BACKGROUND

Learning and acquiring surgical skills are of paramount importance to surgical competence in surgical disciplines. Currently, there is much interest to model and refine the teaching and learning of surgical skills informed by theory and empirical evidence. One popular theory of skills acquisition is the cognitive apprenticeship model of cognitive motor learning. This model of skills acquisition is derived from the traditional apprenticeship model. In the traditional model, the majority of cognitive motor learning for surgical skills are initiated and practiced within the operating room (OR), whereby the ‘master’ (attending surgeon) performed the psycho-motor skill which is first observed by the ‘apprentice’ (resident). The master then goes on to attempt the skill under the guidance and help from the master. As the apprentice gradually acquires skills and knowledge necessary to deal with increasingly complex and diverse tasks, the dependency on the master decreases. While this traditional model is gradually acquiring skills and knowledge necessary to deal with increasingly complex and diverse tasks, the dependency on the master decreases. While this traditional model is inadequate for learning surgical skills that has many ‘non-observable’ aspects. In applying the cognitive apprenticeship model (CAM) to teaching and learning of surgical skills, it is recognized that while technical skills might be observable, it is the thinking and reasoning that must be emphasized, and are integral to the skills. The CAM model also adopts the premise that learning and instruction are influenced by social processes that incorporate active participation within organized environments and activities (i.e., ‘situated learning’ within ‘community of practice’). These important principles that are very applicable to surgical learning. The CAM has six components: modeling, coaching, scaffolding, articulating, reflection and exploring.

PURPOSE

The aims of this study are: (1) to evaluate the extent to which the teaching and learning of surgical skills in the Singhealth Otolaryngology residency are aligned to this model, and (2) to explore areas for improvement.

METHODS

Subjects & Context

Eight Senior Residents from the SingHealth Otolaryngology residency were recruited from Changi General Hospital for this study over three 6-month periods. They were observed for the entire duration of various routine surgeries that they performed as the first surgeon under direct supervision with different faculty. The faculty and residents were blinded to the study.

Table 1. Components & features of the Cognitive Apprenticeship Model (CAM) that are used to support & organize learning activity

<table>
<thead>
<tr>
<th>Component</th>
<th>Feature</th>
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<tbody>
<tr>
<td>Modeling</td>
<td>Teacher observes learner performing the skill, offers hints, feedback, comments, &amp; asks for learner feedback.</td>
</tr>
<tr>
<td>Coaching</td>
<td>Teacher observes learner performing the skill, offers hints, feedback, comments, &amp; asks for learner feedback.</td>
</tr>
<tr>
<td>Scaffolding</td>
<td>Teacher observes learner performing the skill, offers hints, feedback, comments, &amp; asks for learner feedback.</td>
</tr>
<tr>
<td>Articulation</td>
<td>Teacher observes learner performing the skill, offers hints, feedback, comments, &amp; asks for learner feedback.</td>
</tr>
<tr>
<td>Reflection</td>
<td>Learner reviews their own cognitive processing, performance, reasoning, etc.</td>
</tr>
<tr>
<td>Exploration</td>
<td>Learner develops models of problem-solving using own experience, &amp; adapts to change.</td>
</tr>
</tbody>
</table>

Scoring & evaluation

The interactions between the mentor and residents were noted and recorded by the same independent observer – the extent to which each of the six components of the cognitive apprenticeship model was manifested was scored on a 4-point scale: 4 = frequently applied, 3 = occasionally applied, 2 = rarely applied, 1 = never. The scores are then expressed as a percentage of all the teaching moments.

RESULTS

The most commonly manifested component of the cognitive apprenticeship model in this study was: ‘modeling’. This was followed by ‘coaching’ and ‘articulation’. ‘Scaffolding’ was less common, while ‘reflection’ and ‘exploration’ were rarely manifested.

DISCUSSION

It appears that the teaching and learning of surgical skills in the OR are somewhat aligned with the CAM. However, the emphasis is more on the technical (‘How’) aspects of the skills and less on the ‘cognitive’ (‘Why’; ‘When’; ‘What’) aspects, as illustrated by the frequency of manifestation of the components. While it is possible that some components might be manifested outside the observed period, the value might be diminished as the immediacy, situated-ness and contextual elements might be lost. These findings might have far-reaching consequences as the residents’ learning might be suboptimal, and they might not be able to internalize and transfer the skills acquired. If no scaffolding, reflection or exploration are applied or facilitated (adequately) during their learning.

Limitations

1. Small number of study subjects and faculties from Otolaryngology Residency. This is inherent to the nature of the Otolaryngology Program that has an intrinsically small number.
2. Continued study and extension to other residency programs and/or other institutions will be very useful and insightful

REFERENCES