedback; stakeholder feedback, which is used to modify CAP tasks for future cohorts</p>
Scoring of CAP reports VQ3	<ol style="list-style-type: none"> <li>1. Examiner’s judgments (claims) about student’s performance genuinely reflect students’ ability in the task/domain assessed;</li> <li>2. Scoring process is valid – examiner’s response process in observing/reading student’s CAP report and scoring is based on a valid scoring rubric;</li> <li>3. Scoring rubrics/scales sufficiently capture the most important qualities of student performance, i.e. the targeted cognitive and methodological processes in CA in real clinical practice;</li> </ol>	<ol style="list-style-type: none"> <li>1. CIV in scoring process</li> <li>2. Construct under representation (CUV) in scoring rubric</li> </ol>	<ul style="list-style-type: none"> <li>- Audit of scoring process. Collaborative design of scoring rubric to ensure it aligns with outcomes.</li> <li>- Empirical analysis of scores derived from the scoring instrument for internal consistency; inter- rater reliability;</li> <li>- Conceptual/Document analysis (scoring rubric)</li> </ul>
Generalisation of CAP scores VQ4	<ol style="list-style-type: none"> <li>1. Scores for each criterion in the assessment rubric are consistent across different audit topics chosen;</li> <li>2. Each scoring criterion in the rubric is applicable to a variety of clinical audit topic;</li> <li>3. Scores across different tasks assessed (within the scoring rubrics) are consistent and correlated;</li> <li>4. The criteria assessed in a CAP report covers sufficiently the scope of the project as applied in real clinical setting;</li> </ol>	<ul style="list-style-type: none"> <li>- CIV due to clinical audit topic chosen;</li> <li>- CIV due to low inter-task correlation;</li> <li>- CUV due to too few tasks included as assessed criteria;</li> </ul>	<ul style="list-style-type: none"> <li>- Document analysis and expert opinion - the homogeneity of the assessed domain; the number of tasks required for adequate generalizability;</li> <li>- Document analysis/audit of CAP planning and development process</li> <li>- Empirical analysis of CAP scores – for internal consistency between section scores</li> </ul>
Aggregation of CAP scores VQ5	<ol style="list-style-type: none"> <li>1. Aggregation of scores from individual scoring items to be the overall CAP project score is valid;</li> <li>2. Aggregation of sub-section scores from the formative assessment of student’s CAP proposal is meaningful for student in guiding their next step in learning on clinical audit project</li> </ol>	<ul style="list-style-type: none"> <li>- CUV</li> </ul>	<ul style="list-style-type: none"> <li>- Empirical analysis of scores – internal consistency reliability of overall scores; subsection scores</li> </ul>

<p>Extrapolation of CAP scores– CA scores aggregated with marks from all other assessment components <b>VQ6</b></p>	<p>Extrapolation from CAP scores to overall competence as a safe intern (the target domain) is valid</p> <p>The scores in CAP is a predictor of performance in the clinical practice workplace upon graduation</p>	<p>- Inconsistency in internal structure between CAP scores and scores from all assessment modalities</p>	<p>1. Empirical analysis of clinical audit score data for the following:  a. internal consistency between CAP scores and scores from all summative assessment components forming part of the overall aggregate score for fourth year students;  b. Correlation between CAP scores and scores from all other summative assessment components;</p> <p>2. Conceptual analysis - alignment between competency in CAP and overall competence as</p>
<p>Interpretation of CAP Scores <b>VQ7</b></p>	<p>CAP scores are evaluated with reference to the standard set pass mark and standard error of measurement (SEM) which is determined credibly</p>	<p>- CIV due to the meaning and value of scores failed to be translated accurately to the final scores used for final evaluation / judgement;  - Inadequately supported construct language used in scores interpretation</p>	<p>- Document analysis and decision making process audit:</p>
<p>Decision &amp; Actions based on CAP scores – <b>VQ8</b> <i>CAP scores are evaluated to identify students who have demonstrated serious deficiency</i></p>	<p>Decision made based on CAP scores is underpinned by an explicit decision rules, explained to examiners and students</p>	<p>CIV</p>	<p>- Document analysis – decision rules; form of reporting or feedback to be used</p>
<p>Consequences /Educational Impact – <b>VQ9</b></p>	<p>CAP brings more positive educational impact and non-significant unintended consequences</p>	<p>Unintended consequences</p>	<p>Analysis of feedback from student surveys; alumni feedback; stakeholder feedback</p>