

BMJ Open Dermatological disease in the older age group: a cross-sectional study in aged care facilities

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ABSTRACT

Objectives: To estimate the prevalence of dermatological disease in aged care facilities, and the relationship between cognitive or physical disability and significant disease.

Setting: 2 large aged care facilities in Auckland, New Zealand, each providing low and high level care.

Participants: All 161 residents of the facilities were invited to participate. The only exclusion criterion was inability to obtain consent from the individual or designated guardian. 88 participants were recruited—66 females (75%), 22 males (25%) with average age 87.1 years (SD 5.5 years).

Primary and secondary outcome measures:

Primary—presence of significant skin disease (defined as that which in the opinion of the investigators needed treatment or was identified as a patient concern) diagnosed clinically on full dermatological examination by a dermatologist or dermatology trainee. *Secondary*—functional and cognitive status (Rehabilitation Complexity Scale and Abbreviated Mental Test Score).

Results: 81.8% were found to have at least one significant condition. The most common disorders were onychomycosis 42 (47.7%), basal cell carcinoma 13 (14.8%), asteototic eczema 11 (12.5%) and squamous cell carcinoma in situ 9 (10.2%). Other findings were invasive squamous cell carcinoma 7 (8%), bullous pemphigoid 2 (2.3%), melanoma 2 (2.3%), lichen sclerosus 2 (2.3%) and carcinoma of the breast 1 (1.1%). Inflammatory disease was more common in those with little physical disability compared with those with serious physical disability (OR 3.69; 95% CI 1.1 to 12.6, p=0.04). No significant association was found between skin disease and cognitive impairment.

Conclusions: A high rate of dermatological disease was found. Findings ranged from frequent but not life-threatening conditions (eg, onychomycosis), to those associated with a significant morbidity (eg, eczema, lichen sclerosus and bullous pemphigoid), to potentially life-threatening (eg, squamous cell carcinoma, melanoma and breast cancer). Those with less significant physical impairment were found to be at greater risk of inflammatory dermatoses.

Strengths and limitations of this study

- Cross-sectional observational study design facilitating assessment of prevalence of dermatological disease in the older age group living in aged care facilities.
- Facilities were not chosen at random but allowed access to significant numbers of patients with a range of physical and intellectual disability.
- All clinical examinations undertaken by a dermatologist or dermatology trainee; confirmatory laboratory testing was not undertaken but all significant clinical disease was reported to the general practitioner.
- Full skin examination undertaken in 88 participants and genital examination permitted in 55 residents (62%).
- Approximately half of the residents were not able to be examined; therefore, selection bias cannot be excluded.

INTRODUCTION

Residents in long-term residential care for older people are a vulnerable group in the community that is growing with ageing of the population. In New Zealand (NZ), the 65+ age group will form 23% of the population by 2036,¹ and therefore the requirements for residential care will increase as the proportion of the older people in the population rises.

Older people living in long-term residential care may face multiple barriers to receiving appropriate care for dermatological disease not least of which include physical disease and cognitive deficits. Aged care facilities may not have optimal surroundings in which to undertake a comprehensive skin check, primary care physicians may lack dermatological training or confidence in dermatological examination and visits to such care facilities by dermatologists may be infrequent, although these factors will vary from country to country. In addition, older individuals may also have difficulty in obtaining transportation to dermatology clinics or face

financial barriers to accessing care in the private health sector. In NZ, it is not routine for specialist dermatological care to be provided in the setting of an aged care facility; rather, specialist dermatological care is accessed outside the facility, in the public or private sector outpatient clinics.

There are several studies on the prevalence of dermatological disease in the older people but none from NZ. The data that exist suggest a high prevalence of both inflammatory dermatoses and skin cancer.²⁻⁵ In a study published in 2003 carried out in Tampa, Florida, the most common dermatological diagnosis was 'pruritus and other related diseases' but basal cell and squamous cell carcinoma were also recorded.⁶ A review of 61 reports from 12 countries examining the prevalence of skin disease among older people in different clinical environments reported a 57% prevalence of onychomycosis affecting nursing home residents.⁷

Skin disorders can significantly limit quality of life and, in the cognitively impaired, symptoms such as pruritus and pain may lead to behavioural disturbances. Older people with dermatological disease experience a higher rate of depression.⁸

Managing skin cancer in the setting of a long-term residential care facility in the face of multiple comorbidities can be challenging, as treatment decisions will differ compared with a young and healthy patient.

Greater knowledge about the burden of disease in this vulnerable group will lead to better planning and delivery of dermatological care. This study sought to investigate the prevalence of dermatological conditions in residential care and test the hypothesis that those with the greatest physical or cognitive impairment would have the greatest dermatological disease burden.

Aims and hypotheses

The study aimed to estimate the prevalence of newly diagnosed dermatological disease in two aged care facilities and to examine the hypotheses that there was an association between cognitive or physical disability and undiagnosed dermatological disease in this population. In NZ, the elderly who reside in these facilities are usually either significantly physically and/or cognitively impaired.

METHODS

Design

A cross-sectional survey was conducted in two aged care facilities.

Participants and recruitment

All 161 residents of two large aged care facilities in South Auckland, NZ, were invited to participate in the study between December 2012 and November 2013. These facilities were selected as they provided low level care (where residents are partly mobile and require assistance with instrumental activities of daily living

(IADLs) and one or two basic activities of daily living (ADLs), called rest homes in NZ, hostels in Australia, residential homes in the UK, assisted living in the USA to high level care (where most residents are dependent on 24 h nursing care and are dependent in most ADLs), called hospital level care in NZ, nursing homes in the UK, the USA and Australia. The residents were approached by letter and by personal invitation from the staff and researchers. However, if the resident was not able to give consent to the study, the next of kin or legally designated enduring power of attorney was approached. The consent included a request to undertake a genital examination, which could be declined or accepted. A genital examination was not undertaken or discontinued if it was deemed to be too distressing for the resident. The consent also permitted access to the clinical records.

Disease outcomes

The primary outcome was defined as the presence of any significant skin disease. A significant condition was defined as a dermatological disease that in the opinion of the investigators needed treatment or was identified during the assessment as a patient concern. A first set of secondary outcomes were defined as presence of a significant skin disease in one of the following categories: solar damage-related condition; infection or infestation; inflammatory disease; congenital disease; circulation or vascular disease; apocrine or sebaceous disease; immunobullous disease; any other disease. The disease subgroups consisting of all tinea, and of all eczema, respectively, were also added to the list of secondary outcomes.

Disability risk factors

The cognitive assessment was undertaken using the Abbreviated Mental Test Score (AMTS), which consists of 10 questions to assess memory, a score smaller than 8 suggesting cognitive impairment.⁹ For analytical purposes, the AMTS was categorised into three groups (0-3=serious impairment, 4-8=impairment and 9-10=no impairment). The physical assessment was by the Rehabilitation Complexity Scale (RCS) validated and used previously in residential care research in NZ to reflect physical disability.¹⁰⁻¹⁴ The RCS assesses 19 functions of older people among which are mobility, use of toilet, dressing, self-care appearance and showering/bathing. Each component is graded and the final figure is a summation of all the grades with a score of 19 the least disability and 76 the highest disability. The RCS was categorised into three groups (0-29=little impairment, 30-39=moderate impairment and 40+=serious impairment). Individual items of the RCS were also examined as specific risk factors.

Assessments

All the assessments were undertaken by a dermatologist (PJ) or a senior trainee (MSD) and all significant dermatological diseases were recorded. All significant dermatological diseases were reported by letter to the

Table 1 Summary of ethnicity and gender of participating residents

Ethnicity			Gender	
European	Maori	Asian/Indian	Female	Male
82 (93.2%)	4 (4.6%)	2 (2.8%)	66 (75%)	22 (25%)

primary care physician and access to publically funded treatment was made available if needed.

Statistical analysis

Descriptive analyses were carried out. Inferential analyses were carried out using logistic regression. Each disease category (including the primary outcome of 'any disease') was dichotomised and regressed on each of the two categorised risk factors. Both risk factors, as well as their interaction, were fitted together in other models. Results were reported as newly diagnosed disease ORs under serious versus low or no impairment, along with 95% CIs.

The potential confounders identified a priori were gender, age group and aged care facility. Age group and facility were considered distal risk factors compared with impairment level, and were not retained for adjustment. Gender was assessed as a potential confounder for each outcome and impairment type combination by considering the relative difference between the adjusted and unadjusted log-OR estimates associated with impairment and the significance level of the added gender term. Any relative difference of 10% accompanied by an observed significance level of 0.20 or less led to the reporting of a gender-adjusted OR. Participant records with missing AMT or RCS information were removed from the analysis set for the affected analyses only.

As further exploratory analyses, hypothesised relationships between specific disease categories and individual items on the RCS were also examined, as well as interactions between cognitive and physical disability as disease category predictors. Unadjusted observed significance levels were reported. The level of significance where applicable was set at 5% against two-sided alternatives, with a Bonferroni adjustment accounting for the two primary hypotheses used in the sample size calculation. Data were analysed using SAS software (SAS V.9.3 for Windows).

RESULTS

Patient characteristics

There were a potential 161 residents, and in total 88 patients were examined (50%). The average age was

87.1 years (SD 5.5 years) and 55 patients consented to a genital examination. The study group was comprised of 66 females (75%) and 22 males (25%). Eighty-two participants were of European ethnicity (93.2%), four of Maori ethnicity (4.6%) and two participants were of Asian/Indian ethnicity (2.8%) (table 1).

The results relating to AMTS were as follows: 21 participants (25.9%) were designated as having no impairment, 35 participants (43.2%) had impairment and 25 participants (30.9%) had serious impairment (table 2).

Results relating to the RCS were as follows: little impairment was recorded in 42 participants (47.7%), moderate impairment in 18 participants (20.5%) and serious impairment in 28 participants (31.8%). The Spearman correlation coefficient between the AMTS and RCS was -0.63 (95% CI $(-0.74$ to $-0.47)$; table 2).

Dermatological diseases

Eighty-eight residents were examined and 72 (81.8%) were found to have a significant dermatological disease. The number of diagnoses and their frequency are summarised in table 3.

The dermatological disorders are summarised in table 4. The most common disorders were onychomycosis 42 (47.7%), basal cell carcinoma 13 (14.8%), asteototic eczema 11 (12.5%) and squamous cell carcinoma in situ 9 (10.2%). Other significant findings were invasive squamous cell carcinoma 7 (8%), bullous pemphigoid 2 (2.3%), lichen sclerosus 2 (2.3%) and carcinoma of the breast 1 (1.1%). Of those who consented to the genital examination, two were found to have lichen sclerosus.

Confounding by gender

Adjustment by gender caused relative changes of 10% or less in the ORs for both mental and physical impairment, and significance for gender of more than 0.20, in all but two combinations of outcomes and impairment. The exceptions were the combinations of the infection/infestation outcome with both types of impairment. The relative changes in OR exceeded 70%, and the significance of gender was 0.01 in both cases. Gender-adjusted impairment ORs were not significantly different from 1 in either case.

Association of disease groups with cognitive or physical disability

A comprehensive analysis was undertaken to examine groups of diseases, as well as specific diseases against the AMT and RCS total and specific scores. No associations were found between total dermatological disease burden

Table 2 Summary of AMTS and RCS scores

AMTS			RCS Score		
No impairment	Impairment	Serious impairment	Little impairment	Moderate impairment	Serious impairment
21 (25.9%)	35 (43.2%)	25 (30.9%)	42 (47.7%)	18 (20.5%)	28 (31.8%)

AMT, Abbreviated Mental Test Score; RCS, Rehabilitation Complexity Scale.

**Table 3** Number of dermatological diagnoses

Number of dermatological diagnoses	Frequency	Per cent
0	15	17.1
1	26	29.6
2	24	27.3
3	14	15.9
4	6	6.8
5	3	3.4

and cognitive impairment (OR 1.5, 95% CI (0.30 to 7.4), $p=0.88$, no impairment vs serious impairment, any diagnosis) or physical impairment (OR 0.92, 95% CI (0.27 to 3.2), $p=0.97$, little impairment vs serious impairment, any diagnosis). However, examination of all inflammatory diseases showed that those with the least physical impairment had more inflammatory disease than those patients with the most physical impairment (OR 3.69, 95% CI (1.08 to 12.61), $p=0.04$). Significantly, more inflammatory disease was found in those with less physical impairment. Separate items of the RCS examined showed that those who were independent in self-care (compared with those that were dependent), and independent in toileting (compared with dependent) were more likely to have eczema. Separate items of the RCS indicating awareness and increased night care also showed that those who were fully aware and did not need night care were more likely to have eczema. The relevant findings are summarised in [table 5](#).

DISCUSSION

There is a significant burden of unrecognised and inadequately treated dermatological disease in older people living in aged residential care facilities. This study did not show the expected correlation between dermatological disease burden and physical or cognitive ability but showed a significant association between being physically independent and having inflammatory skin disease. A potential explanation is that those residents needing and receiving a higher level of attention by the attending staff because of a significant physical disability had a greater level of incidental observation, and therefore treatment of dermatological conditions. This hypothesis is consistent with high-quality care. Additionally, it is encouraging that in this study, no cases of scabies were diagnosed. Potentially, better education of residents and assistance with application of creams for those who carry out self-care may be important. In addition, those residents with a mild physical disability who may be perceived by the residential care staff to be more independent in self-care than those with a significant disability may require more help from the staff than anticipated to reduce their inflammatory disease burden. Since this study suggests that those with less severe physical disability are at greater risk of

Table 4 Summary of all diagnoses

Diagnosis	N	Per cent
Infections		
Onychomycosis	42	47.7
Candida/intertrigo	9	10.2
Tinea pedis	5	5.7
Tinea corporis	3	3.4
Folliculitis	1	1.1
Tinea cruris	1	1.1
Total infections	61	
Inflammatory		
Eczema asteototic	11	12.5
Eczema lichen simplex chronicus	5	5.7
Eczema varicose	4	4.6
Psoriasis vulgaris	3	3.4
Chondrodermatitis helix nodularis	2	2.3
Eczema contact irritant	2	2.3
Psoriasis scalp	2	2.3
Eczema contact allergic	1	1.1
Eczema discoid	1	1.1
Eczema seborrhoeic	1	1.1
Psoriasis pustular localised	1	1.1
Total inflammatory	33	
Solar damage and skin cancer		
Squamous cell carcinoma (in situ)	9	10.2
Squamous cell carcinoma (invasive)	7	8
Actinic keratosis	4	4.6
Atypical/naevus exclude melanoma	3	3.4
Malignant melanoma	2	2.3
Porokeratosis	1	1.1
Basal cell carcinoma	13	14.8
Total solar damage and skin cancer	39	
Circulatory/vascular		
Capillaritis	2	2.3
Ulcers venous	2	2.3
Ulcers arterial	1	1.1
Ulcers mixed	1	1.1
Ulcers pressure	1	1.1
Total circulatory/vascular	7	
Apocrine/sebaceous		
Acne excoriee	3	3.4
Immunobullous		
Bullous pemphigoid	2	2.3
Congenital		
Ichthyosis NOS	1	1.1
Other		
Vitiligo	3	3.4
Lichen sclerosus	2	2.3
Breast cancer	1	1.1
Epidermoid cyst	1	1.1
Favre-Racouchot syndrome	1	1.1
Web space fissuring	1	1.1
Total other	9	

NOS, not otherwise specified.

dermatological disease, this group may benefit from periodic skin reviews.

The aged care facilities were not randomly selected but chosen because they gave access to significant numbers of patients with a spectrum of physical and

Table 5 Significant associations between inflammatory disease and RCS

Disease category or specific disease	Risk factor	Contrast	Proportion (%)	OR	95% CI	p Value
Inflammatory disease (all types)	RCS	Little impairment	38.1	3.7	1.1 to 12.6	0.04
		Serious impairment	14.3	ref		
	Self-care of appearance	Independent	39.5	4.9	1.0 to 24.2	0.05
		Requires assistance	11.8	ref		
Eczema (all types)	RCS	Little impairment	35.7	4.6	1.2 to 17.9	0.05
		Serious impairment	10.7	ref		
	Self-care of appearance	Independent	34.9	3.5	1.2 to 10.1	0.02
		Requires assistance	13.3	ref		
	Use of toilet	Uses without help	34.8	3.9	1.2 to 13.0	0.03
		Needs assistance	12.1	ref		
	Awareness	Fully aware	35.2	6.2	1.3 to 29.4	0.02
		Sometimes unaware	8.0	ref		
	Night care	Care never/rarely needed	32.5	2.9	1.0 to 8.4	0.05
		More attention needed	14.3	ref		

p Values are not corrected for multiple testing.
RCS, Rehabilitation Complexity Scale; ref, reference level.

cognitive disease, ranging from low to high level care. Half of the potential patients were not enrolled due to a combination of inability to obtain suitable consent, frailty, declining participation and difficulty scheduling convenient appointment times. These factors may have lead to selection bias towards those with dermatological symptoms, those who had received less recent dermatological care and/or those patients who were expected by their next of kin to be more amenable to undergoing examination, although bias may well have lain in the other direction. Nevertheless, the gender and ethnic characteristics of the study group suggest that the findings are likely to be generalisable to a number of centres. Additionally, the diagnoses were made on a clinical basis but by a dermatologist working closely with a dermatology trainee. All significant diagnoses were reported to the general practitioner. The remit of the study did not permit laboratory testing.

Older people living in aged care facilities have a significant incidence of undetected disease, and with anticipated demographic changes, there will be challenges managing this problem both for the patient and dermatologist. There may be benefit from provision of visiting specialist services to this group. Alternatively, teledermatology could be considered.^{15 16} Those who were more independent in residential care had more inflammatory skin disease, suggesting that greater treatment of inflammatory skin disease was offered to those with greater dependency.

CONCLUSION

There was a high rate of undiagnosed and untreated dermatological disease in the study population with 81.8% having one or more significant finding. The disease types varied from the frequent but not life-threatening (eg, onychomycosis), to those associated with a significant morbidity that may be hidden from carers (eg, lichen sclerosis), to potentially life-

threatening (eg, squamous cell carcinoma, melanoma and breast cancer). In this study, over 25% of the residents had three or more dermatological diagnoses. Those with less physical disability had a higher rate of inflammatory dermatoses. No significant association was found between dermatological disease and level of cognitive impairment.

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