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# Systematic mapping review about costs and economic evaluations of skin conditions and diseases in the aged

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ABSTRACT

*Background:* Skin conditions and dermatological diseases associated with advanced age (e.g. fungal infection, dry skin and itch) receive increasingly attention in clinical practice and research. Cost and economic evaluations are important sources to inform priority setting and ressource allocation decisions in healthcare. The economics of skin conditions in aged populations has not been systematically reviewed so far.

*Objectives:* The aim of this mapping review was to summarize the economic evidence of selected skin conditions in the aged (65 + years).

*Methods:* A mapping literature review and evidence summary was conducted. Searches were conducted in data bases Medline and Embase via OVID. Cinahl was searched using EBSCO. References lists of potential eligible studies, reviews, guidelines or other sources were screened for additional literature. For evaluation of methodological quality of full economic analyses the Consensus on Health Economic Criteria (CHEC) checklist was used.

*Results:* Database searches resulted in 1388 records. A total of 270 articles were read in full-text. Thirty-five publications were finally included in the data analysis reporting 38 economic analyses. Ten cost of illness analyses and 26 cost-effectiveness analyses reporting about pressure ulcers, skin tears, pressure ulcers, incontinence associated dermatitis and intertrigo/contact dermatitis/candidiasis treatment and prevention and onychomycosis testing were identified. Limited evidence indicated that low air loss beds were more cost effective than standard beds for prevention of pressure ulcers. Standardized skin care regimens seem to lower the incidence of pressure ulcers, skin tears and IAD but a cost saving effect was not always observed.

*Conclusions:* Findings of this mapping review indicate that there is a paucity of high quality evidence regarding the economic impact of age-associated skin conditions and diseases. Substantial heterogeneity in terms of study design, evaluation perspective, time period, and way of cost estimation was identified. Because of the overall low methodological quality clear cut conclusions cannot be drawn. Robust and large scales economic evaluations about skin conditions and disease in aged populations are needed in the future.



## 1. Introduction

The world population is growing and aging. Skin conditions and dermatological diseases associated with advanced age (e.g. fungal infection, dry skin and itch) receive increasingly attention in clinical practice and research [1,2]. Besides the negative impact on physical, psychological, functional and social well-being, aging associated skin diseases [3,4] place a substantial financial burden on health care systems and all involved parties.

Cost and economic evaluations are important sources to inform priority setting and ressource allocation decisions in healthcare [5]. They can be broadly classified into four types: (1) Cost of illness analyses/cost analyses are analyses of current and anticipated costs of one or more diseases, treatments or health care programmes in predefined settings, e.g. costs of a specific intervention or treatment. (2) Cost-effectiveness analyses evaluate the cost and consequences of (alternative) interventions, treatments or health

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programmes in association with predefined diseases and settings, e.g. implementation of a standardized skin care intervention program vs. skin care as usual for prevention of xerosis cutis. (3) Cost-utility analyses are evaluations with a special focus on the quality of health outcomes produced by treatments or health programmes, e.g. comparison of prevention programes. (4) Cost-benefit analyses are used to value incremental costs and outcomes in monetary units (e.g. beneficial consequences of a program justified to costs). The term cost-minimization analysis is used to describe situations where the consequences of two or more treatments or programmes are equivalent so the difference between them are only the costs [6].

Important for interpreting health economic analyses is the perspective from which an economic evaluation is performed. The societal perspective is the most comprehensive approach. It takes all relevant costs and consequences of interventions and diseases into account. Other perspectives like those of providers, practitioners or the health-care system include only certain components [6,7].

For estimating costs different methods can be used. The bottom-up approach includes “micro-costing”. Each component of resource use is estimated and a unit cost is derived for each [6]. The top-down approach comprises average cost estimations for certain categories like days of hospitalization, laboratory tests or labour costs. The “micro costing” approach is considered to be the most precise method [6].

Health economic analysis comprise direct and indirect costs. The term direct costs means all costs directly attributed to diseases like treatments, laboratory tests or hospitalization. Indirect costs are costs that are not directly accountable to a disease, e.g. reduction or loss of work productivity [6,7].

Cost estimations and economic evaluations are available for a wide range of skin conditions and dermatological diseases (e.g. pressure ulcers (PUs) [8], itch ([9]), non-melanoma skin cancer ([10]), melanoma ([11]). However, the economical evidence of skin conditions in aged populations has not been systematically reviewed so far. Therefore, the overall aim of this mapping review was to identify any health economic evidence about the prevention and treatment of selected skin conditions in the aged. Specifically we wanted to provide an overview about the types of economic evaluations that have been conducted and their methodological quality.

## 2. Methods

A systematic mapping review and evidence summary was conducted according to international scientific standards [12]. A review protocol was developed a priori and published in PROSPERO in May 2014 (registration no. CRD42014009929).

### 2.1. Eligibility criteria

Inclusion criteria were: (1) age ≥65 years; (2) focusing on most prevalent skin conditions in aged populations [13]: xerosis cutis and associated itch; tinea pedis; fungal and bacterial skin and nail infections; contact dermatitis; seborrheic dermatitis; incontinence-associated dermatitis; intertrigo; skin tears, PUs; (3) study designs: cost of illness, cost-effectiveness, cost-minimization, cost-utility containing direct costs (e.g. resource use, expenses) and/or indirect costs; (4) publication languages: English, French, German, Portuguese, Spanish, Dutch; (5) publication dates 1995 to February 2014; (6) primary research reports or publications. Excluded were non-research papers, e.g., narrative (clinical) reviews, expert opinions, editorials, letters to the editor; samples/populations including subjects being younger than 65 years and other skin conditions and diseases.

### 2.2. Information sources

A concurrent search was conducted in data bases Medline and Embase via OVID. Cinahl was searched using EBSCO. References lists of potential eligible studies, reviews, guidelines or other sources were screened for additional literature. Every study meeting the inclusion criteria was forward searched in the Science Citation Index and SCOPUS (citation tracking). Data extraction was conducted by two reviewers independently (AL, EH). Discrepancies were resolved by consensus or a third reviewer (JK).

### 2.3. Search strategies

Seven search strategies were developed (for every skin disease separately) using a combination of subject headings and natural language terms. It consisted of different combinations of concepts for skin conditions, population and economic terms for costs and cost-analysis. Table 1 presents one example of a selected search strategy.

### 2.4. Study selection and data extraction

A data extraction sheet was created comprising relevant study details and variables (e.g. year, country, skin condition, setting, perspective, treatments/intervention (if applicable) and costs). Special emphasis was put on breaking down measures of resource use and costs to greatest detail possible [14]. Extracted data were reviewed and checked by two authors independently (AL, EH), resolving discrepancies by a third author (JK).

### 2.5. Methodological appraisal full economic analyses

For evaluation of methodological quality of full economic analyses comparing costs and consequences of two or more alternatives (cost-effectiveness, cost-minimization, cost utility, cost benefit analysis) the Consensus on Health Economic Criteria (CHEC) checklist was used [15]. Because the CHEC list was developed for full economic analyses, cost of illness studies were not methodological appraised. The checklist consists of 19 yes-or-no questions. If included analyses presented insufficient information the answer “No” was ticked. “Yes” was marked if the study paid sufficient attention to aspects of interest. Two reviewers (AL, EH) independently evaluated the methodological quality. Discrepancies were resolved by consensus or by discussion with a third reviewer (JK). The results were expressed in percentages.

## 3. Results

### 3.1. Study selection and data extraction

Database searches resulted in 1388 records. Additionally searches in CINAHL and forward searches in SCOPUS and Web of Science resulted in additional 534 records. The screening of reference lists resulted in nine additional records. A total of 270 articles were read in full-text. Thirty-five publications were finally included in the data analysis (Fig. 1).

### 3.2. Study characteristics and data extraction

The included publications reported a total of 38 economic analyses. Ten of the included reports were cost analyses, 26 cost-effectiveness analyses. We included one cost-minimization and one cost-utility analysis. Analyses were categorized into prevention

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