

# Patterns of skin disease in a sample of the federal prison population: a retrospective chart review

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## Abstract

**Background:** Dermatology in vulnerable populations is under-researched. Our objective was to analyze the most commonly referred skin diseases affecting the Correctional Service Canada inmates in Ontario.

**Methods:** An observational, cross-sectional, retrospective chart review of inmate patients seen from 2008 until 2013 was performed. Two groups of patients were included in the analysis: those assessed in-person, and those evaluated by e-consult.

**Results:** In the in-person patient group, the 3 most common diagnoses were acne, psoriasis and other superficial mycoses. For the e-consult group, the 3 most frequent diagnoses were acne, psoriasis and rosacea. There was a clear bias toward more inmates being seen in-person where the service was provided (Collins Bay Institution) than from other correctional institutions in Eastern Ontario.

**Interpretation:** Most of the skin diseases that affected the incarcerated population studied were common afflictions, similar to those affecting the general population, which is in agreement with other studies. Future studies investigating skin diseases in male and female inmates across Canada would bestow more generalizable data.

Dermatology in vulnerable populations is under-researched. When focusing on the incarcerated population, few studies have described skin disease in inmates. Previous studies have concluded that the skin diseases affecting the inmate population are similar to those affecting the general population.<sup>1-7</sup> Furthermore, some studies have postulated specific factors in the prison environment that may contribute to skin disease in this population, including stress,<sup>1</sup> smoking,<sup>1</sup> substance addiction,<sup>5</sup> and personal hygiene and overcrowding.<sup>2,3,5,7</sup> In addition, providing dermatologic treatment within the constraints of the correctional facility may have challenges, such as limitations to the dosing frequency of pills and the dispensing of topical compounds, or the routine use of harsh soaps and skin care products.<sup>7</sup>

The objective of this study was to investigate the most common skin diseases affecting male inmates in Correctional Service Canada institutions in Eastern Ontario and to compare the results with those of previous studies.

## Methods

### Setting

Starting in May 2008, 6 dermatology clinics per year were conducted at Collins Bay Institution (Kingston, Ont.). Consultation requests were placed by referring prison physicians. Patients were escorted and transported to and seen at Collins

Bay Institution from any of the following Eastern Ontario institutions to attend their dermatology appointment: the former Kingston Penitentiary, Bath Institution, Millhaven Institution, Pittsburgh Institution, Frontenac Institution, Regional Treatment Centre and Joyceville Institution. Inmates at Collins Bay Institution were escorted to their appointments, but there was no transport of prisoners beyond the prison confines. Appendix 1 (available at [www.cmajopen.ca/content/4/2/E326/suppl/DC1](http://www.cmajopen.ca/content/4/2/E326/suppl/DC1)) summarizes the facility characteristics of the institutions involved; the capacities listed approximate those at the time of consultation.<sup>8,9</sup>

An additional subset of patients was evaluated by e-consult from the non-Collins Bay Institutions, in addition to the more distant Warkworth Institution (Campbellford, Ont.). With e-consult, the dermatologist examined clinical photographs of patients that accompanied a history provided by the referring

**Competing interests:** James Walker was contracted by Correctional Service Canada during the study time frame as a consultant dermatologist. No other competing interests were declared.

This article has been peer reviewed.

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**CMAJ Open 2016. DOI:10.9778/cmajo.20150135**

physician, which were sent over a secure internet connection. The dermatologist then provided written descriptions and diagnostic and therapeutic instructions to the referring physician. There was no direct interaction between the dermatologist and the patient, and there was no transport of inmates outside of their host institutions.

In Canada, essential physician services are paid for by governments (federal inmates are insured by the federal government), therefore patients evaluated both in person and by e-consult had access to care free of charge.

## Design

Ethics approval was obtained from both the Ottawa Hospital Research Ethics Board and Correctional Service Canada. The charts of all patients who had an in-person dermatology or e-consult assessment while they were inmates at a federal correctional facility between May 1, 2008, and June 30, 2013, were reviewed for this observational, cross-sectional study. The study population was limited to men 18 years of age or older, who had a sentence of 2 years or longer, because the correctional facilities included in this study exclusively housed this demographic. It is noteworthy that all patients underwent evaluation by a single dermatologist, and no other dermatology consultation service was provided to this population during this period.

## Analysis

For every patient, each new diagnosis was recorded. Because there may be less certainty in diagnoses made through e-consult, the in-person and the e-consult groups were analyzed separately to determine the most frequent dermatologic conditions. When a patient underwent both in-person and e-consult evaluation for the same diagnosis, the diagnosis was only recorded for the first encounter. However, when a patient underwent both in-person and e-consult evaluation for different diagnoses, each diagnosis was recorded separately. To assess the most frequent dermatologic conditions, diagnoses were assigned based on the International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10). The 5 most common diagnostic groupings were reported for each population, as well as the 3 most common specific diagnoses (based on ICD-10 subheadings).

## Results

A total of 320 patients underwent assessment during the study period (Table 1), 258 of whom were seen exclusively in-person, 60 of whom underwent evaluation exclusively through e-consult, and 2 of whom underwent assessment in both settings with different diagnoses made in each encounter. Each patient received an mean 1.5 (range 0–6) dermatologic diagnoses, and was seen a mean 1.5 (range 1–16) times.

In the in-person consult group, a total of 374 dermatologic diagnoses were provided; 77 diagnoses were given to patients in the e-consult group (Table 2). In the in-person group, the 5 most frequent diagnostic groupings were disorders of skin appendages (88), other disorders of the skin and subcutaneous

tissue (57), dermatitis and eczema (56), papulosquamous disorders (54) and mycoses (27). In the e-consult group, disorders of skin appendages (25), dermatitis and eczema (12), papulosquamous disorders (10) and other disorders of the skin and subcutaneous tissue (10), and benign neoplasms (4) were the 5 most commonly encountered diagnostic groupings.

With respect to the specific dermatologic diagnoses, acne (59), psoriasis (45) and other superficial mycoses (17) were the 3 most common diagnoses in the in-person group. Acne (11), psoriasis (6) and rosacea (5) were the 3 most common diagnoses in the e-consult group. Table 2 outlines the frequency of the grouped and specific dermatologic diagnoses.

Of the 258 in-person consults, 117 (45.3%) of the patients were from the Collins Bay Institution; however, this institution housed only about 225 (7.6%) of the 2965 inmates in Eastern Ontario federal prisons.

**Table 1: Patient characteristics**

Characteristic	No. (%) <sup>*</sup> n = 320
Patients seen only in person	258 (80.6)
Patients seen only in e-consult	60 (18.8)
Patients seen in both in-person and e-consult (for different diagnoses)	2 (0.6)
<b>Age, yr</b>	
Mean age	38.8 (Range 20–89)
Median	36
Mode	30
<b>Skin phototype</b>	
1–3	150 (46.9)
4–6	97 (30.3)
Not recorded	73 (22.8)
<b>Institution</b>	
Kingston Penitentiary	17 (5.3)
Collins Bay Institution	117† (36.6)
Bath Institution	34 (10.6)
Millhaven Institution	30 (9.4)
Pittsburgh Institution	15 (4.7)
Frontenac Institution	33 (10.3)
Joyceville Institution	27 (8.4)
Regional Treatment Centre	2 (0.6)
Warkworth Institution	40 (12.5)
Not recorded	5 (1.6)
<b>No. of encounters per patient, mean (range)</b>	1.5 (1–16)
<b>No. of diagnoses per patient, mean (range)</b>	1.5 (0–6)

<sup>\*</sup>Unless otherwise specified.

†All in-person consults.

## Interpretation

The 4 most common diagnoses seen in our study population were disorders of skin appendages, other disorders of the skin and subcutaneous tissue, dermatitis and eczema, and papulosquamous disorders. With respect to the specific diagnoses,

acne and psoriasis were the 2 most frequent diagnoses both in participants who presented in person and those whose condition was diagnosed via e-consult.

Previous studies have found that prisoners are mostly affected by common skin diseases and skin infections.<sup>1-7</sup> Our results support these conclusions. When comparing our

**Table 2 (part 1 of 2): Dermatologic diagnoses**

Diagnosis	In person	E-consult
<b>Infections of the skin and subcutaneous tissue</b>	13	2
Impetigo	8	1
Cutaneous abscess, furuncle, carbuncle	1	0
Other local infections of skin and subcutaneous tissue	4	1
<b>Bullous disorders</b>	2	0
Other bullous disorders	2	0
<b>Dermatitis and eczema</b>	56	12
Atopic dermatitis	9	4
Seborrheic dermatitis	16	3
Allergic contact dermatitis	15	2
Dermatitis due to substances taken internally	2	0
Lichen simplex chronicus and prurigo	5	1
Other dermatitis	9	2
<b>Papulosquamous disorders</b>	54	10
Psoriasis	45	6
Pityriasis rosea	1	0
Lichen planus	7	4
Other papulosquamous disorders	1	0
<b>Urticaria and erythema</b>	5	1
Urticaria	5	1
<b>Radiation-related disorders of the skin and subcutaneous tissue</b>	13	3
Other acute skin changes due to ultraviolet radiation	1	0
Skin changes due to chronic exposure of nonionizing radiation	12	3
<b>Disorders of skin appendages</b>	88	25
Nail disorders	3	3
Alopecia areata	1	0
Cicatricial alopecia (scarring hair loss)	1	1
Acne	59	11
Rosacea	4	5
Follicular cysts of the skin and subcutaneous tissue	9	1
Other follicular disorders	11	4
<b>Other disorders of the skin and subcutaneous tissue</b>	57	10
Vitiligo	0	2
Other disorders of pigmentation	11	1
Seborrheic keratosis	10	0
Acanthosis nigricans	3	0
Corns and callosities	2	0
Other epidermal thickening	8	4

**Table 2 (part 2 of 2): Dermatologic diagnoses**

Diagnosis	In person	E-consult
<b>Other disorders of the skin and subcutaneous tissue</b>	57	10
Atrophic disorders of the skin	5	1
Hypertrophic disorders of skin	5	0
Granulomatous disorders of skin and subcutaneous tissue	4	1
Vasculitis limited to skin	2	0
Ulcer of lower limb, not otherwise classified	2	0
Other disorders of skin and subcutaneous tissue, not elsewhere classified	5	1
<b>Multiple superficial injuries</b>	1	0
Arthropod bite	1	0
<b>Diseases of veins, lymphatic vessels and lymph nodes, not elsewhere classified</b>	9	0
Varicose veins of lower extremities with inflammation (stasis dermatitis)	9	0
<b>Disorders of the oral cavity, salivary glands, and jaws</b>	3	2
Other specified disorders of gingiva and edentulous alveolar ridge	1	0
Mucocele of salivary gland	1	1
Diseases of lips	0	1
Diseases of the tongue	1	0
<b>Congenital malformations, deformations and chromosomal abnormalities</b>	3	2
Other congenital malformations of the mouth	3	0
Other congenital malformations of skin	0	1
Neurofibromatosis	0	1
<b>Mycoses</b>	27	3
Dermatophytosis	10	2
Other superficial mycoses	17	1
<b>Viral infections characterized by skin and mucous membrane lesions</b>	12	1
Viral warts	12	1
<b>Pediculosis, acariasis, and other infestations</b>	1	0
Scabies	1	0
<b>Other viral diseases</b>	2	0
Viral infection, unspecified	2	0
<b>Benign neoplasms</b>	17	4
Benign lipomatous neoplasm	3	0
Hemangioma and lymphangioma, any site	3	0
Melanocytic naevi of trunk	6	2
Other benign neoplasms of skin	5	2
<b>Melanoma and other malignant neoplasms of the skin</b>	9	2
Other malignant neoplasms of skin	9	2
<b>Metabolic disorders</b>	2	0
Disorders of lipoprotein metabolism and other lipidemias	2	0
<b>Total</b>	374	77

grouped dermatologic diagnoses, other studies have also found that dermatitis and eczema,<sup>1,5-7</sup> disorders of the pilosebaceous follicle or acne,<sup>1,3,5-7</sup> psoriasis,<sup>1,4</sup> fungal diseases or dermatophyte infection,<sup>1-3,5</sup> seborrheic dermatitis,<sup>1,3</sup> and

benign neoplasms and hyperplasias<sup>1</sup> were among the most frequently diagnosed dermatologic diseases.

Although these diagnoses are common in the nonincarcerated population, some factors in the prison environment may

contribute. Bayle and colleagues suggested that stress in the prison environment and smoking may contribute to the high frequency of disorders of the pilosebaceous unit.<sup>1</sup> The smoking habits of our study population were not assessed. In addition, age, substance addiction and length of detention have been associated with dermatologic disease.<sup>5</sup> Finally, some studies have suggested that personal hygiene and overcrowding may play a role.<sup>2,3,5,7</sup> Brauner and Goodheart highlighted some of the potential difficulties in executing dermatologic treatments for prisoners, including limitations to the dosing frequency of pills and the dispensing of topical compounds, or the use of harsh soaps and skin care products.<sup>7</sup> Furthermore, in the Eastern Ontario correctional facilities, there is a limited formulary of available products.<sup>10</sup>

The concept that e-consult is an effective tool to provide care to vulnerable populations is not novel.<sup>11</sup> Coates and colleagues reviewed the accuracy and reliability of e-consult (teledermatology) and suggested that outcomes were comparable to in-person encounters.<sup>12</sup> Our study supports the use of e-consult for the management of skin disease in prisoners. The most common dermatologic conditions treated in our study would likely be amenable to e-consult, thereby decreasing costs and increasing security — prisoners not housed at Collins Bay Institution were required to travel with escorts to Collins Bay for in-person consults, incurring travel costs and raising safety concerns with the transport of prisoners outside of their institutions. In addition, diagnosis and treatment might be provided in a timelier manner with e-consult, particularly if there are a limited number of in-person consultations per year. Thus, e-consult might provide an alternative to service an unmet medical need for this vulnerable population.

### Limitations

Our study evaluates exclusively male inmates from Eastern Ontario, many of whom came from a single institution. Although these parameters may limit the generalizability of our study results, the findings are in keeping with published data, suggesting that our results are in keeping with a global pattern; however, further investigations are required.

A high proportion of included cases were prisoners at Collins Bay Institution, which may indicate a referral bias. Because of concerns with inmate transport and security, as well as the complexity of communication between institutions, the “in-house” inmates at Collins Bay Institution may have been more likely to receive an in-person dermatologic consult than inmates from other institutions. Our study design did not allow us to evaluate unmet need.

Only inmates referred for dermatologic consultation were included, therefore the sample was not randomized, and the incidence or prevalence of dermatologic disease in the incarcerated population cannot be calculated. In addition, any skin diseases treated successfully by other physicians, such as the prison physician, would not have been included, which would

bias our study’s results to capture more complex or treatment-resistant skin diseases.

### Conclusion

The skin diseases that affected this federally incarcerated population in Ontario were common skin diseases, which is in agreement with other studies. Future studies investigating both male and female prisoners across Canada may capture more generalizable data for Canadian prisoners. To evaluate the incidence of dermatologic diseases in this vulnerable population, a random sample of all inmates could be evaluated for skin disease, instead of narrowing the study population to only those patients referred to a dermatologist.

The results of our chart review suggest that e-consult may be used to service the incarcerated population when in-person encounters are not possible. Future studies investigating the effectiveness of e-consult in prisons across Canada would strengthen this observation.

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**Contributors:** All of the authors were involved in the study design, the acquisition or analysis of the data, and the drafting and revising of the manuscript. All of the authors approved the final version to be published and agreed to act as guarantors of the work.

**Acknowledgements:** The authors would like to thank Dr. Tim Ramsay for assisting with the methodology of this study, and Dr. Jeff Turnbull for reviewing the manuscript.

**Supplemental information:** For reviewer comments and the original submission of this manuscript, please see [www.cmajopen.ca/content/4/2/E326/suppl/DC1](http://www.cmajopen.ca/content/4/2/E326/suppl/DC1)