Introduction
An orthopaedic surgical trainee requires a fine balance between knowledge acquisition and the development of technical skills. Despite the fact that these two aspects are closely intertwined, surgical technical experience is the essential step in training an orthopaedic surgeon. Traditionally the surgical and technical competence of Residents has been assessed inadequately and has received little attention among the core competencies defined by the Royal College of Physicians and Surgeons of Canada’s CanMEDS programme and the Accreditation Council for Graduate Medical Education (ACGME).

With the development of novel and advanced surgical techniques with different learning curves, time pressure in busy operating rooms, and increasing complexity of cases at university hospitals, acquiring technical skills for Residents has become more challenging. Over the last two decades, methods have been developed to assess technical competence objectively. In this paper we describe use of an Objective Structured Assessment of Technical Skills (OSATS) for total knee replacement (TKR).

KEYWORDS: Knee Arthroplasty, Medical Education, Residency, Orthopaedics. (JPMA 65: S-52 (Suppl. 3); 2015)

Material and Methods
In order to analyse this problem, a literature search was conducted using Eric, Google Scholar, Medline and CINAHL Plus databases from 1985 to March 2013 using...
search terms 'OSATS,' 'surgical competence,' 'total knee replacement' and 'total knee arthroplasty.' In addition to databases, controlled vocabulary, synonyms and truncation were used to identify appropriate references. Boolean operators were used to combine search terms and references. All manuscripts that incorporated an educational perspective regarding medical education and knee replacement were included.

Results and Discussion

The main crux of surgical Residency programmes is to provide training for technical and psychomotor skills to future surgeons. By convention, consultants supervise Residents performing surgery and based on subjective, distant recall of unstructured observation; determine when their trainees have achieved surgical expertise. These assessments have been shown to have poor test-retest and inter-observer reliability. Therefore, based on contemporary concepts of surgical education, valid, reliable assessment tools are required to ensure the competency of future orthopaedic surgeons. Furthermore, these validated objective measures should also be used routinely to gauge Residents' performance as well as for their promotion.

Resident logbooks used currently are often dependent on accurate completion by the trainee and do not allow for real-time feedback and evaluation. These logbooks therefore lack content validity and do not adequately reflect the Residents' technical skills. Therefore, an objective assessment linked to the logged procedure that assesses the Resident's performance would enhance the value of the procedure log in defining the Residents' technical skills. An ideal assessment instrument should provide constructive feedback on performance as well as benchmark standards for credentialing. Over the last two decades, methods have been developed to assess technical competence objectively. Characteristics of an ideal assessment tool are that it should be valid, reliable, feasible, inexpensive, acceptable, easy to implement and ethically appropriate. General surgery programmes have gauged performance by analysis of dexterity, 'blinded' video ratings using structured rating scales and virtual reality surgical simulation. However, there are few validated methods in orthopaedic surgery including global rating scale and video feedback. A study in 1997 reported using OSATS for the assessment of surgical Residents in a clinical skills laboratory setting where they were shown to have construct validity and inter-rater reliability. Traditionally, OSATS consisted of three components, including a procedure-specific checklist, a

Appendix 1: OSATS Primary Knee Arthroplasty competency assessment form

<table>
<thead>
<tr>
<th>Pathologies</th>
<th>Frequency</th>
<th>Percentage from Total Sample</th>
<th>Percentage from Positive Pathological Findings</th>
</tr>
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</table>

Trainee: PGY Level 4 5 6 Date: 
Diagnosis: Hospital: Attending: 
Difficulty of surgical case: Low Average High 
Number of previous OSATS observed by assessor with any resident: 0 1 2 3 4 5 9 9 
Number of times procedure performed by resident: __________ times 

Preoperative patient assessment including procedure indications 
Patient preparation and positioning 
Arthrotomy 
Identifies need for selective soft tissue release 
Assessment of femoral alignment, degrees of valgus cut 
Identifies and releases ACL only (CR), ACL/PCL sacrificing knee (PS) 
Assessment of femoral size with external rotation 
Distal femoral cuts including chamfer, box / notch cuts 
 Appropriately assess tibia anatomical / mechanical axis 
 Checks flexion / extension gaps 
 Appropriately resects patella 
 Trial reduction 
 Adequately implants final components 
 Proper cementing techniques followed (depending on implant type) 
 Closes incision in layers 

Technical performance 
Efficiently performs steps, avoiding pitfalls and respecting soft tissues 

3D Visuospatial scales 
 Appropriately positions assistants and instruments
Intraoperative use of OSATS was reported to discriminate between novice and expert laparoscopic cholecystectomy in a video-based assessment. A 2008 study showed intraoperative OSATS to be a valid and valuable tool based on trainer and trainee feedback questionnaires. The problems with existing parameters of assessment, including duration of surgery and complication rate, are crude and indirect measures and depend upon the difficulty of individual surgical case, including patient comorbid conditions. Intraoperative OSATS not only overcomes these disadvantages, but can also be used to assess a surgical Resident's training over time. Plotting OSATS score against Resident's level of experience gauges the Resident's progression and can be used to identify Residents who need more training. Because of the intraoperative setting, the cost is nominal with minimal use of faculty time.

Our objective was to develop a valid and reliable tool for the assessment of total knee arthroplasty performed by Residents in the operating room. An OSATS form was developed for primary knee arthroplasty competency assessment (Appendix). The form was based on the work done reported in literature.

**Conclusion**

The search for an ideal method continues to find assessment tools for competency-based training. We need to continue to develop tools with improved discriminatory power. Lot of work is still needed to further validate methods for surgical assessment.

**References**