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Dear Program Directors: There Are Numerous Entrustable Professional Activities on a Burns Rotation!

Chers directeurs de programmes : de nombreuses activités professionnelles confiables se produisent lors des rotations auprès des grands brûlés!

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Abstract

Background: Burn care has long been an integral part of the scope of plastic surgery, but the time allocated to exposure for plastic surgery residents is under threat due to the range of sub-specialities competing for their time. As part of the Competence by Design approach to plastic surgical training, residents are provided with a list of 52 "Entrustable professional activities' (EPA's) to ensure that core skills and knowledge are acquired. **Methods:** This survey, distributed via email using a link to Survey Monkey™, sought to determine which EPA's were available for completion by plastic surgeons in training during the burn rotation at a major academic burn centre in Canada. Via investigator consensus, 26 of the 52 EPA's were included for assessment; the remaining 26 were not regarded as relevant to the burn centre rotation and therefore better acquired elsewhere. **Results:** Thirty two residents who underwent a burn rotation between 1 January 2015 and 31 December 2021 completed the anonymous survey. Seventeen of the 26 EPA's evaluated were judged by more than 75% of respondents as being readily amenable to completion during the burn rotation. Most of these EPA's relate to the comprehensive care of patients with acute burn injuries, the management of an in-patient plastic surgery service, and associated quality improvement processes. Residents who completed rotations less than three months in duration had less opportunity to complete a further 8 EPA's in comparison to those who had longer rotations, especially with respect to the care of patients undergoing complex wound care and burn reconstruction. **Conclusions:** In addition to threatening seamless service delivery at burn centres, reduced resident exposure to the burn rotation may compromise the delivery of burn care in the community. The results of this survey refute any argument that the burn service is a "low yield" rotation from an EPA acquisition perspective.

Résumé

Historique: Les soins aux grands brûlés font partie intégrante de la chirurgie plastique depuis longtemps, mais le temps alloué à y exposer les résidents en chirurgie plastique est menacé en raison de l'éventail de surspécialités. Dans le cadre de l'approche de compétence par conception à la formation en chirurgie plastique, les résultats reçoivent une liste de 52 « activités professionnelles confiables » (APC) pour assurer qu'ils acquièrent les compétences et le savoir de base. **Méthodologie :** Ce sondage, distribué par courriel grâce à un lien vers la plateforme Survey Monkey[MD], visait à déterminer quelles APC étaient offertes

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aux chirurgiens plastiques en formation pendant leur rotation dans un grand centre universitaire pour grands brûlés du Canada. Par consensus des chercheurs, 26 des 52 APC ont été incluses dans l'évaluation. Les 26 autres n'ont pas été considérées comme pertinentes pour la rotation au centre pour grands brûlés, mais mieux à même d'être acquises ailleurs. **Résultats:** Au total, 32 résidents qui ont participé à une rotation auprès des grands brûlés entre le 1er janvier 2015 et le 31 décembre 2021 ont rempli le sondage anonyme. Selon plus de 75% d'entre eux, 17 des 26 APC évaluées peuvent facilement être effectuées pendant la rotation auprès des grands brûlés. La plupart de ces APC portent sur les soins complets aux patients atteints de brûlures aiguës, la gestion d'un service de chirurgie plastique aux patients hospitalisés et les processus d'amélioration de la qualité qui s'y associent. Les résidents qui ont effectué leur rotation en moins de trois mois avaient moins l'occasion d'effectuer huit APC de plus par rapport à ceux qui avaient vécu des rotations plus longues, particulièrement à l'égard des soins des plaies complexes aux patients et de la reconstruction après leurs brûlures. **Conclusions :** En plus de menacer la prestation harmonieuse des services dans les centres pour grands brûlés, la moins grande exposition des résidents à la rotation des grands brûlés peut compromettre la prestation des soins aux grands brûlés dans la communauté. Les résultats de ce sondage réfutent toute prétention selon laquelle les services aux grands brûlés est une rotation « à faible rendement » selon le point de vue de l'acquisition des APC.

Keywords
plastic surgery training, entrustable professional activities, burn surgery, burn critical care, surgical skills, education

Mots-clés
activités professionnelles confiables, chirurgie des grands brûlés, compétences chirurgicales, enseignement, formation en chirurgie plastique, soins intensifs aux grands brûlés

Background

Traditional apprenticeship models in surgery required that trainees performed some menial tasks so that the specialist could supervise the acquisition of knowledge and skills in more complex areas.[1] Because trainees acquire knowledge and skills at different rates and possess different proficiencies, Competence by Design (CBD) was introduced by the Royal College of Physicians and Surgeons of Canada in order to ensure that all graduates of medical speciality programs meet a core set of milestones.[1–8] At the start of residency, the trainees are provided with a well-defined set of learning objectives, referred to as Entrustable Professional Activities (EPA's), with progress contingent upon the successful completion of each.[8]

Burn care has played an important role in the history and development of plastic and reconstructive surgery, and still contributes significantly to the clinical workload and training of plastic surgeons internationally. Even if patients with burn injuries are referred on to burn sub-specialists, it is essential for all plastic surgeons to be able to assess and initially manage a burn-injured patient. Only the burn rotation provides trainees with exposure to the assessment and management of both minor and major burns, as well as the deteriorating or critically ill patient with a burn injury. The nature of modern burn care also exposes plastic surgical trainees to numerous other clinical activities such as the assessment and management of complex skin and soft tissue wounds, the co-ordination of difficult bioethical problems, and the routine integration of scientific research into clinical practice.

And yet, because of the breadth of the speciality and the competing pressures from other sub-specialties, time allocated to the training of plastic surgical residents in burn care has progressively been reduced, compromising clinical service delivery in burn centres, contributing to the predicted shortage of burn surgeons, while also resulting in the suboptimal training of community plastic surgeons who should be capable of providing competent initial assessment and management of many burn injuries and wounds.[9–16]

The purpose of this study was to determine which plastic surgery EPA's are amenable to completion by plastic surgery residents during their rotation at the Ross Tilley Burn Centre (RTBC) at Sunnybrook Health Sciences Centre in Toronto. The RTBC is responsible for the management of most major adult burn injuries in Ontario, home to approximately one-third of the Canadian adult population. One of only two adult burn centres in Canada verified by the American Burn Association, The RTBC is affiliated with the University of Toronto, and residents from at least two other plastic surgery training programs also complete burn rotations here. We hypothesized that there is exposure to many of the 52 plastic surgery EPA's during a three month burn rotation.

Methods

Out of a total of 52 plastic surgery EPA's defined by the Royal College of Physicians and Surgeons of Canada, 26 were deemed potentially relevant to the burn rotation by the two investigators. These 26 were determined by consensus of the two investigators, based on the procedures and activities commonly undertaken at the burn centre. The remaining 26 were excluded from the survey to reduce its length and because the activities referred to were regarded as more regularly undertaken during other rotations.

An anonymous questionnaire using Survey Monkey (Momentive, San Mateo, California, USA) was distributed to residents who completed a burn rotation in the seven years

between 1 January 2015 and 31 December 2021. Data collected included demographics as well as year and length of burn rotation undertaken, as well as the respondent's training program and current career stage. The survey comprised 31 questions, and an opportunity to add additional comments about the burn rotation at the end. Most of the survey requested of the respondents to evaluate their opportunity to perform a list of EPA's, based on a 5 point scale, by selecting one of "none at all", "a little", "a moderate amount", "a lot", or "a great deal". Data was transferred from Survey Monkey to Microsoft Excel for graphing and analysis, and represented as numbers of respondents with means and percentages. T-test inferential statistical tests were performed with significance reported as p values less than 0.05.

Results

Forty-nine plastic surgery residents completed the burn rotation at RTBC during the relevant period. Of these, the contact details (email address and cellular telephone numbers) of 42 residents were readily available and invited to participate. Thirty-two residents completed the survey within two weeks of the request, representing a 76% response rate.

Nineteen of the respondents (59%) undertook their burn rotation in their second year of residency at the University of Toronto, 6 (19%) while in their second year at University of Western Ontario plastic surgery training program, and 7 (22%) during their third year at the University of Ottawa. The largest proportion of residents completed their rotation in 2018 (n = 6, 19%). Two of the residents also undertook a senior rotation in the burn centre, and then a burn fellowship at another centre. The respondents' details (university program, year, duration allocated to burns, career to date) are summarised in Table 1.

Seventeen of the 26 EPA's evaluated were judged by more than 75% of respondents as "a moderate amount", "a lot" or "a great deal" (Table 2). These reflect activities relevant to the management of the inpatient burn and plastic surgery

Table 1. Details of the survey respondents, according to university program, time allocated in months, stage of residency, year, current career stage and if fellowship was undertaken and in which area.

Respondent	University	Year of Training	Duration (months)	Year	Current position	Fellowship
1	Toronto	2 and 5	3	2016 (2021)	Fellow	Burn
2	Toronto	2	3	2019	Resident	NA
3	Toronto	2	3	2020	Resident	NA
4	Ottawa	3	2	2021	Resident	NA
5	Toronto	2	3	2020	Resident	NA
6	Toronto	2	3	2021	Resident	NA
7	Ottawa	2	2	2017	Attending	Hand
8	Toronto	2	3	2019	Resident	NA
9	Toronto	2 and 5	3	2015 (2018)	Attending	Burn
10	Toronto	2	3	2021	Resident	NA
11	Toronto	2	3	2015	Attending	Hand
12	Western	2	1	2016	Attending	Micro
13	Toronto	2	3	2018	Attending	Craniofacial
14	Western	2	1	2020	Resident	NA
15	Ottawa	3	2	2017	Attending	Breast/Micro
16	Toronto	2	3	2017	Resident	NA
17	Western	2	1	2018	Fellow	Micro/ Hand
18	Toronto	2	3	2020	Resident	NA
19	Toronto	2	3	2018	Fellow	Cosmetic
20	Western	2	1	2021	Resident	NA
21	Toronto	2	3	2016	Attending	NA
22	Toronto	2	3	2018	Resident	NA
23	Toronto	2	3	2019	Resident	NA
24	Ottawa	3	2	2016	Attending	Hand
25	Western	2	1	2018	Resident	NA
26	Toronto	2	3	2020	Fellow	Cosmetic
27	Toronto	2	3	2019	Resident	NA
28	Ottawa	3	2	2021	Resident	NA
29	Ottawa	3	2	2019	Resident	NA
30	Ottawa	3	2	2018	Attending	Breast/Micro
31	Western	2	1	2017	Attending	Craniofacial
32	Toronto	2	3	2019	Resident	NA

service, such as assessing and providing initial management for patients, accurately documenting clinical information, excising burn wounds and covering them with either autograft or allograft, managing emergencies and communicating with the patient and family. Six EPA's received "a moderate amount", or more, from all respondents (Table 2).

Those EPA's which received more than 50% but less than 75%, for "a moderate amount", or more, are listed in Table 3, and include a further 8 EPA's. The complete list of all plastic surgery EPA's, those that were judged in this survey, and how they scored relative to others, are documented in Table 4.

The EPA that was regarded as the least available for completion of the 26 was "performing reconstruction with a pedicled flap", with 28% (n = 9) of respondents stating they were exposed to this EPA "a moderate amount", "a lot" or "a great deal". "Executing scholarly work" (n = 8; 25%) and "performing reconstruction with a pedicled flap" (n = 7; 22%) were the only two EPA's evaluated in this survey that received "none at all" from more than 20% of respondents.

Comparing those who undertook a three month rotation (ie those from the University of Toronto; n = 19) versus those whose rotations were shorter (n = 13), the percentage of respondents who scored the EPA's in Table 3 as "a moderate amount" or more, was significantly lower for the latter category of trainees (mean EPA score 55.8%; population mean 61.8%; p = 0.048). This difference was not noted in the first group of

Table 2. Entrustable Professional Activities that received "a moderate amount", "a lot", or "a great deal" of greater than 75% of respondents

Entrustable Professional Activity (EPA)	Percentage of respondents who scored the EPA as "a moderate amount" or more
1. Assessing patients with a traumatic injury relevant to Plastic Surgery	97%
2. Assessing and providing initial management for patients with skin and soft tissue infections and wounds	84%
3. Assessing and providing initial management for patients with burn injury	100%
4. Integrating scientific literature into clinical practice	91%
5. Documenting clinical information	100%
6. Managing patients with emergency conditions	100%
7. Managing the inpatient service	100%
8. Managing adverse events	94%
9. Performing autogenous & other grafts	100%
10. Managing patients with minor burns	88%
11. Providing initial management for patients with major burns	91%
12. Communicating with patients and families with specific needs	94%
13. Applying the principles of biomedical ethics	84%
14. Implementing the principles of quality improvement and patient safety	91%
15. Contributing to the management of an outpatient clinic	75%
16. Contributing to the management of all components of the service	100%
17. Developing a personal learning plan	84%
Mean	**93%**

Table 3. Entrustable Professional Activities that received "a moderate amount", "a lot", or "a great deal" of between 50% and 75% of respondents

Entrustable Professional Activity (EPA)	Percentage of respondents who scored the EPA as "a moderate amount" or more
1. Coordinating, organising and completing a full day surgical list	72%
2. Managing patients with secondary burn deformities	63%
3. Providing consultation and definitive management for patients with lower extremity soft tissue defects	72%
4. Performing surgical interventions for patients with complex wounds of the abdomen/trunk/pelvis	50%
5. Providing surgical assessment and consultation for patients with complex wounds of the abdomen/trunk/pelvis	59%
6. Performing reconstruction with local flaps	59%
7. Executing scholarly work	63%
8. Teaching junior learners	56%
Mean	**61.75%**

Table 4. List of all Entrustable Professional Activities for Plastic Surgery, those that were evaluated in this study, and how often they scored "a moderate amount", "a lot", or "a great deal".

Entrustable Professional Activity (EPA)	Evaluated in this survey	'A Moderate amount" of exposure or more by >75% of respondents	'A Moderate amount" of exposure or more by 50 –75% of respondents	"A Moderate amount" of exposure or more by 25-50% of respondents
Plastic Surgery: Transition to Discipline EPA #1 Assessing patients with a traumatic injury relevant to Plastic Surgery	+	+		
Plastic Surgery: Foundations EPA #1 Assessing and providing initial management for patients with skin and soft tissue infections and wounds	+	+		
Plastic Surgery: Foundations EPA #2 Assessing and providing initial management for patients with an acute hand injury				
Plastic Surgery: Foundations EPA #3 Performing an initial assessment of patients with craniofacial trauma				
Plastic Surgery: Foundations EPA #4 Assessing and providing initial management for patients with burns	+	+		
Plastic Surgery: Foundations EPA #5 Integrating Plastic Surgery scientific literature into clinical practice	+	+		
Plastic Surgery: Foundations EPA #6 Documenting clinical information	+	+		
Plastic Surgery: Foundations EPA #7 Closing abdominal incisions				
Plastic Surgery: Foundations EPA #8 Assessing patients with breast cancer				
Plastic Surgery: Core EPA #1 Managing patients with emergency conditions	+	+		
Plastic Surgery: Core EPA #2 Managing the Plastic Surgery inpatient service	+	+		
Plastic Surgery: Core EPA #3 Managing adverse events	+	+		
Plastic Surgery: Core EPA #4 Performing reconstruction with local flaps	+		+	
Plastic Surgery: Core EPA #5 Performing reconstruction with pedicled flaps	+			+
Plastic Surgery: Core EPA #6 Performing reconstruction with free flaps				
Plastic Surgery: Core EPA #7 Performing autogenous & other grafts	+	+		
Plastic Surgery: Core EPA #8 Providing surgical management for patients with major soft tissue defects and deformities of the face				
Plastic Surgery: Core EPA #9 Assessing and developing a management plan for patients with composite defects of the head and neck				
Plastic Surgery: Core EPA #10 Providing surgical assessment	+		+	

(continued)

Table 4. (continued)

Entrustable Professional Activity (EPA)	Evaluated in this survey	'A Moderate amount" of exposure or more by >75% of respondents	'A Moderate amount" of exposure or more by 50 –75% of respondents	"A Moderate amount" of exposure or more by 25-50% of respondents
and consultation for patients with complex wounds of the abdomen/trunk/pelvis				
Plastic Surgery: Core EPA #11 Performing surgical interventions for patients with complex wounds of the abdomen/trunk/pelvis	+		+	
Plastic Surgery: Core EPA #12 Providing consultation and definitive management for patients with lower extremity soft tissue defects	+		+	
Plastic Surgery: Core EPA #13 Providing assessment and definitive management for patients with simple craniofacial trauma				
Plastic Surgery: Core EPA #14 Managing patients with hand fractures				
Plastic Surgery: Core EPA #15 Assessing patients with non-traumatic hand and/or wrist conditions				
Plastic Surgery: Core EPA #16 Managing patients requiring surgery for joint, ligament, fascia and/or soft tissue pathology of the hand				
Plastic Surgery: Core EPA #17 Managing patients with tendon injuries				
Plastic Surgery: Core EPA #18 Managing patients with peripheral nerve injuries				
Plastic Surgery: Core EPA #19 Assessing patients with a mangled upper extremity and providing initial management				
Plastic Surgery: Core EPA #20 Providing consultation and definitive management for patients with invasive melanoma				
Plastic Surgery: Core EPA #21 Providing consultation and definitive management for patients with non-melanoma cutaneous malignancies				
Plastic Surgery: Core EPA #22 Managing patients with minor burns	+	+		
Plastic Surgery: Core EPA #23 Providing initial management for patients with major burns	+	+		
Plastic Surgery: Core EPA #24 Managing patients with secondary burn deformities	+		+	
Plastic Surgery: Core EPA #25 Assessing patients for non-surgical facial rejuvenation procedures, and performing injections				
Plastic Surgery: Core EPA #26 Providing comprehensive				

(continued)

Table 4. (continued)

Entrustable Professional Activity (EPA)	Evaluated in this survey	'A Moderate amount" of exposure or more by >75% of respondents	'A Moderate amount" of exposure or more by 50 –75% of respondents	"A Moderate amount" of exposure or more by 25-50% of respondents
assessment and consultation for patients presenting for aesthetic surgery				
Plastic Surgery: Core EPA #27 Performing facial aesthetic surgery				
Plastic Surgery: Core EPA #28 Performing body contouring surgery				
Plastic Surgery: Core EPA #29 Performing aesthetic breast augmentation surgery				
Plastic Surgery: Core EPA #30 Providing comprehensive assessment and consultation for patients presenting for reconstructive breast surgery				
Plastic Surgery: Core EPA #31 Performing breast reconstruction surgery				
Plastic Surgery: Core EPA #32 Performing breast reduction surgery				
Plastic Surgery: Core EPA #33 Assessing and managing pediatric patients with hand fractures				
Plastic Surgery: Core EPA #34 Managing paediatric patients with common plastic surgery conditions				
Plastic Surgery: Core EPA #35 Performing the surgical skills of cleft lip and palate procedures				
Plastic Surgery: Core EPA #36 Communicating with patients and families with specific needs	+	+		
Plastic Surgery: Core EPA #37 Applying the principles of biomedical ethics	+	+		
Plastic Surgery: Core EPA #38 Teaching junior learners	+		+	
Plastic Surgery: Core EPA #39 Executing scholarly work	+		+	
Plastic Surgery: Core EPA #40 Implementing the principles of quality improvement and patient safety	+	+		
Plastic Surgery: Transition to Practice EPA #1 Managing an outpatient clinic	+	+		
Plastic Surgery: Transition to Practice EPA #2 Coordinating, organizing and completing a surgical day of core procedures	+		+	
Plastic Surgery: Transition to Practice EPA #3 Managing a Plastic Surgery practice	+	+		
Plastic Surgery: Transition to Practice EPA #4 Developing a personal learning plan for continuing personal and professional development	+	+		

(higher scoring) EPA's represented in table one (mean EPA score 91.6% vs population mean 93%; $p = 0.23$).

In the free text sections following each multiple choice question, a variety of comments regarding the burn rotation were shared with the investigators. Exposure to the comprehensive care of the major acute burn, and quality improvement processes, were regarded as positive aspects of the rotation. Consistent themes that emerged included the need to introduce three month rotations for those training programs allocating shorter (one or two month) rotations, and requests for greater exposure to complex wound surgery and reconstructive burn surgery. Furthermore, the consistent allocation of at least two residents to this program, in addition to the two fellows, was considered necessary to allow for greater involvement in the important area of outpatient follow-up, while not compromising on acute burn surgery and burn critical care. Respondents also identified interest in more opportunities to participate in traditional research and quality improvement interventions while allocated to burns.

Discussion

Our survey revealed that plastic surgery residents have an excellent opportunity to complete one-third (17 out of 52) of the required plastic surgery EPA's during their burn rotation. Furthermore, there is at least some opportunity to complete a further 8 EPA's, thus accounting for 25 (almost half) of all those required by the Royal College of Surgeons.

Our results reinforce not only the educational benefits of the burn rotation, but also demonstrate an excellent opportunity to increase resident exposure to the assessment and comprehensive surgical management of complex wounds (necrotising soft tissue infections, surgical wound complications, pressure injuries, degloving wounds, and exfoliative skin conditions), which are conditions seldom managed in other rotations. More than half of the respondents identified at least "a moderate amount" of exposure to EPA's related to complex wound assessment and care.

An unintended but potential consequence of the introduction of EPA's to specialty training, is that program directors may utilise the number of EPA's potentially acquired during a rotation, to justify the distribution and allocation of residents. In fairness, the number of potential EPAs might be one of several criteria used by program directors to deal with the practical problem of where, and for how long, to assign residents. Our findings strongly counter any argument that the burn service is a "low yield" rotation from an EPA acquisition perspective. Instead, the results of this survey should provide reassurance to program directors that a burn rotation will help trainees achieve the mandatory number of EPA's.

We have consistently noted that residents who undertook short rotations (1-2 months) had less opportunity to be involved in the range of activities undertaken in the burn centre in comparison with those who had a dedicated 3 month rotation.[13] This survey has shown that this is especially true in the category of EPA's where 50-75% of respondents selected "a moderate amount", or more. This suggests the importance of at least a three month burns rotation for junior or intermediate residents. In addition to direct clinical experience and the coordination of a busy in- and outpatient service during their burn rotation, residents find particular value in being exposed to the burn centre's quality improvement program, issues of biomedical ethics, and the management of adverse events.

While it is clear that trainees usually obtain excellent exposure to burn resuscitation, critical care and acute burn surgery, the qualitative commentary associated with this survey reflected the need to balance clinical service on the burn critical care unit, with greater involvement in the burn clinic, particularly with respect to the assessment and management of secondary burn deformities in follow-up, as well as greater opportunities to undertake burn related research.

This study has some limitations. First, not every resident who completed a burn rotation at the RTBC over the last seven years completed this survey. However, a majority were contacted and we had a 76% survey completion rate of those invited to participate. Second, the authors, who sub-specialize in total burn care, selected the EPA's to be included in the survey, and also trained the respondents. This introduces a bias towards reporting a higher number of potential EPA's. We would argue that this is not a major limitation because the residents themselves rated the selected EPA's, and all responses were anonymous.

In conclusion, the burn rotation remains a fundamentally important part of plastic surgery training, and offers residents a significant number of the Entrustable Professional Activities (EPA's) that they require. Given the breadth of plastic surgery and the marked variation in terms of service provision to training ratios, both the number of potential EPA's as well as other criteria, (perhaps average time required to master the EPA's and site specific service considerations), should be utilised to determine the distribution of plastic surgery residents across the academic sites. We would also recommend that a comprehensive assessment of EPA's available per rotation should be regularly undertaken to ensure that resident needs are being met.

Author Contributions

Both authors were involved in all stages of data collection, conception, analysis, editing and final submission of the manuscript.

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