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Regional Wait Times for Patients With Nonmelanoma Skin Cancer in Southwestern Ontario

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Regional Wait Times for Patients With Nonmelanoma Skin Cancer in Southwestern Ontario

Les temps d'attente régionaux pour les patients atteints d'un cancer cutané non mélanome dans le sud-ouest de l'Ontario

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Abstract

Background: Nonmelanoma skin cancer (NMSC) affects many Canadians. Although morbidity and mortality are rare, the burden to patients and the health-care system is significant. This study aims to evaluate current plastic surgery wait times and care pathways for patients with NMSC in Southwestern Ontario. **Methods:** A retrospective chart review of 225 patients treated in Ontario from 2015 to 2018 was conducted. Inclusion criteria included patients with an NMSC managed with surgical excision. Referral information was compared. Primary outcomes were wait times: from referral to consultation, referral to excision, and consultation to excision. Data were analyzed using Student *t* test with equal variance. **Results:** One-hundred forty-three patients were included from the academic cohort and 82 from the community cohort. Referrals to academic and community surgeons included lesion location (90% and 97.6%, respectively), but less frequently included size (18% and 29.2%, respectively). Most referrals to academic surgeons included biopsy results (78.6%), as opposed to community referrals (25.6%). Patients in the academic cohort waited 15.3 ± 12.7 weeks from referral to consultation, and 15.7 ± 13 weeks from referral to excision. Patients from the community cohort waited significantly shorter periods of 4.9 ± 3.1 ($P < .001$) and 11.7 ± 9.9 weeks ($P = .016$), respectively. However, patients of the academic cohort waited 2.4 ± 7.1 weeks from consultation to excision, while patients in the community cohort waited 6.7 ± 9.6 weeks ($P < .001$). Rates of negative peripheral margins on pathology were similar between groups, at 89.5% of the academic cohort and 88.9% of the community cohort. Deep margins were positive 5.7% of the time at the academic sites and 6.2% of the time in the community. **Conclusions:** Patients referred to academic centres waited significantly longer periods of time in several parameters compared to those referred to a community surgeon. However, academic surgeons often had expedited consultation-to-excision time frame. This study provides important data for future quality improvement initiatives in NMSC care.

Résumé

Historique : De nombreux Canadiens ont un cancer cutané non mélanome (CCNM). Bien que la morbidité et la mortalité soient rares, le fardeau est important pour les patients et le système de santé. La présente étude a été conçue pour évaluer les temps d'attente et les trajectoires de soins en chirurgie plastique pour les patients du sud-ouest de l'Ontario ayant un CCNM. **Méthodologie :** Les chercheurs ont réalisé une analyse rétrospective des dossiers de 225 patients traités de 2015 à 2018 en

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Ontario. Un CCNM traité par excision chirurgicale faisait partie des critères d'inclusion. Les chercheurs ont comparé les données d'adressage vers la chirurgie. Les résultats cliniques primaires étaient les temps d'attente entre l'adressage et la consultation, entre l'adressage et l'excision ainsi qu'entre la consultation et l'excision. Les chercheurs ont analysé les données au moyen du test de Student de variance égale. **Résultats :** Au total, 143 patients ont fait partie de la cohorte universitaire et 82, de la cohorte communautaire. L'adressage vers des chirurgiens universitaires ou communautaires découlait du siège de la lésion (90 % et 97,6 %, respectivement) et, à une moindre fréquence, de sa dimension (18,6 % et 29,2 %, respectivement). La plupart des adressages vers des chirurgiens universitaires incluaient les résultats de biopsies (78,6 %), contrairement à celui vers des chirurgiens communautaires (25,6 %). Les patients de la cohorte universitaire ont attendu $15,3 \pm 12,7$ semaines entre l'adressage et la consultation, et $15,7 \pm 13$ semaines entre l'adressage et l'excision. Les patients de la cohorte communautaire ont attendu beaucoup moins longtemps, soit $4,9 \pm 3,1$ ($P < 0,001$) et $11,7 \pm 9,9$ semaines ($P = 0,016$), respectivement. Cependant, les patients de la cohorte universitaire ont attendu $2,4 \pm 7,1$ semaines entre la consultation et l'excision, et ceux de la cohorte communautaire, $6,7 \pm 9,6$ semaines ($P < 0,001$). À la pathologie, le taux de marges périphériques négatives était semblable entre les groupes, se situant à 89,5 % dans la cohorte universitaire et à 88,9 % dans la cohorte communautaire. Les marges profondes étaient positives dans 5,7 % des cas en milieu universitaire et dans 6,2 % des cas dans la communauté. **Conclusions :** Les patients adressés à des centres universitaires attendaient considérablement plus longtemps à l'égard de plusieurs paramètres par rapport à ceux adressés à un chirurgien communautaire. Cependant, les chirurgiens universitaires réduisaient souvent la période entre la consultation et l'excision. La présente étude fournit des données importantes en vue de prochaines initiatives d'amélioration de la qualité des soins du CCNM.

Keywords

basal cell carcinoma, nonmelanoma skin cancer, referral, squamous cell carcinoma, wait times

Introduction

Nonmelanoma skin cancer (NMSC) is one of the most common clinical presentations encountered by plastic surgeons who play an essential role in the definitive management of these patients. In 2014, NMSC accounted for over 40% of new cancer diagnoses in Canada.¹ One in 8 Canadians will develop basal cell carcinoma (BCC) in his or her lifetime, and 1 in 20 will develop squamous cell carcinoma (SCC).²

Unfortunately, care pathways of patients with NMSC in Ontario are poorly understood as limited research has been conducted. Patients with NMSC currently follow an unclear and often complicated care plan. Most commonly, they are referred to a dermatologist by a general practitioner and then onto a surgeon. At each stage of care, there are variable wait times for the assessment and management of a single lesion. A multidisciplinary team approach would be beneficial along with access to waitlist times and specialist's availabilities. This may optimize appropriate triaging of patients to ensure timely treatment by a qualified specialist.

Additionally, there is a lack of standard method of referral. For instance, referrals sent to specialists often contain inconsistent information (such as size and location of the lesion, whether or not a biopsy has already been completed), which in the limitations of the current system makes it difficult to triage the referrals. In an ideal framework, NMSC care would be coordinated to eliminate barriers such as this and improve patient accessibility.

Aside from the burden to our health-care system, there are also significant implications for patients with regard to morbidity and potential mortality, although NMSC is rarely associated with death. There are notable psychosocial effects on a patients ultimately affecting quality of life.³ Nonmelanoma

skin cancer frequently affects cosmetically sensitive areas and patients may worry about scarring or disfigurement, feel anxious about a cancerous lesion, and have concerns about recurrence.^{4,5} Presently, the literature has mixed results on whether longer time to excision is related to increased lesion size^{6,7}; however, it is important to remember that lack of statistical significance does not negate clinical significance.

There is increasing demand for timely access to cancer treatment, including NMSC, in the Canadian health-care system. Quality improvement initiatives are necessary to ensure optimal delivery of patient care. Plastic surgeons should be at the forefront of these quality improvement initiatives for patients with NMSC. In Ontario, the provincial cancer agency Cancer Care Ontario is moving toward quality-based funding for many cancer disease sites including NMSC.⁸ In a quality-based funding structure, health-care dollars follow the patient after diagnosis, as opposed to a global budget for care. This model is purported to provide opportunity for process improvements, clinical re-design, improved patient outcomes, enhanced patient experience, and potential health system cost-savings.⁸ Quality initiatives such as this require understanding current care pathways for these patients.

Currently, only 5 Canadian provinces (Alberta, British Columbia, Manitoba, New Brunswick, and Saskatchewan) have a cancer registry that routinely includes NMSC data.⁹ Unfortunately, this does not yet exist in Ontario. The information of NMSC is hard to collect since patients are diagnosed and treated in numerous settings. Although difficult, it is important to include NMSC in data collection since it is such a high-volume problem with a variety of stakeholders, including patients; a variety of health-care providers involved such as plastic surgeons, general practitioners, and dermatologists; and

the health-care system itself. Without a pooled resource, it becomes challenging to understand the clinical picture of this disease state. To further complicate matters, there is inconsistent data collection between health-care providers, and consequently inaccurate estimation of the financial burden. Including NMSC data in current cancer registries would improve our current understanding of epidemiology, trends, overall health-care burden (ie, to health-care providers and overall financial burden), resource allocation, and public health strategies.

The purpose of this study is to understand current wait times and the care pathway that is involved when a patient is referred to local academic and community plastic surgeons (affiliated with Western University) with a provisional diagnosis of NMSC. We aim to define various wait times (referral to consultation, consultation to treatment, and referral to treatment) and secondary outcome measures (including information included in referrals and histologic data at lesion excision) of patients with clinically suspected or documented NMSC and how they are managed by plastic surgeons in Southwestern Ontario.

Materials and Methods

The study was approved by the Western University Research Ethics Board (REB #110840) and Lawson Health Sciences. A retrospective chart review was performed on 225 patients who underwent surgical excision of an NMSC by plastic surgeons within the Division of Plastic and Reconstructive Surgery at Western University between January 1, 2015, and January 24, 2018.

Inclusion Criteria

Patients referred to the practices of plastic surgeons with a provisional diagnosis of an NMSC in both our academic (London Health Sciences Centre and St. Joseph's Health Centre in London, Ontario) and affiliated community hospitals (Windsor Regional Hospital and Stratford General Hospital) for surgical excision were included in our study. Patients who underwent lesion excision during the time period were included. One lesion per patient was included in our analysis.

Exclusion Criteria

Patients with an alternate clinical diagnosis than NMSC, incomplete medical records, prior history of radiation for skin cancer to the anatomic site of the current referral, and those with a genetic predisposition to NMSC (eg, xeroderma pigmentosum and Gorlin syndrome) were excluded from our study.

Chart Review

Charts were reviewed for demographic information (age, gender, distance from home to clinic), past medical history (including risk factors for NMSC, medications), referral information (date of referral, time from referral to consultation, type of lesion, description of lesion, suspected clinical diagnosis, size of lesion, biopsy information [SCC or BCC], and number of

Table 1. Patient Demographics.

	Academic Centre	Community
Total patients included	143	82
Males	87	37
Females	56	45
Average age (years)	72 ± 12	70.9 ± 13.3
Average distance from clinic (km)	21.6	43.7

skin cancers referred), factors around definitive treatment (any barriers to timely treatment, location of lesion, clinical margins recorded, type of suture used for closure, type of closure, and number of excisions completed), histologic information (pathologic diagnosis, size of specimen, deep and peripheral margins), and follow-up information.

Statistical Analysis

Data were then analyzed to assess our primary outcome of wait times (from biopsy, to referral, to consultation, and ultimately lesion excision) and secondary outcomes of information included in referrals (size and location of lesion, biopsy results) and histologic data at lesion excision. Statistical analysis was performed using Student *t* test to test the null hypothesis that patients would wait a similar amount of time from referral to consultation, referral to excision, and consultation to excision between groups. *Z* test comparison of proportions was used to compare information included in referrals. The level of significance was set to .05.

Results

Demographics

Patient cohorts from 5 staff surgeons were included in this study. Demographic data are illustrated in Table 1. Within the academic cohort, 143 patients from 3 staff surgeons were included. Within the community cohort, 82 patients from 2 staff surgeons were included. The community cohort included patients were seen by surgeons at Windsor Regional Hospital or Stratford General Hospital.

Patients seen in London lived significantly closer to clinic than those in the community cohort ($P < .001$). Occupation was not recorded for most patients seen at the academic centre (81.1%, $n = 116$). Of those recorded ($n = 27$), 22 (81.5%) patients had an occupation without significant sun exposure, 3 (11.1%) had significant sun exposure, and 2 (7.4%) were farmers. In the community, patient occupation was not recorded in 69.5% of cases. Of those recorded ($n = 25$), most patients had an occupation without sun exposure (64%, $n = 16$), 2 (8%) patients had an occupation with sun exposure such as landscaping work, and 7 (28%) patients were farmers.

Wait Times

Wait times between various parameters such as referral to consultation, referral to excision, consultation to excision, and

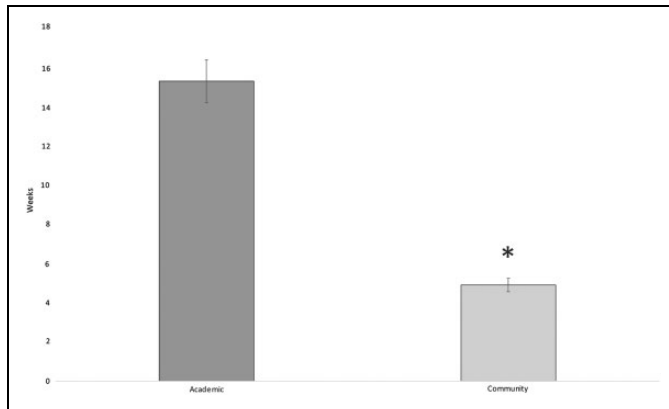


Figure 1. The average number of weeks patients waited between the date of referral and date of consultation in both the academic and community cohorts. Standard error of mean plotted. Asterisk indicates statistical significance ($P < .05$).

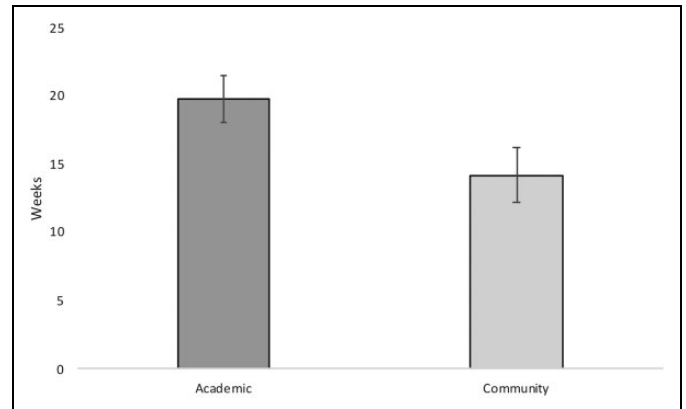


Figure 4. The average number of weeks patients waited between the date of biopsy and date of excision in both the academic and community cohorts. Standard error of mean plotted.

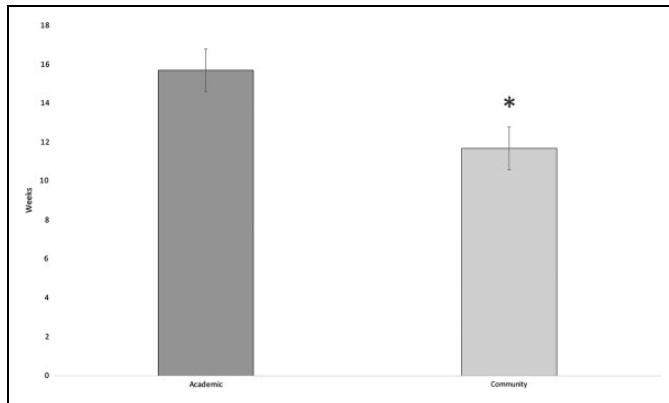


Figure 2. The average number of weeks patients waited between the date of referral and date of excision in both the academic and community cohorts. Standard error of mean plotted. Asterisk indicates statistical significance ($P < .05$).

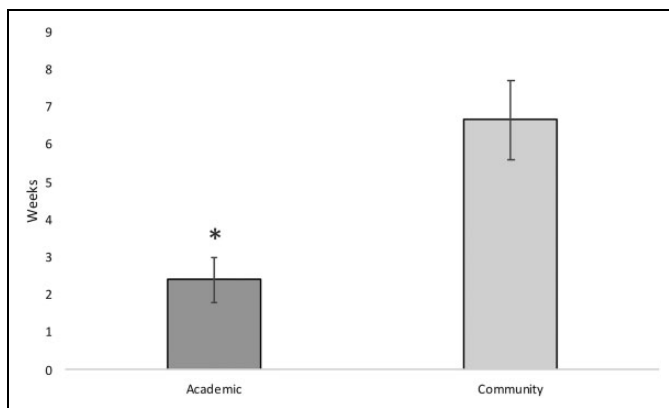


Figure 3. The average number of weeks patients waited between the date of consultation and date of excision in both the academic and community cohorts. Standard error of mean plotted. Asterisk indicates statistical significance ($P < .05$).

biopsy to excision were calculated. Patients from the academic cohort waited an average of 15.3 ± 12.7 weeks from referral to consultation. In comparison, patients who saw a community surgeon only waited 4.9 ± 3.1 weeks ($P < .001$; Figure 1). The academic cohort waited 15.7 ± 13 weeks from referral to excision. Patients referred to a community surgeon waited a significantly shorter amount of time, with an average of 11.7 ± 9.9 weeks ($P = .016$; Figure 2). The average time elapsed from consultation to excision was 2.4 ± 7.1 weeks in the academic cohort, in comparison to the community cohort at 6.7 ± 9.6 weeks ($P < .001$; Figure 3). Patients waited a similar amount of time between biopsy and excision, at 19.8 ± 18.4 and 14.2 ± 13.8 weeks, respectively (Figure 4).

Referral Information

Within the academic cohort ($n = 143$), the majority of patients were referred for a clinically suspected BCC ($n = 83$), followed by SCC ($n = 41$) and unknown lesion ($n = 16$). Of the 143 patients, 3 did not require a new referral since he or she was already known to the surgeon. A similar trend in referrals was seen in the community ($n = 82$) with regard to type of suspected lesion. Most patients were referred for clinically suspected BCC ($n = 44$), followed by SCC ($n = 17$) and unknown lesion ($n = 13$). There were also 4 referrals made for alternate diagnoses, including keratoacanthoma, keratin horn, cyst, and tumour.

Within the academic group, 110 (78.6%) referrals included biopsy-proven lesions. In contrast to the academic group, the minority of referrals received in the community included a biopsy result (25.6%, $n = 21$, $P < .0001$). Overall, 79.1% of excisions by the academic surgeons underwent biopsy prior to excision (including those with biopsies at referral and those who underwent biopsy after consultation), in comparison to 58.5% of patients who underwent biopsy prior to excision in the community ($P = .00003$; Figure 5).

The majority of new referrals to the academic centres included a description of the lesion location (90%, $n = 126$).

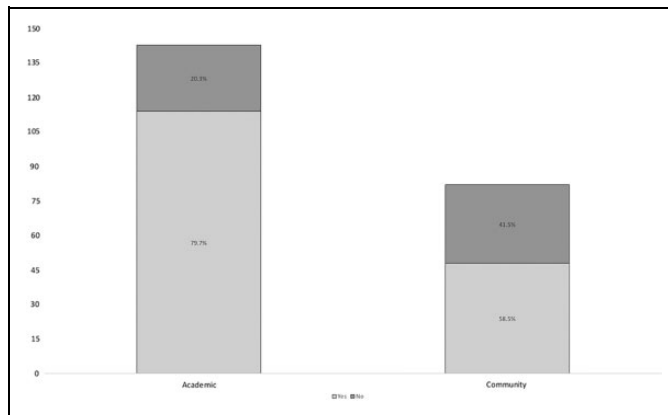


Figure 5. Proportion of patients who underwent biopsy of lesion prior to excision.

in comparison to 97.5% ($n = 80$) of referrals made to the community. Additionally, a similar proportion of patients referred to academic centres and the community included a description of the lesion size (18.6% [$n = 26$] and 29.2% [$n = 24$], respectively).

Overall, 130 (90.9%) patients from the academic group were referred for a new lesion, 8 (5.6%) for a recurrence, and 5 (3.5%) for re-excision for positive margins. Some patients (22.9%, $n = 32$) were referred for multiple lesions. Most patients referred had a previous history of skin cancer (55.7%, $n = 78$). Thirty-three patients were reported to have specific risk factors for NMSC, including a history of immunosuppression, excessive sun exposure, blistering sunburns, or premalignant lesions.

Within the community cohort, most patients were referred for a new suspected lesion (85.4%, $n = 70$). The remaining patients were referred for suspected recurrence (14.6%, $n = 12$). Community surgeons did not receive any referrals for re-excision of lesions with positive margins. The majority of patients did not have a previous history of skin cancer (54.9%, $n = 45$). Only 26 patients were noted to not have any risk factors for developing NMSC. Most patients were referred for single lesions (82.9%, $n = 68$).

Biopsy/Histologic Data

Most lesions were excised from the head and neck region (Figure 6). Referral information for type of clinically suspected lesion or biopsy-proven lesions was consistent with histologic results after lesion excision in 119 (83.2%) patients in the academic cohort and 45 (54.9%) patients in the community cohort. Basal cell carcinomas were more prevalent than SCCs in both cohorts (academic: 47.9% vs 42.9%; community 53.7% vs 30.5%, respectively). Within the academic centres, 1.4% of excised lesions showed no malignancy and 4.3% of them showed dermal scar, in comparison to the community where 8.5% of lesions showed no malignancy and 4.9% of them showed dermal scar.

Clinical margins were noted in 106 (74.6%) operative notes from the academic surgeons in comparison to 72 (90%) in the

community. The average clinical margin taken was similar between sites, at 2.96 mm on average in the academic centre and 2.89 mm on average in the community. Additionally, rates of negative peripheral margins on pathology were similar between groups, at 89.5% of the academic cohort and 88.9% of the community cohort. Deep margins were positive 5.7% of the time at the academic sites and 6.2% of the time in the community.

Discussion

The prevalence of NMSCs has been steadily increasing over the past 40 years.¹⁰ With an aging Canadian population, the public health-care system will be required to shoulder the extra burden of managing this common disease. Efforts should be made to optimize care strategies should and begins with understanding current practice. This study collected data on NMSC treatment in Southwestern Ontario in order to understand current care pathways for future quality improvement initiatives.

The results of this study identified a number of different findings about the current treatment of NMSC. For example, wait times from referral to consultation for patients seen in academic centres (15.3 ± 12.7 weeks) was significantly longer in comparison to those seen in the community (4.9 ± 3.1 weeks), despite the fact that patient demographics and lesion characteristics including size and aggressiveness were similar between 2 groups. This suggests that there is opportunity for more effective triage and sharing of clinical burden between academic and community physicians. Interestingly, at academic centres, patients waited less time from consultation to surgical excision (2.4 ± 7.1 weeks), presumably because community surgeons wait for pathology results from biopsies prior to lesion excision, whereas academic centres often only accept biopsy-proven referrals. Additionally, academic centres have more resources that allow for more procedural time, and more manpower (such as residents) to perform these procedures. Rates of negative peripheral and deep margins were similar between both groups, suggesting that NMSC is being adequately treated in both community and academic setting.

Wait times in this study were longer than those found in a cross-sectional study by Thind et al,¹¹ which found patients referred over a 5-year period in Southwestern Ontario waited a median time of 50 days for consultation with a plastic surgeon. Another study by Barua et al¹² cited the median wait time between referral and consultation for plastic surgery in Canada was 12.8 weeks in 2013, and the wait between consultation and treatment was a median of 14.7 weeks, resulting in a period of 27.5 weeks between referral and treatment. In Ontario, the median patient wait from referral to consultation was 8 weeks, with an additional wait time of 7.8 weeks to receive treatment. Although direct comparisons are difficult as some of these studies included melanoma and NMSC, there may be a trend toward increasing wait times due to increasing volumes of skin cancer.

This current study identifies that patients seen in the academic centre lived significantly closer to clinic than those seen

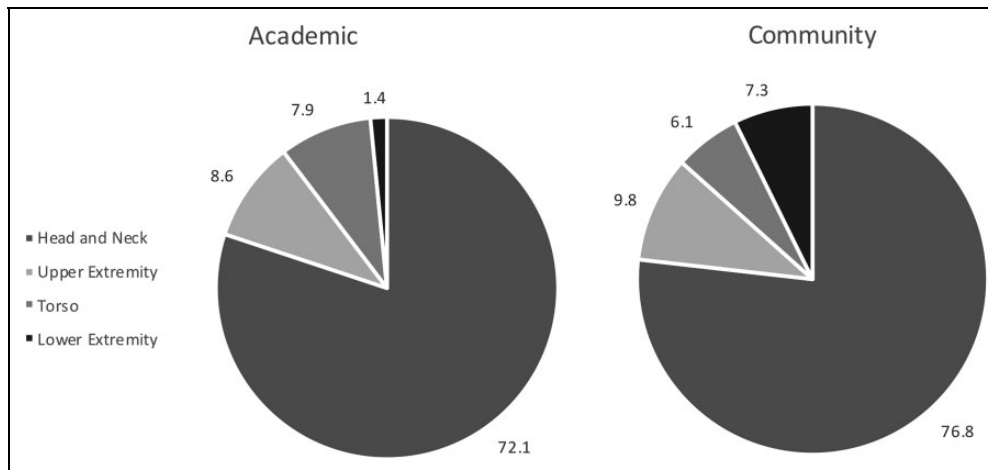


Figure 6. Location of lesion (values in percentages).

in the community. This was contradictory to our hypothesis that patients may travel longer distances for care in a tertiary care centre. One possibility for this unexpected outcome would be that this study only captured distance travelled from a patient's home to the surgeon's main office. This may be misleading as many community surgeons offer "satellite" clinic services where physicians travel to various locations to complete consultations and treatments in rural settings, providing increased convenience for patients. Additionally, the population surrounding academic centres is more condensed, so patients may travel shorter distances overall.

Referral information provides an important component of triaging care. Many referrals from primary care physicians to community surgeons (82%) as well as academic surgeons (92%) included a description of lesion location. It is important for this information to be captured in referrals, to allow the consulting surgeon to assess whether they treat that anatomic area and plan the time required for consultation, or to direct the referral elsewhere. For example, it may take 20 minutes to conduct a consultation and perform excision for NMSC on a back, whereas a lesion on a cosmetically sensitive area may require additional time for the consult (to explain cosmetic or functional risks) and treatment (longer procedure time to perform a complex repair). Interestingly, referrals to both cohorts rarely described the size of the lesion (18% of community and 29% of academic referrals). This information is also vital in the accurate triage of patients with NMSC. Larger lesion size is correlated with increased morbidity, case complexity, and rarely mortality.¹³ Incomplete data likely influence wait times since consulting physicians are not being provided with the full clinical patient history.

Another interesting finding is that the majority of referrals sent to the academic centre included biopsy results of the lesion prior to referral (78.6%), in comparison to 25.6% of those sent to the community. This practice pattern likely serves as a method of triage for academic surgeons who only accept biopsy-proven referrals. On the other hand, community plastic surgeons provide an important element of primary care and

screening of both benign and malignant lesions and therefore may not view prior diagnosis as important. Understanding referral patterns such as this will be important when future quality improvement initiatives for NMSC commence.

Strengths and Limitations

To our knowledge, this is the first study that directly compared wait times for a common clinical problem between academic and community surgeons in plastic surgery. There are some limitations to our study, which may have influenced our results. First, the study period was only limited to 3 years. Additionally, the confounding factor that patients may have been referred to another physician for biopsy, such as a dermatologist, prior to referral to a plastic surgeon has not been accounted for. Further, a "patient-based incidence approach" is used, which may underestimate the burden of NMSC in our patient population.¹⁴

Conclusion

In conclusion, we have discovered patients are waiting longer periods of time for consultation and treatment with academic plastic surgeons in comparison to the community. Quality improvement initiatives may look at methods of sharing the clinical burden more equitably among those providing care to patient with NMSC. Also, this study has identified there is room for improvement in the referral process, such as standardizing referral forms to include information vital to the triage of patients with NMSC. Specifically referring physicians should aim to include critical information in their referrals, including lesion location and size at minimum, and tumour-specific information, such as recurrent disease or actual biopsy results when available. Further research is required across the province and country to more accurately capture care pathways for NMSC, but this study can serve as a pilot to begin the quality improvement initiatives and optimize the care of this patient population.

Authors' Note

Caitlin Symonette and Aaron Grant are co-senior authors.

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Declaration of Conflicting Interests

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References

- Canadian Cancer Statistics. 2014: Special topic—skin cancers. Government of Canada, Canadian Cancer Society; 2014. <http://www.cancer.ca/~media/cancer.ca/CW/cancer%20information/cancer%20101/Canadian%20cancer%20statistics/Canadian-Cancer-Statistics-2014-EN.pdf>. Accessed January 28, 2019.
- Non melanoma skin cancer. Public Health Agency of Canada, Government of Canada; 2015. <https://www.canada.ca/en/public-health/services/chronic-diseases/cancer/non-melanoma-skin-cancer.html>.
- Rhee JS, Matthews BA, Neuburg M, Logan BR, Burzynski M, Nattinger AB. The skin cancer index: clinical responsiveness and predictors of quality of life. *Laryngoscope*. 2007;117(3):399-405.
- Burdon-Jones D, Thomas P, Baker R. Quality of life issues in nonmetastatic skin cancer. *Br J Dermatol*. 2010;162(1):147-151.
- Radiotis G, Roberts N, Czajkowska Z, Khanna M, Körner A. Nonmelanoma skin cancer: disease-specific quality-of-life concerns and distress. *Oncol Nurs Forum*. 2014;41(1):57-65.
- Diehl J, Choi YM, Liang LJ, Chiu M. Association between mohs surgery wait times and surgical defect size in patients with squamous cell or basal cell carcinoma of the skin. *Dermatol Surg*. 2015;41(7):768-774.
- Gaulin C, Sebaratnam DF, Fernández-Peñas P. Quality of life in non-melanoma skin cancer. *Australas J Dermatol*. 2015;56(1):70-76.
- Ministry of Health and Long-Term Care Ontario. Quality-Based Procedures Clinical Handbook for Cancer Surgery. 2015. http://www.nelhin.on.ca/~media/sites/ne/Accountability/HSFR/3%20Clinical%20Handbook-%20Cancer%20Surgery_Final%20January%202015.pdf?la=en. Accessed March 8, 2019.
- Hayes RC, Leonfellner S, Pilgrim W, Liu J, Keeling DN. Incidence of nonmelanoma skin cancer in New Brunswick, Canada, 1992 to 2001. *J Cutan Med Surg*. 2007;11(2):45-52.
- Abbas M, Kalia S. Nonmelanoma skin cancer trends in Canada: the influence of gender, age and location. *J Am Acad Dermatol*. 2015;72(5):AB188.
- Thind A, Stewart M, Manuel D, et al. What are wait times to see a specialist? an analysis of 26,942 referrals in southwestern Ontario. *Healthc Policy*. 2012;8(1):80-91.
- Barua B, Rovere M, Skinner B. *Waiting Your Turn: Wait Times for Health Care in Canada*. 21st ed. Vancouver, Canada: Fraser Institute; 2013.
- Rigel D, Robinson J, Ross M, et al. *Cancer of the Skin*. 2nd ed. Philadelphia, PA: Saunders; 2011.
- Krueger H, Williams D. Burden of malignancy after a primary skin cancer: recurrence, multiple skin cancers and second primary cancers. *Can J Public Health*. 2010;101(4): I23-27.