

## Student-selected components in surgery: providing practical experience and increasing student confidence

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### Abstract

**Introduction** Reviews of the medical school curriculum in the UK and Ireland have recommended the introduction of student-selected components (SSCs). The Department of Surgery in The Royal College of Surgeons in Ireland (RCSI) has introduced a 6-week surgical SSC, which aims to develop practical clinical skills, provide mentorship and prepare students for internship.

**Methods** Emphasis was placed on exposure to surgical specialities, teaching practical skills and student integration into surgical teams. Students completed an online survey pre- and post-SSC, assessing attitudes towards the course and confidence in performing ward-based and surgical skills.

**Results** The mean Likert scale scores increased for all the skills assessed. Students felt that the SSC prepared them for their first day of work and strengthened their desire to pursue surgical careers.

**Conclusion** A surgical SSC has been successful in increasing student confidence in performing practical skills required for commencing work as a doctor. Provision of dedicated SSCs is likely to influence the career choice of students.

**Keywords** Education · Medical · Surgery

### Abbreviations

GMC General Medical Council  
SSC Student-selected components

IMC The Irish Medical Council  
GCS Glasgow coma scale

### Introduction

In 1993 [1], the General Medical Council (GMC) in the UK published “Tomorrow’s Doctors”, a report that was further updated in 2002 [2]. This report made a number of recommendations aimed at improving undergraduate medical education in the UK. One recommendation advised that undergraduate medical schools should devote between 25 and 33% of their curriculums to modules in which students could choose between different options. These modules would be additional to the core curriculum and be called “special study modules”, more recently renamed as “student-selected components” (SSCs). The GMC advised that SSCs should be offered to all students to facilitate deeper study in an area of particular personal interest.

In 2003, the Irish Medical Council (IMC) published their “Review of Medical Schools in Ireland” [3]. This publication looked at the state of medical schools in Ireland and made recommendations aimed at improving Irish medical education. One of these recommendations was that “effective” SSCs should be developed and implemented.

The Department of Surgery in The Royal College of Surgeons in Ireland (RCSI) has a long-standing history and interest in progressive undergraduate surgical teaching. Our department has recently designed and implemented a comprehensive surgical SSC, emphasising the development of practical clinical and surgical skills. This paper describes the initial introduction and piloting of our SSC and examines its design and rationale. In coming years, we plan to expand the module to include a larger cohort of

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students. We present the results of an assessment questionnaire of student confidence in practical procedures and basic surgical skills, taken both before and on completion of the 6-week course. Finally, we describe the central role that this method of clinical teaching can play in nurturing students' interest in a surgical career.

## Methods

### Course design

#### *A week-by-week outline*

The surgical SSC is offered to medical students in their penultimate year. This 6-week course gives students a broad exposure to many surgical specialities. Places on the SSC are limited and each student is designated to a different week in the programme. Participating students all have an expressed interest in a surgical career.

Close mentoring of students is a central tenet of the SSC design. In each participating hospital, a surgical trainee acts as a "local mentor" to guide students through their schedule, introduce them to the relevant consultants and deliver a pre-ordained programme of teaching. A lecturer in the Department of Surgery serves as the overall "SSC mentor" and ensures that the programme is run in a pro-active manner, encouraging full participation and regular feedback from students.

*Week 1: elective surgery in a private health-care environment* This week is spent in a private hospital receiving one-to-one teaching from consultant surgeons. SSC students are the only medical students present in this hospital. The operating schedule for the week ahead is made available in advance, and students can select cases in which they are interested. All students are expected to scrub as the first assistant in surgical cases, an experience facilitated by the absence of other student competition. The local mentor directs the student's learning and delivers two surgical tutorials during the week. One morning is also spent shadowing a consultant radiologist, providing another high-yield teaching experience.

*Week 2: elective general surgery, plastic surgery and research database* Of this week, 2 days are spent in an elective 5-day teaching hospital, clerking patients and assisting in theatre. Once again the SSC student is the only student onsite, allowing for increased patient access. On day 3, students join a plastic surgery team on their morning round and spends the day assisting in elective and trauma operations. A senior plastic surgery registrar supervises the

students and gives them some insight into life as a plastic surgeon. The remainder of the week is spent assisting the breast cancer database coordinator and learning about databases in surgical research.

*Week 3: senior clinical attachment and surgical skills laboratory* The third week is spent as a sub-intern on the Professor of Surgery's team: a busy breast and general surgical service. Students function as one of the team's interns. They carry a bleep, clerk elective patients, participate fully in daily rounds, organise inpatient care, and spend a night on call with the team. Participating students are also required to assist in theatre and are given their own consultation room in the outpatients' clinic prior to discussing patient management with a consultant. Students also keep in regular contact with the renal transplant team and are expected to scrub for renal transplants when the opportunity occurs. Each student also delivers an oral case presentation at the weekly surgical grand rounds conference. Finally, one afternoon is spent in the surgical skills laboratory learning hand and instrument knot tying, instrument handling, suturing techniques, basic laparoscopic skills and fundamentals of bowel anastomosis.

*Week 4: elective surgery in a private health-care environment* This week has the same structure as week 1 of the SSC, giving students another chance to receive one-to-one teaching and interaction with consultant surgeons.

*Week 5: elective orthopaedic and paediatric cardiothoracic surgery* The first 4 days of this week are spent in the National Orthopaedic Hospital. Patients are clerked pre-operatively and students assist in a wide range of orthopaedic procedures. Students participate in a number of clinics, including general orthopaedics, foot and ankle, hand, spine and sports injury clinics. On day 5, students go to the National Children's Hospital as part of the paediatric cardiothoracic team. A pre-operative ward round is followed by a day of observation in the theatre. Both the orthopaedic and paediatric cardiothoracic teams provide a local mentor to deliver directed teaching and to maximise their experience.

*Week 6: neurosurgery, literature review and surgical skills laboratory* A second basic surgical skills session starts this week, and the surgical skills learnt in week 3 are further consolidated. In the afternoon the student meets with the SSC mentor and a topic is decided on for a 2,500-word literature review. A librarian delivers two sessions on the use of databases and literature search engines to help students complete their projects. Participants also join the

**Table 1** Learning objectives and assessment of the surgical SSC

Objectives of SSC	Student assessment techniques
Pro-active integration into surgical teams	Feedback sessions from mentor, local mentors and consultants
Development of ward-based practical skills	Surgical case upload
Introduction to basic surgical skills	Literature review project
Exposure to diverse surgical specialities	Poster presentation
Introduction to academic surgery	Grand rounds presentation
Provision of role models and mentorship	
Development of confidence for work as a surgical intern	

national neurosurgical acute referral service for a 24-h period. The student is involved in daytime elective surgery and spends a night on call with the neurosurgical team. Whilst on call, students help to assess and admit acute neurosurgical transfers, which are then presented on the post-call ward-round.

### Student assessment

The assessment of students on the surgical SSC consists of the following (Table 1):

1. Surgical case upload: Students are required to choose a surgical case they are involved in and write the case history. A short literature review on the evidence for the procedure carried out is also completed. This assignment is then read and corrected by the SSC mentor, who provides feedback and constructive criticism to the student on their work.
2. A literature review project: The student undertakes to write a 2,500 word literature review on an agreed topic of surgical interest. This is graded and the student is given detailed feedback on his/her writing and research skills.
3. Poster and surgical grand rounds presentations: At the end of the SSC, students present a poster on a surgical topic at a poster meeting involving students who completed SSCs in all areas of medicine. Participants are also graded on their oral presentation at the surgical grand rounds.
4. Feedback from SSC mentor, consultant surgeons and local mentors: On completion of the SSC in surgery, the SSC mentor liaises with consultants and local mentors before having a feedback session with each student. The emphasis of this session is to provide positive encouragement to participants, to identify areas for future improvement, as well as to receive student feedback on the running of the SSC programme.

### Assessment questionnaires

During the consecutive academic years from 2006 to 2008, a total of 17 students chose to participate in our surgical SSC. These students were asked to complete an assessment questionnaire before and after the SSC to assess their knowledge and level of confidence in undertaking a number of ward-based practical procedures. These procedures included venepuncture, inserting an IV line, inserting a urinary catheter and assessing a patient's GCS. Students were also asked to grade their confidence in performing several basic surgical skills before and after completing the module. The skills assessed were suturing a wound, hand-tying a surgical knot, instrument tying a surgical knot, scrubbing technique, different suture techniques and knowledge of surgical instrument names. Responses to questions were based on a 5-point Likert scale.

### Results

The response rate of students to the assessment questionnaires was 100%. Students' ages ranged from 22 to 32 years. Ten students were females and seven males. Six students had previously completed undergraduate degrees, with one also having a postgraduate qualification. Before starting the SSC, 13 students stated they wanted to be surgeons, whilst four were uncertain. After completion of the SSC, all students either agreed ( $n = 5$ ) or strongly agreed ( $n = 12$ ) that their SSC experience had strengthened their determination to be a surgeon.

Figure 2 shows that without exception student confidence in performing the ward-based and surgical procedures increased over the SSC. The mean Likert scale score for each skill is depicted in Fig. 3. The statistical package STATA 10.0 for Macintosh<sup>1</sup> was used to calculate the Mann–Whitney  $U$  test on the Likert data. This was done to assess the significance of changes in student

<sup>1</sup> STATA Corporation, 4905 Lakeway Drive, TX, USA.

confidence over the course of the SSC. A statistically significant change was observed for student confidence in: inserting an IV line ( $P = 0.008$ ), assessing a patient's GCS ( $P = 0.041$ ), suturing a wound ( $P = 0.0001$ ), hand-tying a surgical knot ( $P < 0.0001$ ), instrument tying a surgical knot ( $P < 0.0001$ ), scrubbing technique ( $P = 0.004$ ) and different suture techniques ( $P < 0.0001$ ).

Students were asked to rate on a Likert scale whether they felt that completion of the SSC made them more confident about their first day as a surgical intern. Ten students "strongly agreed" and seven students "agreed". Participating students were also questioned regarding their previous opportunities to scrub for operations and suture wounds. Before starting the SSC, three students had never scrubbed for an operation, six had scrubbed for 2–5 cases, four had scrubbed for 5–10 cases and the remaining four students for 10–20 cases. Whilst on the surgical SSC, one student scrubbed and assisted 5–10 times, six students 10–20 times and ten students more than 20 times. Ten students had never sutured a wound prior to commencing the SSC, four had sutured on a single previous occasion, two students had sutured 2–5 times in the past and one student on 10–20 occasions. Whilst on the SSC, 15 students took the opportunity to close wounds. Of these students, ten sutured two to five times and five students sutured five to ten times.

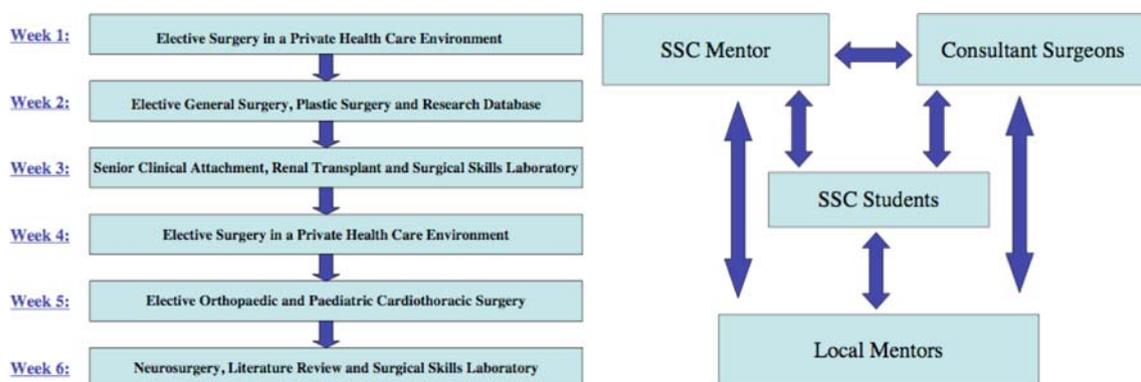
With the aim of improving the SSC for future students, participants were asked which components of the programme they felt were beneficial learning experiences. Figure 4 shows student responses on a 5-point Likert scale. All students strongly agreed that both the surgical skills session and presenting at surgical grand rounds were worthwhile learning experiences. Nights on call with the general and neurosurgery teams also proved popular. Students felt that the time spent with the database manager was of least value, with one student questioning the utility of its inclusion at all.

## Discussion

Both the GMC and the IMC have recently recognised the need to reform medical school teaching and have advised on the introduction of "student-selected components". This is to facilitate students to gain experience in specialities in which they have a particular interest.

The Department of Surgery in The Royal College of Surgeons in Ireland (RCSI) has implemented a surgical SSC, which aims to better prepare students for their intern year. It also aims to identify and encourage those students with a pre-existing interest in a surgical career. This paper examines whether this module has achieved these goals. Our results show that all participating students had a stronger desire to pursue a surgical career on completion of this SSC. Furthermore, all students felt better prepared for their first day of work as an intern.

Our surgical SSC strives to engage students in a positive atmosphere, provide them with appropriate role models and give them as much practical experience of basic surgical skills and surgery as is feasible. The importance of a "mentor" in training to be a surgeon cannot be overestimated, and a keystone of this module is the provision of strong mentorship. Close mentoring of both medical students and junior surgical trainees is known to influence their choice of the surgical speciality [4]. Our students are encouraged to contact the programme mentor with feedback or problems they may have during the module. The mentor contacts students regularly, to ensure that their experience is as enjoyable and beneficial as possible. Regular communication is also maintained between the mentor, consultants and local mentors in each hospital (see Fig. 1). Specific attributes associated with being a superior role model include building relationships and spending extra time with students [5, 6]. This active approach to mentoring was described by Wright [5] as "role model consciousness" and we strive to adopt this approach in our SSC.

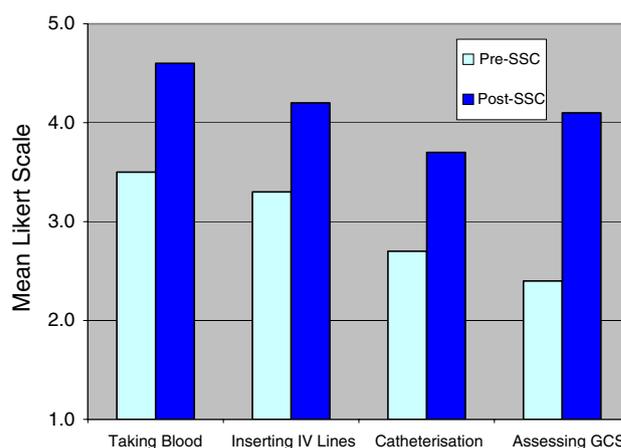


**Fig. 1** Six-week surgical SSC course outline and open communication structure

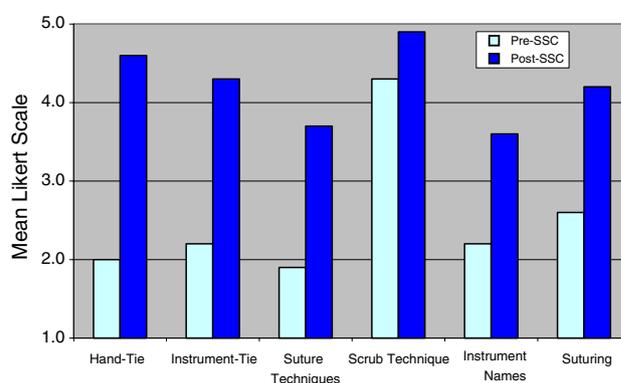
It has been suggested that medical students' decreasing interest in surgery may be as a direct result of a lack of adequate role models in their clinical years [7]. Medical students are more inclined to choose a surgical career if exposed to good clinical teachers, strong role models and close mentors [8]. It has also been shown that a lack of surgical exposure and surgical teaching is a reason for not choosing surgery as a career [9]. The kind of operative exposure, skills training and interaction with trainees and consultants introduced by this surgical SSC has been shown elsewhere to positively influence a student's decision to pursue a career in surgery [10].

During this SSC, proficiency in basic surgical skills is achieved through dedicated time, operating as first assistant with consultants, and by the provision of two surgical skills laboratory sessions. Skills laboratories are well recognised as providing an environment conducive to structured learning and feedback and are found useful by undergraduates [11]. While they do not offer a "real patient" experience, they provide opportunities for students to practise their skills safely and can help in reducing the "reality shock" on the first day as an intern [11]. Peyre et al. [12] have shown that medical students with surgical skills and laboratory experience have more confidence in their skills than doctors starting their internship. An Australian study has also shown that medical students' competence and safety awareness are increased by surgical skills sessions [13]. Results (Fig. 1) from our surgical SSC, which includes two surgical skills sessions, are consistent with this, with all students agreeing or strongly agreeing that they are more confident about performing basic surgical skills and on their first day as a surgical intern.

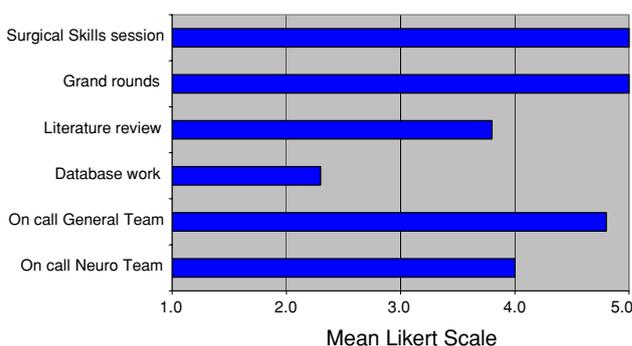
A recent US paper found that many students entering internship lack many basic procedural skills, including phlebotomy, IV canula insertion and Foley catheter placement [14]. This and other studies found self-assessment of competence by students to be positively correlated with their frequency of procedure performance [14, 15]. Goodfellow et al. [16] surveyed 122 final-year medical students at a UK university, in eight "core" clinical skills, and found that the majority of these skills had been performed few times by students over their entire undergraduate course. A Dutch study showed that medical schools cannot rely on clerkships to train students in basic clinical skills to the expected standard [17]. The authors go on to show that skills in laboratories result in students performing more clinical skills whilst on clinical rotation [17]. Another recent study showed that a concentrated course in procedural skills can improve students' own assessment of their proficiency, confidence and anxiety levels [18]. The surgical SSC that we have introduced encourages students to perform a variety of ward procedures. Our results (Fig. 2)



**Fig. 2** Confidence in ward-based practical procedures: mean response from 5-point Likert scale



**Fig. 3** Confidence in basic surgical skills: mean response from 5-point Likert scale



**Fig. 4** How worthwhile students viewed SSC components: mean response from 5-point Likert scale

show that this has increased student confidence in performing these procedures.

It has been suggested by the IMC [3] that too much of Irish medical schools' clinical curriculum is dedicated to the teaching of medicine and surgery to the detriment of other subspecialties. The time students spend in surgery,

however, tends to be almost exclusively in the area of general surgery. Students have limited opportunity for exposure to other specialities. In the design of our SSC, we include exposure to general, vascular, plastic, paediatric, cardiothoracic, orthopaedic, neurosurgery and transplant surgery. In a survey of 146 students interviewing for general surgery training at Johns Hopkins Hospital, it has been found that students' anticipated subspeciality is highly correlated with the operative exposure that they had experienced as medical students [19]. It is therefore in the interest of each subspeciality to afford medical students worthwhile exposure to their area of surgery or medicine, if they want to continue to attract and retain motivated trainees. This programme facilitates this cross-speciality exposure.

### Limitations

We recognise that our sample size is small; however, by design SSCs have a small number of participants. In the coming years, we plan to expand the module to include a larger cohort of students. It should also be recognised that the individual attention and clinical opportunities given to students would be unfeasible in a much larger cohort. We also acknowledge that the 17 students who completed the SSC were self-selected, they applied to participate in the SSC. However, the students' self-selection does not belittle the fact that confidence for practical procedures increased unequivocally over the 6 weeks.

### Conclusion

The introduction of an SSC in surgery has allowed students to gain insight into many of the surgical specialities as well as a true perspective of the rigours and stresses of surgical training. Informal contact with consultant surgeons, training in technical skills and the SSC mentorship all emphasise the positive aspects of a surgical career. The SSC is an effective way of facilitating students who wish to have more surgical exposure and time in the theatre.

We believe that delivering a high-yield, student-centred surgical SCC will help students in their career direction and aid in the identification of high-calibre candidates who are truly suitable for a surgical career. Immersing students into a surgical team, and giving them ample practical opportunities in theatre and minor procedures, nurtures their interest in surgery, increases their self-confidence in both surgical skills and ward-based procedures and ultimately prepares them for their first day as a doctor.

**Conflict of interest statement** The authors declare that they have no conflict of interest.

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