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Plastic Surgery Undergraduate Training - How a single local event can inspire and educate medical students --Manuscript Draft--

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Abstract:	<p>Introduction: Plastic surgery teaching has a limited role in the undergraduate curriculum. We held a one day national course in plastic surgery for undergraduates. Our aim was to introduce delegates to plastic surgery and teach basic plastic surgical skills. We assessed change in perceptions of plastic surgery and change in confidence in basic plastic surgical skills.</p> <p>Method: The day consisted of consultant-led lectures followed by workshops in aesthetic suturing, local flap design and tendon repair. A questionnaire divided into three sections: 1. Career Plans 2. Perceptions of Plastic Surgery 3. Surgical Skills and Knowledge, was completed by thirty nine delegates before and after the course. Data was analysed using the Mann-Whitney U test for non-parametric data.</p> <p>RESULTS:</p> <p>Career Plans: Interest in pursuing a plastic surgery career significantly increased over the course of the day by 12.5% ($p < 0.0005$).</p> <p>Perceptions: Statistically significant changes were observed in many categories of plastic surgery, including: The perception of the role of plastic surgeons in improving patient quality of life, increased by 18.31% ($p = 0.063$). Prior to the course 10% of delegates perceived plastic surgery to be a superficial discipline and 20% perceived that plastic surgeons did not save lives. After completing the course no delegates held those views.</p> <p>Surgical skills: Confidence to perform subcuticular and deep dermal sutures improved</p>

	<p>by 53% ($p < 0.0001$) and 57% ($p < 0.0001$) respectively. Delegates' subjective understanding of the basic geometry of local flaps improved by 94% ($p < 0.0001$). Interestingly, before the course 2.5% of delegates drew an accurate modified Kessler suture compared with 87% of on completion of the course.</p> <p>Conclusion: A one day intensive undergraduate plastic surgery course can significantly increase delegates' desire to pursue a career in plastic surgery, dispel common misconceptions about this field and increase their confidence in performing the taught skills. The results of this course demonstrate that a one day course is an effective means of teaching basic plastic surgery skills to undergraduates and highlights the potential role for local plastic surgery departments in advancing plastic surgery education.</p>
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Title Page:

Complete Manuscript Title: Plastic Surgery Undergraduate Training – How a single local event can Inspire and educate medical students

Brief Title: Educating and dispelling misconceptions of undergraduate medical students

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Details of presentations: 8th Annual Plastic Surgery Doctors Update Conference. Val d'Isere, France. February 2011.

Sources of support: None

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Introduction: Plastic surgery teaching has a limited role in the undergraduate curriculum. We held a one day national course in plastic surgery for undergraduates. Our aim was to introduce delegates to plastic surgery and teach basic plastic surgical skills. We assessed change in perceptions of plastic surgery and change in confidence in basic plastic surgical skills.

Method: The day consisted of consultant-led lectures followed by workshops in aesthetic suturing, local flap design and tendon repair. A questionnaire divided into three sections: 1. Career Plans 2. Perceptions of Plastic Surgery 3. Surgical Skills and Knowledge was completed by thirty nine delegates before and after the course. Results were presented as mean scores and the standard error of the mean used to calculate data spread. Data was analysed using the Mann-Whitney U test for non-parametric data.

RESULTS:

Career Plans: Interest in pursuing a plastic surgery career significantly increased over the course of the day by 12.5% ($p < 0.0005$).

Perceptions: Statistically significant changes were observed in many categories of plastic surgery, including: The perception of the role of plastic surgeons in improving patient quality of life, increased by 18.31% ($p = 0.063$). Prior to the course 10% of delegates perceived plastic surgery to be a superficial discipline and 20% perceived that plastic surgeons did not save lives. After completing the course no delegates held those views.

Surgical skills: Confidence to perform subcuticular and deep dermal sutures improved by 53% ($p < 0.0001$) and 57% ($p < 0.0001$) respectively. Delegates' subjective understanding of the basic geometry of local flaps improved by 94% ($p < 0.0001$). Interestingly, before the course 2.5% of delegates drew an accurate modified Kessler suture compared with 87% of on completion of the course.

Conclusion: A one day intensive undergraduate plastic surgery course can significantly increase delegates' desire to pursue a career in plastic surgery, dispel common misconceptions about this field and increase their confidence in performing the taught skills. The results of this course demonstrate that a one day course is an effective means of teaching basic plastic surgery skills to undergraduates and highlights the potential role for local plastic surgery departments in advancing plastic surgery education.

Keywords: Undergraduate Education, Plastic Surgery Skills, Perceptions of Plastic Surgeons, Plastic Surgery Careers.

Introduction:

Plastic surgery is one of the most competitive surgical specialties in Europe and the USA¹. To make an informed decision, undergraduates require speciality exposure and advice from those practicing within the specialty. It is currently felt that there is a lack of plastic surgery exposure for medical students within the undergraduate and junior doctor curricula. A survey in 1986 revealed that plastic surgery was part of the undergraduate curriculum at 78% of UK medical schools². More recently, it is estimated to be part of the curriculum in 71% of medical schools³. Most of this is attributed to the large number of learning objectives that need to be achieved within undergraduate training. Fundamental links between the specialty and undergraduates is required to prevent misconceptions. This limited exposure has been shown in a sample of UK medical students that perceive that the majority of the plastic surgery workload is either cosmetic or involves very complex procedures⁴.

Courses in plastic surgery are potential catalysts to instil career interest. Career choice is based on preconceived ideas and 'positive exposure' to a specialty, both of which can be driven during an influential course⁵. Davis *et al* were the first to describe how a one-day course significantly increases plastic surgery knowledge, skills and career interest in medical students⁶. The impact of plastic surgery courses for junior doctors has also been evaluated in a two-day course (Mid-Yorkshire Plastic Surgery course). Similarly, there was a greater intention to pursue a career in plastic surgery after the course with increased confidence in practical skills and a better understanding of what the career entails⁷.

However, the notion that a course is the solution in introducing undergraduates to the specialty has been questioned. It is believed that those attending introductory courses are already inclined towards plastic surgery as a career choice⁸. Furthermore, it has also been suggested that there are ample opportunities to become engaged and involved with the specialty without attending courses. One such suggestion has been to introduce and develop interest at medical school with special study modules, student electives and attending outpatient clinics⁹.

It is encouraging to see the support of organizations such as the British Association of Plastic and Reconstructive Surgeons (BAPRAS) and the Royal College of Surgeons of England (RCSEng). Courses such as the Undergraduate Plastic Surgery Course (UPRAS) and the BAPRAS Undergraduate Course have been heavily oversubscribed¹⁰.

St George's, University of London hosted the first documented one-day course at a medical school in plastic surgery for medical undergraduates only. Cardiff University planned to hold a one-day plastic surgery day¹¹ and Norfolk and Norwich University have held a talk on plastic surgery followed by a pig trotter workshop¹². Our aim was to introduce delegates to the varied field of plastic surgery survey their perceptions of plastic surgeons and teach them basic plastic surgery skills. Over the course of the day, we assessed change in perceptions of plastic surgery as a specialty and confidence in performing basic plastic surgical skills.

Method:

All UK medical students were invited to attend the course held on a Saturday at St George's, University of London. Participation in the course did not provide any educational credits for medical school. The course took the format of consultant-led talks in the morning session about the different subspecialties within plastic surgery followed by three rotating workshops in the afternoon session with a tutor to delegate ratio of 1:4. The morning session had no limitation to the number of delegates; however, the afternoon workshops were limited to 20 rotating delegates per station. The workshops covered the following topics (*see Figure 1*):

- **Aesthetic Suturing:** The lead tutor gave a brief talk regarding the principles of wound healing followed by a demonstration that was projected on a large screen. Tutors then supervised their delegates performing deep dermal and subcuticular sutures on specialised suturing pads.
- **Local Flap Design:** Tutors took their delegates through basic local flaps with the aid of laminated instructional handouts and practised on pig-skins.
- **Tendon Repair:** Delegates listened to an introductory talk covering the basics of tendon anatomy and repair. This was followed by delegates practising tendon repair with focus on the modified Kessler technique whilst supervised by their tutors.

These topics were selected for a variety of reasons. They are all fundamental skills that are required in plastic surgery. In addition, they are technically relatively easy to simulate and are associated with a low cost to run.

Delegates were asked to complete a pre- and post-course questionnaire. This was designed to assess three key areas:

1. **Career plans:** Delegates were asked to rank all surgical specialities from 1 to 10 depending on their interest in pursuing that specific surgical field.
2. **Perceptions (and misconceptions) of plastic surgery:** Delegates were given both positive and negative perceptions about plastic surgery and asked to identify which descriptions they felt apply to plastic surgeons.
3. **Surgical skills and knowledge:** Delegates were asked to record on a Likert scale (1= strongly disagree, 5= strongly agree) their confidence in performing basic plastic surgical skills and knowledge pertaining to aesthetic suturing, local flap design and tendon repair. Other responses were collected as categorical data in the form of either a correct answer or an incorrect answer.

Results were presented as mean scores and the standard error of the mean used to calculate data spread. Data was analysed using the Mann-Whitney U test for non-parametric and the McNemar's test was used for categorical data using GraphPad Prism software.

Results:

Sixty delegates attended from a variety of UK medical schools. Of these delegates 39 completed pre and post course questionnaires (response rate 65%). There was equal gender and year of study distribution.

Career Plans

Plastic surgery was the number one career aspiration of delegates both before and after the course with a mean pre and post course of 7.18 and 8.08 respectively. This was followed by trauma and orthopaedics (before: 5.90 and after: 6.00), general surgery (before: 5.36 and after: 4.97) and neurosurgery (before: 4.74 and after: 4.92). Following the course this order remained unchanged. However, over the course of the day interest in pursuing a career in plastic surgery increased by 12.5% ($p < 0.0005$). There was no statistically significant change in career aspirations in any of the other surgical specialties.

Perceptions

Delegates were asked to identify both positive and negative perceptions of plastic surgery before and after the course. **Table 1** and **Figure 2** summarise the responses and the percentage change in the individual perceptions.

Plastic Surgery Skills and Knowledge

The mean self-reported pre-course score across all practical workshops was 2.67 ± 0.19 . Following completion of all workshops this increased to 4.04 ± 0.14 representing a 50% mean increase in self-reported ability and knowledge. In addition, each assessment criteria saw a significant positive improvement (**Table 2** and **Figure 3**). Attendees were asked specific questions to assess their general knowledge of workshop content. Correct responses to these questions improved by a mean score of 553% (**Table 3** and **Figure 4**).

Discussion:

Career Plans

Delegates ranked Plastic Surgery as their preferred surgical specialty before and after the course. This is expected as delegates attending an undergraduate plastic surgery course are a self-selected group who are more inclined to the specialty. However, plastic surgery is the only field that experienced a statistically significant increase in its mean score, 12.5% ($p < 0.005$) upon completion of the course. This can be explained by delegates re-affirming their aspirations by listening to the inspirational talks that were held and by the surgical skills learnt. Furthermore, delegates who did not consider plastic surgery as a career option, having clarified some of the pre-conceived misconceptions, developed an interest in pursuing it as a career.

Perceptions

In terms of positive perceptions, there was a 22% increase in delegates' awareness of the various subspecialties within plastic surgery and a 37% increase in their awareness of the competitive nature of the specialty. The high competition ratio for training posts was discussed during the career section in the morning session. Regarding negative perceptions, there was a -100% change in delegates who perceived plastic surgery as being a superficial and non-life saving field. Furthermore, there was a -67% change in the perception of plastic surgeons being "greedy" and plastic surgery being a purely cosmetic field. Delegates were more aware of the long hours and long training pathway in plastic surgery with a change of 82% and 73% change respectively.

The stark change in delegates' perceptions of plastic surgery being a superficial and non-life saving speciality is a direct reflection of the lack of exposure of medical students to plastic surgery during their surgical rotations and undergraduate curriculum. Delegates will primarily base their opinions on anecdotal evidence derived from the media and from marketing campaigns for cosmetic services⁴.

Plastic Surgery Skills and Knowledge:

The third part of the questionnaire was divided into two sections:

1. Confidence in performing specific basic plastic surgical skills that was based on a self-reported Likert scale
2. Knowledge of basic principles in plastic surgery based on nominal answers that are either correct or incorrect

Table 2 in the results section summarised the self-reported scores into five main categories:

1. Understanding the principles of wound healing
2. Performing subcuticular sutures
3. Performing deep dermal sutures
4. Understanding the principles of the local flap geometry

5. Understanding the principles of tendon repair and anatomy

There was a statistically significant increase in self-reported confidence scores in all five main categories with the largest increase in the understanding of the principles of local flap geometry, an integral concept in plastic surgery, with a mean score of 2.23 ± 0.19 and 4.33 ± 0.13 ($p < 0.0001$) before and after the course respectively. The results indicate the importance of teaching those basic skills and clarifying basic concepts that undergraduates are not exposed to. This will develop a solid foundation for undergraduates to build on as they progress in their careers. Furthermore, the increase in confidence of performing different forms of suturing will enable undergraduates to be more proactive when assisting in theatre during their surgical rotations.

Regarding the questions posed to delegates that assessed their basic knowledge, there was a generalised increase in correct responses in all six questions (*see Table 3*). Knowledge of drawing the correct method of repairing a tendon using the modified Kessler technique on a diagram of a severed tendon increased by 3200% with 33 correct responses at the end of the course against 1 correct response prior to the course.

Upon completion of the course, 92 % of delegates believed that basic surgical skills should form an integral part of the undergraduate medical curriculum and 84% felt that more emphasis should be placed on plastic surgery. The delegates' ability to competently perform basic local flaps and tendon repairs illustrates the need to incorporate basic surgical skills teaching in the undergraduate curriculum. It underlines the important role that a University Surgical Society should lead as an adjunct to the undergraduate curriculum. Attendees were asked about the perceived relevance of tendon repair, suturing and flap design skills for their future careers. Before the course the mean perceived relevance score was 3.96 ± 0.16 . This increased by 11.5% to 4.70 ± 0.10 .

Qualitatively, the feedback received from delegates was very positive and students were very enthusiastic about future opportunities to participate in similar intensive courses. Some delegates advised that expanding the course to a two-day event will enable them to practice the taught skills for a longer period of time and allow them to grasp more advanced concepts such as the geometrical basis of the different local flaps. The feedback has been welcomed and future courses will allow more time for surgical skills practice.

Conclusion:

We believe a one-day course in plastic surgery should be offered to medical students by university surgical societies because it may benefit both students and the specialty. As written by Burd *et al* in 2004, “exposure can only be of benefit to the specialty” of plastic surgery¹³. Benefits to plastic surgeons of increased exposure to the specialty potentially include improved patient referrals¹⁴ and improved basic plastic surgery knowledge in non-plastic surgery trainees¹⁵.

Plastic surgery is a challenging career and junior doctors wishing to secure a plastic surgery training programme must have a strong academic record⁸. Medical students and junior doctors are also under increasing pressure to choose their future specialty at an earlier stage⁷. There is often limited teaching of plastic surgery in medical schools¹⁶. It is important that medical students are exposed early to the field of plastic surgery as there is often a negative portrayal of plastic surgery in the media and a one-day course may help dispel some of these negative perceptions¹⁰. Medical students and junior doctors often choose a particular specialty because of a positive influence from a Consultant and due to the mentor role a Consultant can provide^{15,17,18}.

A one-day plastic surgery course, such as the plastic surgery day at St George’s, can introduce students to the exciting and varied field of plastic surgery. It can demonstrate to students the variety of the subspecialties in plastic surgery and could therefore improve referrals to plastic surgery. It can teach students basic plastic surgical skills which are useful to any surgical specialty and to allied specialties such as Emergency Medicine. It may also alert students at an early stage that plastic surgery is a difficult specialty to get into and may encourage motivated students to work harder to achieve their goals to succeed in the specialty.

In conclusion, St George’s, University of London, Surgical Society held a one day plastic surgery course for undergraduates. A one day course may increase delegates’ desire to pursue a plastic surgery career, improve perceptions and dispel misconceptions about plastic surgery and teach basic plastic surgery skills to delegates. We encourage other medical schools to offer similar courses.

Declarations:

Conflict of Interest: None

Funding and Ethical Approval: Not Applicable

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Figure Legend:

Figure 1: Images of the three different workshops, a. aesthetic suturing b. local flap design c. tendon repair workshop d. tendon repair lecture

Figure 2: Illustrating the change in perceptions in percentages before and after completing the course

Figure 3: Illustrating the mean self-reported confidence scores before and after the course

Figure 4: Percentage of correct responses before and after the workshop

24th June 2013

To the Editor of the Annals of Plastic Surgery,

We would be grateful if you consider our original manuscript title: "Plastic Surgery Undergraduate Training – How a single local event can enthuse and educate medical students" for publication in the Annals of Plastic Surgery.

We would like to confirm that the "Guide for Authors" has been read, thereby indicating compliance with those instructions and acceptance of the conditions posed. The authors have seen and agreed to the submitted version of the paper and bear responsibility for it and all who have been acknowledge as contributors or as provides of personal communications have agreed to their inclusion. We confirm the material is original and neither published elsewhere nor submitted for publication simultaneously. If the paper is accepted it will not be published elsewhere in the same or similar form, in English or in any other language without written consent from the copyright holder.

Thank you for your time and we hope to hear from the editorial board in due time.

Best wishes,

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Core Surgical Trainee CT1

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Mr Oliver Boughton
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Reviewer Comments

Reviewer 1:

Reviewer #1: The authors of this paper have done an excellent and commendable thing - trying to distill the nature of a vast profession into a one day introductory course to medical students interested in plastic surgery.

More information in the methods section is needed to better understand the nature of the study:

1. Was there a cost associated with attending this course?

The cost for attendance was £20.00 GBP equivalent to \$32 USD. The fee was determined to cover the running costs of the course and we did not aim to generate any profit from running the course.

2. Was this activity for educational credit?

Participation in the course did not provide any educational credits for medical school.

(see text)

3. Did students have protected time to attend the course or did they do it on a weekend?

This was attended on a weekend on a voluntary basis

(see text)

4. what was the thought process behind what topics were included in the course and why?

The consultant-led talks focussed on:

1. The history of plastic surgery
2. Paediatric plastic surgery
3. Plastic surgery and trauma
4. Hand surgery
5. Burns surgery
6. The application of local flaps in skin cancer
7. Career advice from a junior registrar (resident)

These topics were selected for a variety of reasons. They are all fundamental skills that are required in plastic surgery. In addition, they are technically relatively easy to simulate and are associated with a low cost to run.

(see text)

Please include in the discussion section:

1. What are the next steps? Are there any plans to re-test the students who completed the course in one year, two years, or anytime in distant future?

Currently the course is being run annually at St Georges, University of London. Delegate contact details were not collected, therefore retesting would be difficult. However, this is a good idea and is worth considering for future courses.

2. What did the authors learn in doing this course?

- Many misconceptions amongst medical students regarding plastic surgery
- Many surgical skills can be taught at an early stage and the understanding of more advanced surgical skills such as local flaps and tendon repair are concepts that could be understood and implemented by medical students
- Need for intense one day specialty courses to dispel misconceptions and introduce medical students to different specialties

3. Will the authors do this course again? What will they do the same, and what will they do differently?

Due to the course popularity and success we have carried out the course again and are planning to do so on an annual basis. From the feedback we have received, we have allotted more time for delegates to practice the newly learnt skills and we are planning to develop the course into a two-day weekend course.

We will aim to compile the names of the tested delegates and assess the retention of the learnt skills in the long-term. Moreover we are hoping to carry out longitudinal follow-up of perceptions and career destinations.

A major finding of this study is the 100% change in perception of medical students (interested in plastic surgery) regarding the scope of practice (as extending beyond aesthetic procedures popularized by media). Have the authors made any progress toward mandating such a course in the national medical school curriculum or distilling it into something that could be included in the medical curriculum for all medical students regardless of planned eventual specialty?

Unfortunately, this is very difficult to achieve. The national medical school curriculum is not prescriptive enough to introduce mandatory specialty courses. However, at a local level we have managed to introduce the course as an annual event at St George's, medical school. Furthermore, due to the popularity of the course we have been allocated funding by the University to carry out future courses, which will enable us to eliminate the course fee.

Reviewer #3:

Minor comments:

1. How were the subjects instructed to differentiate the "competitive" of the positive perception vs. the "competitive" of the negative perceptions?

As junior trainees, we felt that the competitiveness of a certain speciality can be both a pulling and pushing factor. We aimed to survey if the competitive nature of plastic surgery selection that was highlighted during the course encouraged or discouraged delegates from pursuing plastic surgery as a career.

2. How many students total were invited? What year(s) of training/schooling were the students that were invited/attended?

Students from all 32 UK medical schools were invited. Any year of training was allowed to attend, however, it was suggested that the course would be of more benefit to year 3 and above. There was no limit to the number of students attending the morning talks, however, delegates were limited to 60 (20 delegates per skills station) in the afternoon workshops.

3. please provide a little more detail on the structure of the course: how long was the course? how long for didactic lectures? for suture labs and the like? breaks? was this held on a weekend (i.e. was the formal school time, or was this a sacrifice by the students to use free weekend time?)

The course took place on a Saturday. The course commenced at 9am and ran till 1:15pm, there was a 20min coffee break at 10:45. The workshops resumed at 2pm after the 45min lunch break and ran until 5:30pm. Each workshop had one hour allocated to it, with 5min factored in for the delegates rotating to the next station.

Figure 1
[Click here to download high resolution image](#)

Figure 2

Figure 2: Illustrating the change in perceptions in percentages before and after completing the course

Figure 3

Figure 3: Illustrating the mean self-reported confidence scores before and after the course

Figure 4

Figure 4: Percentage of correct responses before and after the workshops

Table 1: Summary of Perceptions of Plastic Surgery Before and After the Course

	Percentage response 'Yes' before the course	Percentage response 'Yes' after the course	Percentage Change	P value
Positive Perceptions				
Well Paid	51	48	-5.88%	1.00
Diverse	71	87	22.54%	0.109
Improving patient's quality of life	71	84	18.31%	0.063
Competitive	41	56	36.59%	0.031
Challenging	76	87	14.47%	0.289
Creative	87	94	8.05%	0.250
Artistic	43	48	11.63%	0.480
Rewarding	69	79	14.49%	0.125
Wide range of subspecialties	74	90	21.62%	0.070
Negative Perceptions				
Long hours	28	51	82.14%	0.012
Long training	28	48	71.43%	0.008
Competitive	66	74	12.12%	0.375
Superficial	10	0	-100.00%	-
Non-life saving	20	0	-100.00%	-
Greedy	15	5	-66.67%	0.219
Cosmetic	23	7	-69.57%	0.031
Not-proper medicine	2	2	0.00%	1.00
High chance of litigation	28	17	-39.29%	0.125

Table 2: Summary of self-reported confidence in surgical skills and knowledge before and after completion of the course

	Pre-Course Mean	Post-Course Mean	P value
Principles of Wound Healing	2.89 ± 0.17	3.92 ± 0.16	< 0.0001
Performing subcuticular sutures	2.61 ± 0.21	4.00 ± 0.15	< 0.0001
Performing deep dermal sutures	2.58 ± 0.20	4.07 ± 0.13	< 0.0001
Geometry of local flaps	2.23 ± 0.19	4.33 ± 0.13	< 0.0001
Tendon Repair Anatomy	3.05 ± 0.15	3.87 ± 0.16	0.0008

Table 3: Summary of correct answers before and after completing the course

Question		Pre-Course Number Correct	Post-Course Number Correct	% Change
1	For optimal healing a wound must be...	27	33	22%
2	DIEP is a local flap	23	25	8%
3	Skin graft is a local flap	23	34	47%
4	Deep dermal suture can be used to repair tendon	21	32	52%
5	Modified Kessler is a way of repairing tendon	25	37	48%
6	Please draw how you would repair a tendon	1	33	3200%

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