

Economic Burden and Cost Drivers of Dystrophic Epidermolysis Bullosa: A Systematic Literature Review

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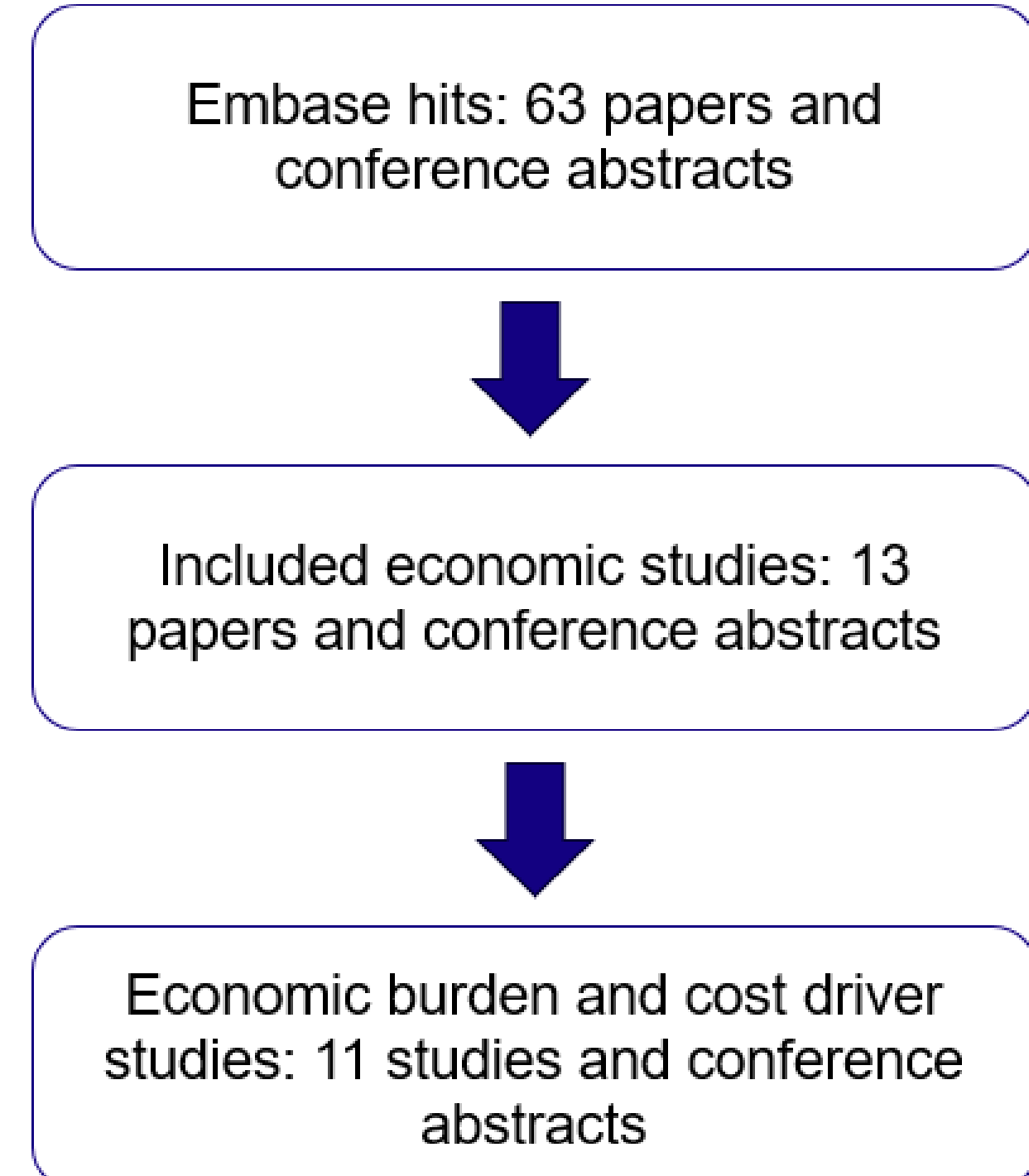
EE395

Introduction

- Dystrophic Epidermolysis Bullosa (DEB) is a rare genetic skin condition that causes recurrent painful blisters on the skin and mucous membranes.
- DEB is divided into autosomal dominant (DDEB) and recessive (RDEB) forms¹. Although RDEB is considered the more severe form, phenotypic overlap exists between RDEB and DDEB².
- Presently, there are no approved curative or disease-modifying treatments available for DEB³. As a result, the management of DEB primarily focuses on supportive care and symptomatic relief.
- Wound care is an essential part of this management, necessitating specialised bandages that facilitate healing. Dressing changes and wound care can be time consuming and expensive, making it burdensome to patients and caregivers².
- This study aims to investigate the global economic burden and cost drivers associated with DEB for both the healthcare system and patients/caregivers.

Methodological Approach and Searches

- A broad systematic literature review (SLR) was conducted in Embase in March 2023 to evaluate the direct and indirect costs associated with six rare diseases.
- Studies of interest were full text papers published 2008-2023 or conference proceedings published 2020-2023 presenting data on healthcare resource utilisation (HCRU) or disease-related direct or indirect costs.
- For this analysis focused on DEB, 63 studies and conference abstracts were screened of which 11 studies met the inclusion criteria and were included in the final analysis following removal of a duplicate and exclusion of a case series.



Results

The SLR yielded 11 papers with data on the economic burden and cost drivers of DEB. Data from 7 key papers most recently published are presented. All values have been converted into a single currency (Euros) for comparison (September 2023 currency rates via <https://www.google.com/finance/>)

Annual total cost of DEB

- The mean annual cost (direct and indirect) per person with DEB in Europe and the USA is presented in Table 1.
- Overall, the mean cost of disease increased as the severity of disease increased. For the study based in the USA, the median costs for treating moderate to severe disease were higher than mild disease, but the mean was skewed by one patient².

Table 1: Mean annual cost per patient with DEB in the EU5 and USA

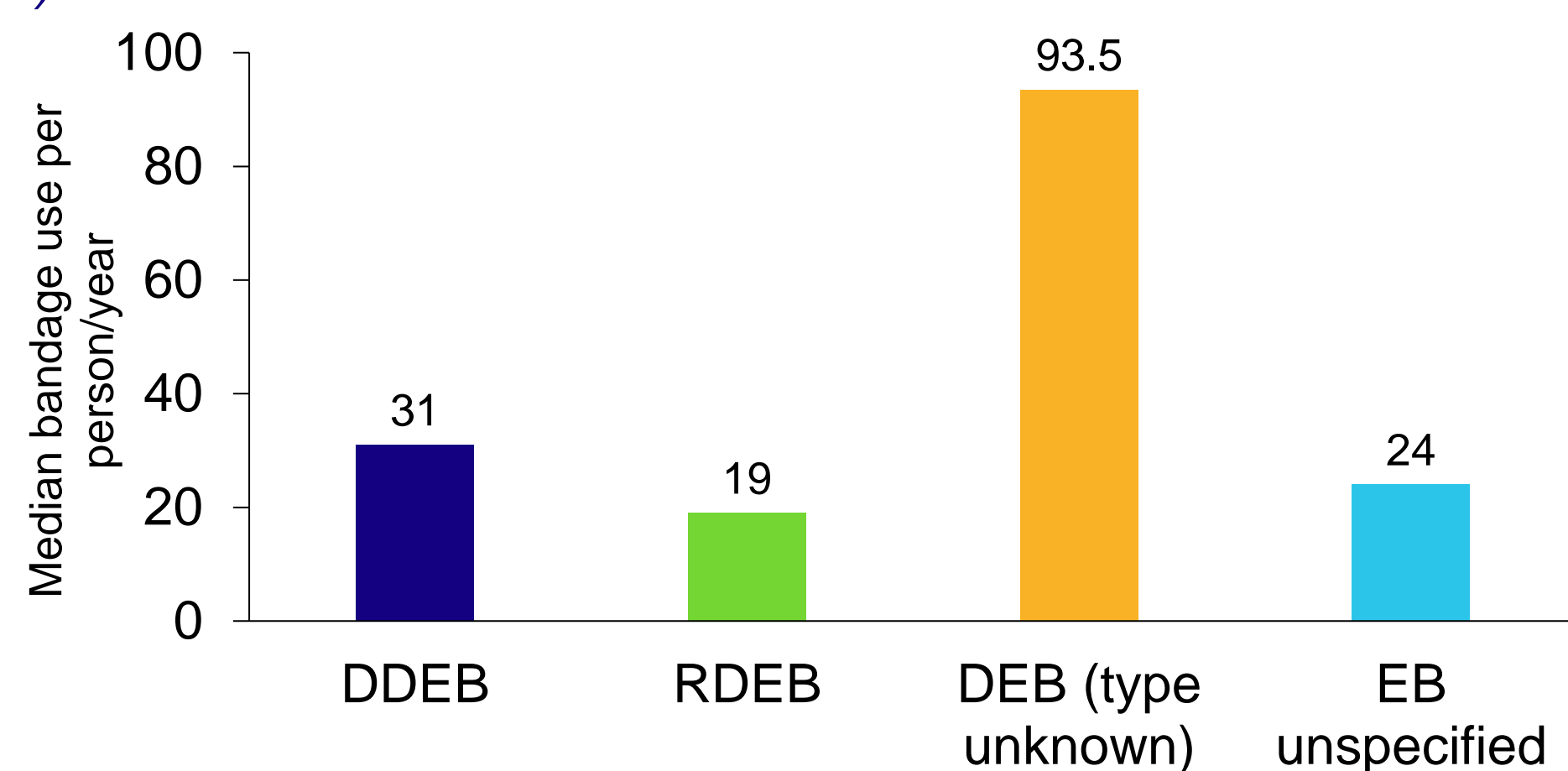
Region	Annual mean costs	Annual cost of treating disease		Currency year
		Mild	Moderate to severe	
EU5 ⁴	€53,359	€11,241	€74,749	2020
USA ²	\$73,000 (€68,467)	\$31,836 (€29,859)	\$29,995 (€28,132)	2019

Note: Costs were converted from the published currency into Euros using September 2023 currency rates via <https://www.google.com/finance/> where 1 USD = 0.94 Euro

Wound care

- Wound care was identified as a significant driver of economic burden. The overall median number of bandages used per patient per year in the USA was 24, varying by the subtype of DEB (Figure 1)². The average time taken to change dressings was reported to be between 39 minutes and 105 minutes⁵.
- One study reported an annual bandage cost of €4,411² (USA), while another found that the total average annual cost of wound dressings, tubular bandages, and retention garments was €53,388⁵(UK).
- The RDEB subtype was associated with higher annual bandage costs (€5,055) compared to the DDEB subtype (€123 2019)².
- The severity of DEB correlated with wound care costs, with RDEB annual wound care costs ranging from €1,977 for milder forms (RDEB inversa) to €99,082 for more severe disease in the UK (2020)⁶.

Figure 1: Median number of bandages per person per year in the USA by subtype of DEB (2016 -2020)²



Note: EB: Epidermolysis bullosa. The EB unspecified cohort included those patients with only EB diagnosis and did not have any details to indicate subtype (RDEB, DDEB, or DEB). Data collection: January 1, 2016, to June 30, 2020.

Healthcare resource utilisation

- Three studies reported a significant use of medications among patients with DEB. Antibiotics, pain medications, and anti-itch medications were commonly prescribed and administered^{2, 4, 7}.
- One study conducted in the EU5 found that the cost of care (professional and informal) accounted for the largest portion of overall costs, averaging 77.5% of per patient costs⁴. Use of specialist care, including dermatology and mental health services, was common among patients with DEB. Severe cases, such as RDEB-generalised severe (RDEB-GS), often result in urgent care and hospitalisation².
- Ambulatory visits, emergency department visits, and inpatient stays were therefore significant components of HCRU^{7,8} and lead to high healthcare costs (Table 2).

Table 2: Mean annual HCRU cost associated with DEB in the EU5 and USA

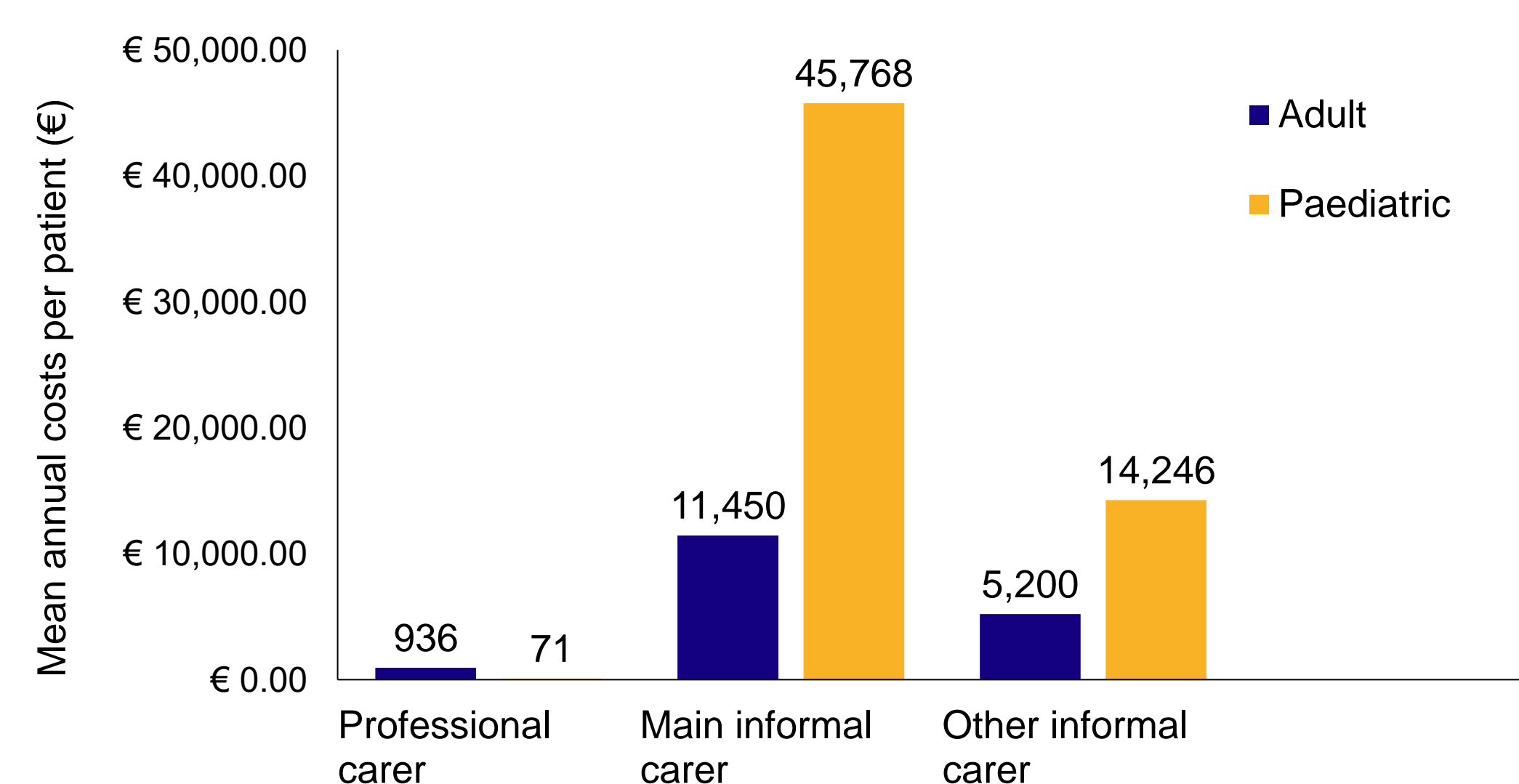
Region	Annual HCRU Costs	Currency year
EU5 ⁴	€8,357	2022
USA ²	\$23,609 (€22,136)	2019

Note: Costs were converted from the published currency into Euros using September 2023 currency rates via <https://www.google.com/finance/> where 1 USD = 0.94 Euro

Indirect costs

- The average annual productivity loss for patients with DEB was €274, with early retirement loss estimated at €3,374⁴.
- Patients had monthly out-of-pocket expenses €938⁹ or more per person, with most of these costs attributed to wound care.
- The costs of informal care were higher among paediatric patients compared to adult patients with DEB (Figure 2).
- A US study reported that patients required an average of 17.2 (SD: 54.7) days of home healthcare per year².
- More details on caregiver burden across various rare diseases can be found in Poster number EE399.

Figure 2: Mean annual costs associated with care of DEB in the EU5 in 2020⁴



Note: **Professional care** refers to social care services (formal care); **Informal care**: informal care was care provided by non-professional caregivers, e.g., relatives, friends, neighbours, etc.; **Main informal carer**: individuals who provide primary and often the most significant care and support; **Other informal carer** refers to individuals who also provide care and support to someone with healthcare needs, but their role is secondary to the main informal carer.

Conclusions

- DEB is associated with a high economic burden, driven by wound care (bandages, medications), specialist visits for severe cases, and significant informal care expenses, especially for children unable to dress their wounds.
- As disease severity increases, the economic burden and HCRU increases, since management primarily focuses on symptomatic relief.
- Caregivers of individuals with DEB, particularly children, experience significant burden due the hours required for wound care. To alleviate caregiver burden, it's crucial to decrease the occurrence of wounds in individuals with DEB and offer a more holistic treatment approach.
- An increasing number of clinical trials are being conducted for DEB in cell-based therapies, gene therapies, protein replacement therapies, exon skipping and molecular therapies.
- New treatment options for DEB that reduce the number of wounds experienced would be expected to offset the economic burden and resource utilisation associated with symptomatic treatment.

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