The Utility and Efficiency of a Resident Hand Clinic for the Management of Acute Hand Trauma at the University of Alberta

L'utilité et l'efficacité d'une clinique de la main de résidents pour la prise en charge des traumatismes aigus de la main à l'université de l'Alberta

Emilie M. Robertson, BSc, MD¹, Curtis R. Budden, MD, MEd¹,
Brandon J. Ball, BSc, MD, FRCSC¹, and Adil Ladak, MD, MSc, FRSCS¹

Plastic Surgery
2019, Vol. 27(2) 195-199
© 2018 The Author(s)
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/2292550318800323
journals.sagepub.com/home/psg

Abstract

Background: The University of Alberta established a resident-run hand clinic in 2005 to expeditiously manage the growing numbers of patients with traumatic hand injuries. The purpose of this study was to examine the clinical volume and types of cases assessed and treated in the clinic, as well as gauge patient satisfaction with care received. **Methods:** A retrospective chart review and patient satisfaction questionnaire were conducted for patients assessed in the hand clinic in 2015. Demographic data, referral data, and treatment required were recorded. Patients were asked to complete a survey on their experience at the end of their visit. **Results:** A total of 1022 charts were reviewed. The most common reason for referral was a fracture or dislocation (57%), followed by tendon injury (18%). The average wait time to be seen in clinic was 2.97 ± 2.13 days in the winter and 4.12 ± 2.14 days in the summer. Forty-seven percent of patients required splinting, 17% required a procedure, and 21% of patients were referred for surgery. Patient satisfaction on average was 9.29 ± 0.87 on a satisfaction scale of 10. **Conclusion:** In a 6-month period, residents attending hand clinic assessed and treated 1022 patients, providing timely management of acute injuries. A resident-run hand clinic is an effective model to decrease wait times for patients, to decrease time spent assessing nonemergent injuries in the emergency department, and to concentrate hand trauma in a setting conducive to resident training, while still maintaining high patient satisfaction.

Résumé

Historique : En 2005, l'université de l'Alberta a mis sur pied une clinique de la main dirigée par des résidents pour accélérer la prise en charge du nombre croissant de patients ayant des lésions traumatiques des mains. La présente étude visait à examiner le volume clinique et le type de cas évalués et traités en clinique, ainsi qu'à évaluer la satisfaction des patients à l'égard des soins reçus. **Méthodologie :** Les chercheurs ont procédé à une analyse rétrospective des dossiers et ont distribué un questionnaire sur la satisfaction des patients qui avaient été évalués dans la clinique de la main en 2015. Ils ont consigné les données démographiques, les données sur l'envoi vers un médecin et le traitement requis. Les patients ont été invités à remplir un sondage sur leur expérience à la fin de leur rendez-vous. **Résultats :** Au total, les chercheurs ont examiné 1022 dossiers. La principale raison de l'orientation vers un médecin était une fracture ou une dislocation (57 %), suivie d'une lésion du tendon (18 %). Le temps d'attente moyen pour être vu en clinique était de $2,97 \pm 2,13$ jours pendant l'hiver et de $4,12 \pm 2,14$ jours pendant l'été. De plus, 47 % des patients ont eu besoin d'une attelle, 17 % ont eu besoin d'une intervention et 21 % des patients ont été envoyés en chirurgie. En moyenne, la satisfaction des patients était de $9,29 \pm 0,87$ sur une échelle de satisfaction de 10. **Conclusion :** Sur une période de six mois, les résidents qui ont travaillé à la clinique de la main ont évalué et traité 1022 patients, assurant une prise en charge rapide des lésions aiguës. Une clinique de la main dirigée par des résidents est un modèle efficace pour réduire les temps d'attente pour les patients, réduire le temps passé à évaluer des blessures non urgentes à l'urgence et concentrer les traumatismes de la main dans un milieu favorable à la formation des résidents tout en assurant une satisfaction élevée des patients.

¹ Division of Plastic and Reconstructive Surgery, University of Alberta, Edmonton, Alberta, Canada

Corresponding Author:

Adil Ladak, 2D2.09, Walter MacKenzie Health Science Center, 8440-112 Street NW, Edmonton, Alberta, Canada T6G 2B7.
Email: aladak@ualberta.ca

Table 1. Hand Clinic Patient Demographic Information.

		Demographic Data					
	Patient Volume (#)	Male (%)	RHD (%)	WCB (%)	Local (%)	ECR (%)	Outside ECR (%)
Winter	486	67	90	18	49	29	22
Summer	536	71	91	15	43	35	22
Total	1022	71	90	16	46	32	22

Abbreviations: ECR, Edmonton Capital Region; RHD, right hand dominant; WCB, Workers Compensation Board (i.e. work related injury).

Keywords

hand surgery, education, resident clinic, patient satisfaction, hand trauma, resident-run clinic

Introduction

Resident-run clinics provide an opportunity for residents to gain skill and knowledge in a particular domain, provide an alternative location for treatment to already burdened emergency departments, and have the potential for significant cost savings to the health-care system. The University of Alberta's Division of Plastic Surgery began developing a resident hand clinic in 2005. This clinic was implemented in order to reduce the burden of acute hand consults from emergency department and family physicians. Six days a week, residents at the University of Alberta hospital run a 4- to 8-patient clinic at the end of the day. All residents are expected to attend. The clinic attends to both pediatric and adult patients with acute hand injuries. The referring physician makes bookings for the clinic once the case is discussed with the on-call senior resident or attending plastic surgeon. Residents of all training years are expected to see patients, devise treatment plans, and perform minor procedures. The chief plastic surgery residents run the clinic, with the ultimate clinical decisions overseen by the on-call staff surgeon.

The educational impact of and patient satisfaction with resident clinics has been assessed previously in nonsurgical domains such as internal medicine.¹⁻³ Studies have been published on the influence of a resident-run cosmetic surgery clinic, both as a superb educational and skill development tool and as a positive service to patients, but little has been published on other resident clinics in surgical specialties.⁴⁻⁸

With an increasing emphasis on work-hour restrictions and the development of competent residents, efforts to improve efficiency and optimizing a resident's work hours are essential. Wojcik et al examined a general surgery resident-run minor surgery clinic at their center as a useful tool to adhere to resident work-hour restrictions, as well as to improve residents' operational autonomy and prevent feelings of unpreparedness for fellowship, without compromising patient safety. Resident hand clinics are one way for residents to assess and treat a high volume of acute patients while minimizing the time they need to spend in the emergency department after hours. This provides a venue for residents to quickly expand their knowledge base on acute hand injuries, as well as to perfect minor hand procedure surgical skills. The most longitudinal study is a 10-year review of cosmetic procedures performed at a senior resident cosmetic

clinic.⁷ In the study, authors examined the surgical volume and learner's satisfaction with the experience. They found that residents were in agreement that this initiative enhanced their learning and should be incorporated into residency training programs. Neaman et al examined chief resident-run cosmetic clinics across the United States and similarly found that these opportunities provided residents with milestone skills in their training, not only in regard to surgical skills but also in decision-making in presurgical planning and postoperative care.⁸

In addition to increasing exposure for surgical trainees, hand clinics have the opportunity to decrease unnecessary interhospital transfers for acute assessment. Previous studies have shown that approximately 70% of hand surgery consults sent to a tertiary center are inappropriate for urgent assessment and could be assessed in clinic.^{9,10} Reducing the patient burden in emergency departments also has significant cost-saving benefit.⁹

The objective of this study is to examine the volume and type of injuries seen at the University of Alberta plastic surgery resident hand clinic as well as to evaluate patient satisfaction with their treatment at the clinic.

Methods

This study was approved by the Research Ethics Office of the University of Alberta. A retrospective chart review of patients seen at the University of Alberta resident hand clinic over a 6-month period was conducted. The months were divided into 2 blocks: the first was a 3-month winter period from January to March 2015 and the second was during the summer months from June to September 2015. Information collected included patient area of residence, handedness, occupation, injury, date of first assessment by a medical professional, length of wait time required to be seen in the hand clinic, whether a patient underwent a procedure in clinic, received a referral to occupational therapy, and/or if they were booked for surgery.

Patient satisfaction with the resident hand clinic was also assessed with a satisfaction survey. This survey was developed through a combination of the Generic Short Patient Experiences Questionnaire (GS-PEQ), Consumer Assessment of Health-Care Providers Survey, and questions designed specifically for this study. It was then field tested with 10 mock participants and reviewed with clinic staff. Revisions were made to the survey items.

Figure 1. Occupation of patients seen in hand clinic.

Figure 2. Types of hand injuries seen in clinic.

Table 2. Clinic Data Including Referral Time in Days Between Referral to Hand Clinic and Date Seen in Hand Clinic, Percentage of Patients Who Had a Procedure in Hand Clinic, Percentage of Patients Who Were Referred to Occupational Therapy in Hand Clinic, and Percentage of Patients Who Were Referred for Surgery From Hand Clinic.

	Clinic Data			
	Referral Time (days)	Procedure in Clinic (%)	Referral to OT (%)	Referral for Surgery (%)
Winter	2.97	18	44	21
Summer	4.37	15	45	21
Total	3.67	17	45	21

Abbreviation: OT, occupational therapy.

Patients attending the clinic over a 4-month period were asked to fill out an anonymous survey once their clinic appointment was completed. The items were scored using a Likert scale. Where percentages are reported, the responses of agree and strongly agree were condensed into one category as a maker of satisfaction. Descriptive statistical analysis was performed using Microsoft Excel (version 2013, Microsoft Corporation, Redmond, Washington, USA).

Table 3. Results From Patient Satisfaction Survey.

Questionnaire Items	Satisfaction Score (%)
Staff treated me kindly	100
Residents provided enough info re: diagnosis	98.6
Residents listened carefully	97.4
Residents described treatment options	97.2
Overall I was pleased with my appointment	94.5
Clinic was well-organized	94.4
Overall satisfaction	92.9

Results

A total of 1022 patient charts from 2015 were reviewed from the University of Alberta Resident Hand Clinic. Four hundred eighty-six patients were seen in the winter months (January to March), and 536 were seen in the summer months (July to September). The majority of patients (46%) were from Edmonton, while 32% were from the Edmonton Capital Region (ECR), and 22% were from outside of the ECR. Most patients were male (69%), right hand dominant (90%), and the average age was 34.4 years (Table 1). Sixteen percent of the patients seen were involved in work-related injuries. Most patients seen in the clinic were employed in trades (32%), with students comprising the second most common (23%) and unemployed persons the third most common (14%; Figure 1). Twenty-nine percent of patients were referred from the University of Alberta Hospital's emergency department, 46% were referred from other hospitals, and 25% were referred from a general practitioner's office. Wait time for the clinic appointment was on average 3.7 days over the 6 months included in this study.

In clinic, the types of injuries seen were hand fractures and dislocations (59%), tendon injuries (18%), soft tissue injuries (9%), ligamentous injuries (5%), amputations (4%), infections (2%), foreign bodies (1%), facial trauma (1%), and other injuries (1%; Figure 2). Seventeen percent of the patients had a procedure performed in hand clinic. Examples of procedures performed include revision amputation, extensor tendon repair, and fracture reduction. From clinic, 45% of the patients were referred to occupational therapy, and 21% were referred for definitive surgery (Table 2).

There were differences between summer and winter cohorts studied which included the number of patients seen (486 in the winter months, 536 in the summer months) and the referral time (2.97 ± 2.13 days for winter months, 4.12 ± 2.14 days for summer months). The difference in referral time was statistically significant ($P < .0001$).

We received 98 responses for the patient satisfaction survey, and patient satisfaction with their experience at the hand clinic was on average 9.29 ± 0.87 on a satisfaction scale of 10. Patient satisfaction was assessed using a 12-item questionnaire (see Online Appendix A). This questionnaire found that patients thought residents listened carefully (97.4%), residents provided enough information about the diagnosis (98.6%), residents provided enough information regarding treatment (97.2%), the clinic was well-organized (94.4%), staff treated the patient kindly (100%), and overall patients were pleased with their visit (94.5%; Table 3).

Discussion

This study is the first to report on clinical volume and patient experience of a resident-run hand trauma clinic. We found that despite the large volume of patients in a 6-month period, patient wait times were low and overall patient satisfaction was high.

Resident-run clinics provide a platform for effective and efficient trainee education. Resident physicians are able to gain significant experience in treating a high volume of hand injuries through aggregation of acute hand injuries to a mandatory trainee clinic. With this model, senior residents are given the opportunity to teach junior residents and medical students while having the support of the staff surgeon for review of any complicated cases or cases requiring surgical intervention. Within the scope of resident education, resident work hours has recently become a contentious issue. The argument toward adhering to work-hour restrictions is that it improves patient and resident safety, while opponents to work-hour restrictions argue that it decreases operative volume and experience. Studies in general surgery have been equivocal with some demonstrating that adherence to work-hour restrictions has decreased resident operative experience significantly,¹¹ while others suggest that these restrictions have not significantly decreased operative volume and instead improved resident education.¹² Our resident-run hand clinic model aggregates patients who previously would have been seen in the emergency department, many of them after hours, into an afternoon clinic that starts when most elective operating room theaters are finished for the day. Therefore, exposure to surgical cases is not decreased, work-hour restrictions are adhered to, and there is an educational benefit from having all of the plastic surgery residents on rotation at the University of Alberta assessing urgent hand cases as opposed to just the resident on call. These educational benefits were also found in other studies examining resident-run patient assessment clinics.^{8,13,14}

In addition to optimizing resident education, the resident hand trauma clinic model serves to decrease the burden on the emergency department. The high volume of hand trauma and the resources required to treat them have been studied in the United States, with an estimated 4.7 million emergency department visits for traumatic hand injuries in 2008.⁹ All 1022 patients seen in our clinic in a 6-month period would have otherwise been assessed and/or treated in a hospital emergency department in lieu of direct referral to the clinic. This highlights the current demand that hand trauma places on the health-care system.

Another benefit of this model of patient care is that it allows for effective screening of potential traumatic hand consultations, as staff and/or resident review of the case is required prior to booking into the clinic. This correlates with extensive savings in the health-care system. A single-center study in the United States found that the cost for transfer of 1108 patients for hand surgeon assessment carried a cost of US\$4.6 million, and the majority of these were unnecessary.⁹ In another study, where hand surgeons and emergency physicians were blinded

to patient information and asked to rank the appropriateness of transfer to a tertiary center, raters deemed 66% of transfers unnecessary.¹⁰ With our current model, a majority of these inappropriate patient transfers and hand surgeon assessments are avoided, thereby conferring significant health-care savings.

Although cost savings and resident education are important factors at an academic center, patient satisfaction with care received is paramount. We wanted to demonstrate that the benefits of a primarily learner-run model were not at the expense of patient satisfaction. Our resident hand clinic is staffed by plastic surgery residents, by an occupational therapist for splinting services, and is overseen by the staff surgeon on call. In addition, direct referrals to physiotherapy are made from the clinic, thereby streamlining comprehensive care for traumatic hand injuries. We administered a questionnaire to assess the patient satisfaction with care received at the clinic, achieving very high satisfaction scores (95%). A recent systematic review demonstrated that there is no consensus over which of the many validated tools to measure patient satisfaction is the gold standard but maintains that the measurement of patient satisfaction is still integral to the goal of delivering quality patient-centered care.¹⁵ Many studies have assessed resident satisfaction with learner-run clinics; however, only few studies have been published on patient satisfaction, specifically in cosmetic surgery and internal medicine resident clinics. The results of these surveys were similar to ours, with overall high patient satisfaction in learner-run clinics.¹⁶⁻²⁰

Future studies will explore the experience of the hand clinic from the viewpoint of referring physicians. It may be of value to ascertain whether referring physicians find this a useful service. Methods to improve clinical efficiency and prepare patients for their appointments could be enhanced from exploring other viewpoints in the clinical care pathway. Additionally, with the move toward competency-based training, the hand clinic may serve as a powerful platform for trainee assessment. The utility of the hand clinic to provide formative and potentially summative evaluation will be explored in future studies. Many competencies of hand surgery are required to successfully run this clinic, and these can be assessed during hand clinic hours without requiring Observed Structured Clinical Exam (OSCE) or other time-consuming and costly simulations. The feasibility of this will be explored in future studies. An additional direction for this study will be to conduct a formal cost analysis for both financial resources and demands on acute care service.

Overall, this study describes a treatment paradigm to efficiently triage and care for patients with acute traumatic hand injuries using a resident-run clinic model. We have demonstrated high patient satisfaction while maximizing trainee education and experience within the confines of tightening work-hour restrictions.

Authors' Note

Presented at Canadian Society of Plastic Surgeons (CSPS) 2017 in Winnipeg, Canada, and Alberta Society of Plastic Surgeons 2017 in Banff, Alberta. Dr Emilie M. Robertson contributed to article drafting,

patient chart data collection, and statistical analysis of chart data. Dr Curtis R. Budden contributed to article drafting, data collection, survey design, and statistical analysis of survey data. Dr Brandon J. Ball contributed to study conception and design and manuscript revisions. Dr Adil Ladak contributed to study conception and design and manuscript revisions. This study was approved by the Research Ethics Office of the University of Alberta.

Acknowledgments

The authors thank Dr Anna Todd, Hand clinic staff (Althea, Hannah, Stephanie, and Cynthia), and the University of Alberta residents for assisting with survey data collection.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Supplemental Material

Supplemental material for this article is available online

References

- Houston TK, Connors RL, Cutler N, Nidiry MA. A primary care musculoskeletal clinic for residents. *J Gen Intern Med*. 2004;19(5 pt 2):524-529.
- Lo MC, Freeman M, Lansang MC. Effect of a multidisciplinary-assisted resident diabetes clinic on resident knowledge and patient outcomes. *J Grad Med Educ*. 2013;5(1):145-149. doi:10.4300/JGME-D-12-00065.1.
- Sing MK, Einstadter D, Lawrence R. A structured women's preventative health clinic for residents: a quality improvement project designed to meet training needs and improve cervical cancer screening rates. *Qual Saf Health Care*. 2016;19(e45):1-6. doi:10.1136/qshc.2009.033274.
- Pyle JW, Angobaldo JO, Bryant AK, Marks MW, David LR. Outcomes analysis of a resident cosmetic clinic. *Ann Plast Surg*. 2010;64(3):270-274.
- Iorio ML, Stolle E, Brown BJ, Christian CB, Baker SB. Plastic surgery training: evaluating patient satisfaction with facial fillers in a resident clinic. *Aesthetic Plast Surg*. 2012;36(6):1361-1366.
- D'Souza GF, Gosman A. Evaluation of an academic resident aesthetic clinic from perspective of patient and resident. *Supplement Plast Reconstr Surg*. 2015;136(4S-1):122-123.
- Pu LL, Thornton BP, Vasconez HC. The educational value of a resident aesthetic surgery clinic: a 10 year review. *Aesthet Surg J*. 2009;26(1):41-44.
- Neaman KC, Hill BC, Ebner B, Ford RD. Plastic surgery chief resident clinics: the current state of affairs. *Plast Reconstr Surg*. 2010;126(2):626-633.
- Friebe I, Isaacs J, Mallu S, Kurdin A, Mounasamy V, Dhindsa H. Evaluation of the appropriateness of patient transfers for hand and microsurgery to a level I trauma center. *Hand (N Y)*. 2013;8(4):417-421.
- Drolet BC, Tandon VJ, Ha AY, et al. Unnecessary emergency transfers for evaluation by a plastic surgeon: a burden to patients and the health care system. *Plast Reconstr Surg*. 2016;137(6):1927-1933.
- Damadi A, Davis A, Saxe A, Apelgren K. ACGME duty-hour restrictions decrease resident operative volume: a 5-year comparison at an ACGME-accredited university general surgery residency. *J Surg Educ*. 2007;64(5):257-259.
- Durkin E, McDonald R, Munoz A, Mahvi D. The impact of work hour restrictions on surgical resident education. *J Surg Educ*. 2008;65(1):54-60.
- Wojcik BM, Fong ZV, Patel MS, et al. The resident-run minor surgery clinic: a pilot study to safely increase operative autonomy. *J Surg Educ*. 2016;73(6):142-149.
- Day KM, Scott JK, Gao L, et al. Progressive surgical autonomy in a plastic surgery resident clinic. *Plast Reconstr Surg Glob Open*. 2017;4(5):1-7. doi:10.1097/GOX.0000000000001318.
- Almeida RS, Bourliataux-Lajoie S, Martins M. Satisfaction measurement instruments for healthcare service users: a systematic review. *Cad Saude Publica*. 2015;31(1):11-25.
- Brahmania M, Young M, Muthiah C, Ilnyckyj A, Duerksen D, Moffatt DC. Resident trainees do not affect patient satisfaction in an outpatient gastroenterology clinic: a prospective study conducted in a Canadian gastroenterology clinic. *Can J Gastroenterol Hepatol*. 2015;29(7):363-368.
- Brandel MG, D'Souza GF, Reid CM, Dobke MK, Gosman AA. Analysis of a resident aesthetic clinic. *Ann Plast Surg*. 2017;78(4):175-179.
- Francis M, Warm E, Julian K, et al. Determinants of patient satisfaction in internal medicine resident community clinics: findings of the educational innovations project ambulatory collaborative. *J Grad Med Educ*. 2014;470-477. doi:10.4300/JGME-D-13-00398.1
- Freiberg A, Giguere D, Ross DC, Taylor JR, Bell T, Kerluke LD. Are patients satisfied with results from residents performing aesthetic surgery? *Plast Reconstr Surg*. 1997;100(7):1824-1831.
- Koulaxouzidis G, Momeni A, Simunovic F, Lampert F, Bannasch H, Stark GB. Aesthetic surgery performed by plastic surgery residents. *Ann Plast Surg*. 2014;73(6):696-700.