

Teledermatology management of difficult-to-treat dermatoses in the Faroe Islands

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Abstract

Introduction: Teledermatology is a useful tool for underserved areas. However, because it is not without costs, knowledge of the burdens incurred by teledermatology treatment would be valuable for future types of management.

Methods: All specialist dermatology services in the Faroe Islands have been provided by our department through a mix of standard and teledermatology consultations. We performed a retrospective review of the teledermatology database from its inauguration in 2003 to November 2018. The ratio of consultations per patient (CPP) was calculated as a way to investigate any disproportionate teledermatology burden per patient with a specific disease.

Results: The most common diagnoses were psoriasis, dermatitis, atopic dermatitis, and acne. Among the most frequent CPP diagnoses were bullous pemphigoid, hidradenitis suppurativa, lichen sclerosus, and granuloma annulare.

Conclusions: Dermatological conditions that require paraclinical assistance for diagnosis, hands-on examination, or treatment with either biologics or surgery will all result in high CPP. However, teledermatology still has a place in the treatment of high-CPP dermatoses in rural areas because there is no other alternative. For non-rural areas, CPP can be used as a way to identify those dermatoses that are not advantageous to treat using telemedicine, but instead best benefit from standard face-to-face consultation.

Keywords: teledermatology, dermatosis treatment, teledermatology consultation, difficult to treat

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Introduction

Telemedicine is particularly useful in fields that rely strongly on visual assessment of morphological appearance, such as dermatology (1). It can bring expert dermatological assessment of cases to underserved areas like rural Australia (2), Sub-Saharan Africa (3), and the Faroe Islands (4). From the perspective of a specialist, teledermatology is frequently proposed as a means of reducing not only the burden of treatment but also cost (1, 5). However, teledermatology is not without costs in itself. We therefore identified diseases with a high number of consultations as a possible proxy for disease severity or complexity. When we noticed that knowledge regarding the relative burden of teledermatology treatment of difficult dermatoses was lacking, we decided to investigate the teledermatology challenge of skin diseases because increased knowledge of their places in teledermatology may help shape future decisions regarding this type of management.

Methods

The Faroe Islands

The Faroe Islands are a group of 18 islands in the north Atlantic, located between the UK, Iceland, and Norway. The islands cover 1,396 km² and have a population of 49,864 (in 2017). Specialist dermatology service is exclusively provided by Zealand University Hospital in Denmark (approximately 1,500 km away).

Health services provided

All specialist dermatology services in the Faroe Islands are provided by the Department of Dermatology at Zealand University

Hospital through a mix of standard consultations (800/year) and store-and-forward teledermatology consultations (approximately 2,400/year). Patients are referred to the dermatology service by general practitioners, and they are triaged to either standard physical consultations or telemedicine, depending on the information provided. Patients seen in standard face-to-face consultations are subsequently transferred to telemedicine as soon as clinically possible. Telemedicine consultations therefore represent both standard follow-up as well as emergency assessment of flares because the telemedical capacity is much greater than that of face-to-face consultations.

Analysis

We performed a retrospective review of the teledermatology database from its inauguration in 2003 to November 2018. The 100 most frequent diagnoses were selected (the number 100 was arbitrarily chosen) to avoid rare diseases with only a single diagnosed patient seen multiple times. All diseases were then pooled into groups where applicable (i.e., psoriasis and psoriasis vulgaris were grouped under “psoriasis”), and descriptive statistics and simple comparisons between diagnostic entities were calculated. We calculated the ratio of consultations per patient (CPP) as a way to investigate any disproportionate teledermatology burden for each patient with a specific disease.

Results

From 2003 to 2018, 10,713 Faroese were diagnosed by a dermatologist and managed by teledermatology across 803 different diagnoses. Descriptive statistics of the 10 most common diagnoses are shown in Table 1. The most common dermatoses were psoriasis

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(1,081 patients), dermatitis (864 patients), atopic dermatitis (816 patients), and acne (601 patients). The top 10 most common diagnoses covered 44.4% of all teledermatology patients and 49.4% of all teledermatology consultations. Table 2 shows the 10 diseases with the highest teledermatology burden/_CPP. These are bullous pemphigoid (CPP 1.67), hidradenitis suppurativa (CPP 1.43), lichen sclerosus (CPP 1.36), psoriasis (CPP 1.27), and granuloma annulare (CPP 1.23).

Discussion

Significant differences were found in the CPP for different diagnoses. Among the resource-heavy diagnoses, we find hidradenitis suppurativa, psoriasis, atopic dermatitis, hand eczema, bullous pemphigoid, lichen sclerosus, granuloma annulare, and balanitis. Different mechanisms may be suspected. Bullous pemphigoid, hidradenitis suppurativa, and lichen sclerosus are generally recognized as difficult-to-treat dermatoses. Bullous pemphigoid requires histopathology and immunofluorescence for diagnosis and needs to be followed up for prolonged periods of time (6). Hidradenitis suppurativa used to be an orphan disease, where the only treatment for severe cases is surgery and tumor necrosis factor (TNF) antibodies (7). Lichen sclerosus is a chronic inflammatory disease for which the diagnosis is clinical but patients may require a biopsy to rule out vulvar intraepithelial neoplasia. The disease may further require surgery to alleviate synechiae complications (8). In contrast, granuloma annulare is a benign self-limiting inflammatory condition without a gold standard for treatment but with a wide array of therapeutic options ranging from photo-

therapy and injections to cryosurgery (9). Balanitis is a common disorder with multiple infectious and non-infectious etiologies. The disease increases the risk of penile cancer and the development of ulcerations and phimosis. The diagnosis is clinical but often requires swabs and cultures to rule out sexually transmitted disease. The treatment is simple, but circumcision can become relevant (10). It is speculated that patients' coping and demands for treatment contribute to the high CPP for granuloma annulare. Similar arguments are suggested for balanitis. Thus, a range of diagnosis-specific factors may be hypothesized: treatment-associated factors, factors associated with diagnostic testing, or psychosocial patient-related factors may influence the CPP.

A previous study in rural Australia found that dermatologists requested biopsy for further information in 29.2% of the cases referred for teledermatology (2). A frequently promoted point of teledermatology is that it is supposed to be quick and easy for the dermatologist, offering a means of reducing both the burden of treatment and cost. Thus, teledermatology should be used for simple diseases, for which patients do not require multiple consultations. Physical absence of a dermatologist impose restrictions on both examination and treatment. As is apparent from our data, many difficult dermatoses require a physical dermatologic presence. This is because proper diagnosis may require help from other specialties (e.g., for bullous pemphigoid); because regular disease activity is troublesome, as in the case of sinus tracts (e.g., for hidradenitis suppurativa) or flares (e.g., for atopic dermatitis); or due to supervision to adherence and monitoring for adverse effects of systemic treatment (e.g., for psoriasis and acne). These restrictions can explain at least some of the disproportionate bur-

Table 1 | The ten most frequent diagnoses as measured by the number of patients listed under that diagnosis.

Rank among 803 diagnoses	ICD10 codes	Diagnosis	Patients, n (% of total)	Teledermatology consultations (% of total)	Average age	CPP
1	L40.9, L40., L40.4, L40.3, L40.0C, L40.8A	Psoriasis	1,081 (10.1)	1,372 (11.5)	51.2	1.27
2	L30.9, L30.0, L30.8C, L30., L30.8A	Dermatitis	864 (8.1)	939 (7.9)	53.3	1.09
3	L20.9, L20.8A, L20.0, L20.8B, L20.8	Atopic dermatitis	816 (7.6)	964 (8.1)	19.4	1.18
4	L70.9, L70.0, L70.	Acne	601 (5.6)	731 (6.1)	29.5	1.22
5	D22.9, D22.5, D22.9E	Nevi (incl. dysplastic)	440 (4.1)	470 (4.0)	34.7	1.07
6	L71.9, L71., L71.8	Rosacea	368 (3.4)	398 (3.3)	55.7	1.08
7	L21.9, L21.0, L21.	Seborrheic dermatitis	273 (2.5)	295 (2.5)	49.3	1.08
8	L30.8H	Hand eczema	253 (2.4)	301 (2.5)	44.8	1.19
9	L23.9, L23.	Allergic contact dermatitis	198 (1.8)	209 (1.8)	53.3	1.06
10	L50.9, L50.8A, L50.8D	Urticarial	191 (1.8)	207 (1.7)	41.8	1.08
Total			10,713	11,893	47	1.07

CPP = ratio of consultations per patient. ICD10 codes from <https://icd.who.int/browse10/2016/en>.

Table 2 | Ten diagnosis with the highest teledermatology burden per patient.

Frequency among 803 diagnoses	ICD10 codes	Diagnosis	Patients, n	Teledermatology consultations	Average age	CPP
100	L 12.0	Bullous pemphigoid	18	30	88.1	1.67
65	L 73.2	Hidradenitis suppurativa	30	43	38.2	1.43
62	L 90.0	Lichen sclerosus	31	42	52.3	1.36
1	L40.9, L40., L40.4, L40.3, L40.0C, L40.8A	Psoriasis	1,081	1,372	51.2	1.27
52	L 92.0	Granuloma annulare	35	43	41.6	1.23
4	L70.9, L70.0, L70.	Acne	601	731	29.5	1.22
57	N48.1A	Balanitis	33	40	60.4	1.21
8	L30.8H	Hand eczema	253	301	44.8	1.19
3	L20.9, L20.8A, L20.0, L20.8B, L20.8	Atopic dermatitis	816	964	19.4	1.18
53	C43.9	Malignant melanoma	34	40	57.6	1.18

CPP = ratio of consultations per patient. ICD10 codes from <https://icd.who.int/browse10/2016/en>.

den of these diseases on the teledermatology service. Because teledermatology is used as an adjunct to standard face-to-face consultations, the transfer of all high-CPP consultations to standard consultations would place an even greater burden on these and may therefore not be feasible.

Limitations of this study are that the database only registered the number of teledermatology consultations, not the standard consultations. There is a possibility that, if it were quickly decided that a complicated case should be seen in a standard consultation, this would falsely lower the CPP. This may explain why none of the diagnoses presents with a CPP above two.

Conclusions

Difficult-to-treat dermatoses and dermatological conditions that

require either paraclinical assistance for diagnosis, hands-on examination, or treatment that involves regular follow-up will all result in a higher teledermatology burden. Currently there is no other alternative for high-CPP diseases besides teledermatology, which therefore still has a place in the care of difficult-to-manage dermatoses in rural areas. The authors' suggestion is that for dermatologists invested in telemedicine in non-rural areas CPP can be used as a way to identify dermatoses that are not advantageous to treat via telemedicine. It is speculated that patients with a high-CPP disease are more appropriately seen face-to-face, in turn freeing up resources for teledermatology, which is then more cost-effectively spent for treating low-CPP dermatoses.

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