Orthopaedic Boot Camp II: Examining the retention rates of an intensive surgical skills course

Follow-up from *Orthopaedic Boot Camp: Examining the effectiveness of an intensive surgical skills course (Surgery, 2011)*

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The International Conference on Residency Education | La conférence internationale sur la formation des résidents
Current Challenges in Resident Training

- Reduce wait times
- Reduce work hours
- Improve patient safety
- Reduce time spent in OR
- Teaching basic skills

Reduced training opportunities for residents
The problem

• Current training paradigms may fail to adequately prepare surgeons for independent practice (Bell et al., 2009)

“For 63 of 121 ‘essential’ procedures in General Surgery, the modal value of supervised procedures undertaken by residents was 0...”
“The Toronto Experiment”

• The University of Toronto is pioneering a new, competency-based approach to surgical education

• Pilot study to evaluate the benefits of a competency-based curriculum over the traditional model
Guiding principles

• Competency-based, modular training linked to specific learning objectives

• Accelerate skill acquisition through skills laboratories, simulation and structured practice

• Diminish unproductive time
Module 1: Orthopaedic Boot Camp

• Intensive laboratory-based surgical skills program at the onset of residency

• Time to practice and master basic skills
• Lower stress environment
• Less time pressures while learning
• Skills are transferable to OR
• Simulated and cadaveric models
• Staff and senior residents to provide feedback
• Individualized program based on proficiency
• Self-regulated practice
• Self-regulated feedback
Boot Camp Course Objective

Introduce and consolidate basic technical skills at the onset of residency
Advantages of laboratory-based training

- Residents can learn at their own pace in a safe environment
- Residents can learn from mistakes
- Learning activities can be tailored, which would be impossible in a clinical environment
Is the boot camp course effective?

- 3 PGY1 resident groups
  - CBC (n=6)
  - On-service (n=8)
  - Off-service (n=8)

- All residents given OSATS type pre-test

- CBC group given 30-day skills course

- Residents then retested with similar post-test
GRS results show no pre-test differences between groups

ns, p=0.223
All groups showed improvement over the first month of training

\[ F(1,19) = 112.2 \]
\[ p < 0.001 \]
GRS results show that residents from the boot camp course improved the most.
Boot camp course improves self-efficacy

Mean Reported Self-Confidence (5-point scale)

- Competence
- Teaching

Group:
- On Service
- Off Service
- CBC

$p<0.001$
Summary

• Residents involved in the boot camp course showed improved performance:
  • completing basic surgical skills
  • skills specific to orthopaedic surgery

• Residents in the boot camp course reported higher self-efficacy both in their own competence and also in their training
There are clear short-term benefits to the boot camp course, but what are retention rates?

That’s nice, but so what?
Participants

6 residents per group

**Group 1** - CBC residents
*boot camp course*

**Group 2** - JR residents
*traditional residency [on service]*

**Group 3** - SR residents
*traditional residency*

At least 43 months into residency

1\textsuperscript{st} and 2\textsuperscript{nd} year orthopaedic residents from Sonnadara et al., (2011)
Skills Test Exam

• *CBC and JR residents*
  
  • After the first month of training

Retention Test

• *CBC, JR, SR residents*
  
  • 6 months after the CBC residents completed the boot camp course
The CBC residents maintain their skill level for at least 6 months post-training.
There are no significant differences in skill level post-training between the CBC and SR residents.
Conclusions

• The boot camp course is a highly effective mechanism for teaching basic technical skills

• Boot camp course allows new residents to perform targeted basic technical skills at the same level as senior residents in the laboratory setting

• Skills are retained longer than 6 months post-training

• Early evidence suggests that teaching technical skills early in residency privileges later clinical learning
Recent Developments

• This year, the boot camp course was offered to all 12 of the first year incoming residents in orthopaedics.
Future work

• How robust are our findings?

• Does an early focus on basic technical skills facilitate enhanced learning later in residency?

• Can we improve the boot camp course?

• What are the benefits of such a course?
  • Do skills transfer to the operating room?
  • Is clinical practice enhanced?

• Should we develop similar programs for other aspects of residency?
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Questions?
Post GRS results show that performance differential is highest on targeted tasks.
The Orthopaedics Competency Based Curriculum (CBC) Experiment
Current challenges in resident training

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The Competency-Based Curriculum

• The Department of Surgery is pioneering a new, competency-based approach to surgical education

• Support of the Royal College of Physicians and Surgeons of Canada

• Project funding from the Health Human Resources division of the Ministry of Health and Long-Term Care

• Pilot study to evaluate the benefits of a competency-based curriculum over the time-based model
Our approach

• Division of Orthopaedics is currently running two parallel residency streams

• Participating residents achieve all of the CanMEDS competencies

• CBC residents sit all the regular Royal College Examinations
Our approach continued...

- Streamlined, more efficient training through a focused, modular curriculum

- Potential for a shortened (or elongated) residency

- Residents must demonstrate proficiency in all of the CanMEDS competencies prior to graduation
Guiding principles

• Competency-based, modular training linked to specific learning objectives

• Accelerate skill acquisition through skills laboratories, simulation and structured practice

• Diminish unproductive time
Guiding principles continued...

• Incorporate meaningful assessment into day-to-day activities

• Develop and promote a culture of collegiality

• Retain strengths of conventional approaches to training,
Assessing “Competency”

- Rigorous, reliable and regular assessment of the CanMEDS competencies
- Liberal use of formative assessment
- Diverse array of assessors:
  - Self and peers
  - Other health professionals
  - Patients
  - Faculty
Participants and preceptors

- 3 residents selected annually from pool of incoming residents
- Faculty preceptors chosen from among 60 U of T orthopaedics faculty
- Volunteer instructors and examiners
- Faculty development sessions to ensure reliable evaluation and consistent teaching
Curriculum structure

• Divided into 3 phases:
  • Phase 1 – Early (9 modules)
  • Phase 2 – Mid (6 modules)
  • Phase 3 – Late (6 modules)

• Participants continue in mandatory rotations throughout training

• Additional training in team-based CanMEDs competencies
Modules

• Over all three phases, there are 21 modules encompassing all aspects of orthopaedic surgery:
  
  • Basic technical skills
  • Fractures
  • Trauma care
  • Arthroscopy and arthroplasty
Modules continued...

- Upper and lower extremity surgery
- Spine surgery
- MSK medicine
- Oncology
- Paediatric orthopaedics
Lessons learned from other fields

• Emphasis on deliberate practice with frequent feedback

• Technical skill rehearsal in non-OR setting

• Personal constructive feedback

• Small student-to-teacher ratio learning
The story so far

- New approach is highly effective
- CBC residents perform at a level well above their peers
- CBC curriculum is extremely resource intensive
- New approaches bring new challenges
Technical Skills module

• Skill acquisition literature suggests that allowing residents to focus early on technical skills may enhance their later learning

• Module 1 is in the midst of its third iteration

• Our results suggest...
GRS results show no differences between groups at start of the module
GRS results show that Module 1 improved performance on targeted skills.
Module participants are more confident in both their abilities and their training.

Main effect of group:

$$F (1,9) = 176.7$$

$$p < 0.001$$
More than a year after skills course, participating residents performed basic tasks as well as senior residents.
Crossover into regular residency

- Module 1 is now offered to all incoming residents in the form of the Toronto Orthopaedic Bootcamp (TOBC)

- Focus is on basic technical skills:
  - Aseptic technique
  - Soft tissue handling
  - Power tool use
  - Casting/Splinting
  - Basic AO technique
Aims of TOBC

• Competence in basic technical skills

• Set building blocks to perform more complex procedures

• Enhanced learning and performance at later stages of residency
Ongoing research

• Optimizing methods for teaching technical skills

• Longitudinal acquisition studies

• New tools for data collection

• Effects of trained vs. novice examiners