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Prognostic factors for incontinence-associated dermatitis (IAD): Results of an international expert survey

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ABSTRACT

Background: Incontinence-associated dermatitis (IAD) is a prevalent and distressing form of irritant contact dermatitis caused by prolonged exposure to urine and/or faeces. Not all incontinent individuals develop IAD, suggesting that additional prognostic factors contribute to its onset. The quality of empirical evidence supporting risk factors for IAD development is moderate to very low. Therefore, it is necessary to systematically compile and analyse expert knowledge on this topic.

Aim: This study aimed to identify and prioritise key prognostic factors for IAD development through an international expert consultation.

Materials and methods: A cross-sectional expert survey was conducted among international experts using an electronic survey platform. Participants rated the importance of 26 pre-identified prognostic factors, ranked relevant factors and suggested additional factors. Data were analysed to determine expert consensus and factor rankings.

Results: A total of 45 experts participated, with a response rate of 39 %. The highest-ranked prognostic factors included double incontinence, faecal incontinence, loose stools, stool frequency, urinary incontinence, and impaired mobility. Other important factors were advanced age, friction and shear forces, cognitive impairment, and poor nutrition. In addition, experts highlighted systemic factors such as caregiver knowledge gaps and staff shortages as potential contributors to IAD risk.

Conclusion: Study results support established risk factors for IAD development such as stool frequency and limited mobility. Experts also identified factors, such as higher age and the presence of loose or liquid stool, that are considered relevant by experts but are not yet fully supported by empirical evidence. Findings will inform a future large-scale cohort study.

1. Introduction

Incontinence-associated dermatitis (IAD), (WHO ICD-11 code EK02.22) is a form of irritant contact dermatitis that results from prolonged exposure of the skin to urine and/or faeces in adolescents and adults [1,2]. With prevalence ranging from 5.2 % to 46 % across various populations and settings, IAD represents a significant global public health concern [3–6]. Symptoms include discomfort, soreness, itching, and tingling, which have an adverse impact on patients' daily lives and quality of life [1,7–9].

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Incontinence is a prerequisite for IAD, yet not all incontinent individuals develop IAD [10,11]. This indicates that numerous additional factors and characteristics influence a person's susceptibility to developing IAD. A recent systematic review identified several prognostic factors associated with the development of IAD [12]. The review identified 15 potential prognostic factors, including increased stool frequency, limited mobility, and friction/shear, which were supported by moderate-quality evidence as being associated with a higher risk of IAD. Furthermore, female sex, older age, and loose/liquid stool were identified as risk factors of IAD, although the evidence supporting these associations was of low quality according to an adapted GRADE approach [12,13].

Complementary meta-analyses have also highlighted significant risk factors for IAD, particularly in critically ill patients. A systematic review and meta-analysis that analysed 24 studies of moderate to high methodological quality identified key risk factors such as older age, fever, altered consciousness, higher APACHE II score, lower Braden score and low oxygen saturation. In addition, factors such as double incontinence, liquid stools and frequent incontinence were also associated with an increased risk of developing IAD [14]. Similarly, another meta-analysis focusing on critically ill patients, found that age ≥60 years was a significant risk factor, along with female sex, fever, dialysis, high PAT scores (≥7), the use of vasoactive agents, liquid stool and frequent bowel movements. Given the variability in risk factors across studies, further expert consultation is necessary to clarify the importance of prognostic factors [15].

The objective of this study is to identify and prioritise potential prognostic factors for IAD from the perspective of experts. By gathering expert insights, the aim is to gain a deeper understanding of the factors influencing IAD development, which will ultimately support the development of more effective prevention and patient care strategies.

2. Materials and methods

A cross-sectional survey study was conducted using an electronic-based survey, where insights from international experts were gathered. The reporting follows the Consensus-Based Checklist for Reporting of Survey Studies (CROSS) [16].

2.1. Development of the survey

The survey was developed by the research team based on the findings from recent systematic reviews [12,15,17] and pertinent literature on IAD risk factors [10,18–25], as well as the collective expertise of the team in the field of IAD. This process resulted in the identification of a total of 26 prognostic factors for the development of IAD in an incontinent adults (>18 years) and adolescents (age 10–18 years) [26]. In addition, questions were developed to collect data on demographic variables, including age, gender, country of residence, stakeholder group (researcher, healthcare provider, or both), and years of experience in the field. The initial version of the survey was drafted and subsequently reviewed by a panel of four experts in order to assess its clarity, wording and overall readability. Based on their input the survey was revised and finalised prior to distribution. The structure of the resulting survey is presented in Table 1, and the detailed survey is presented in Appendix 3.

Table 1
Structure of the final resulting survey.

Subsection	Number of questions
Demographics	6 questions
Prognostic factor importance	1 question with 26 prognostic factors
Ranking	1 question

2.2. Participants

The study utilized a convenience sampling approach, selecting experts from the research team's professional network, ensuring a broad representation of clinicians and researchers with extensive experience in dermatology, wound management, and IAD. Experts were eligible if they met at least one of the following criteria: a) they were registered healthcare professionals (e.g. nurses physicians) who regularly managed individuals with IAD in clinical practice; b) they had conducted original research or published peer-reviewed work related to IAD or related fields, such as dermatology or wound care; and c) they had sufficient proficiency in English to understand and complete all study materials, which were administered in English. Experts with a combination of clinical and academic qualifications were also included.

A total of 114 experts were invited to participate, with representation from a range of geographical regions, including North America, South America, Europe, Asia, Africa and Oceania, to ensure a diverse range of perspectives.

2.3. Survey administration

The survey was distributed using Qualtrics software, Version 2024 (Qualtrics, Provo, UT, USA) an online survey platform. Each invited expert received a unique survey link generated by Qualtrics to ensure only one submission per participant and prevent multiple responses from the same individual. Experts were invited to participate via email, and the survey remained open for a period of seven weeks. To enhance participation, a follow-up email was dispatched two weeks following the initial invitation, with a further reminder sent one week prior to the conclusion of the survey.

Experts were asked to rate the importance of 26 possible prognostic factors for IAD development. They could respond with "Yes" if they considered the factor important, "No" if not, or "I don't know" if unsure. Next, factors that experts identified as important (answered "Yes"), were ranked in order of importance. A unique rank was assigned to each factor, with 1 being the most important. Factors that were designated as "No" were excluded from the ranking process for that specific expert. Additionally, experts were provided with an open-ended section in which they could suggest any additional prognostic factors not included in the initial list. These proposed factors could then be ranked together with the pre-listed factors.

2.4. Data analysis

The data were analysed using Microsoft Excel (version 18) [27]. Frequency tables were generated for each demographic variable to summarise the distribution of responses. The number and percentage of experts for each category (e.g., gender, age groups, country of residence, stakeholder group, and years of experience) was calculated.

The responses were tabulated for each factor to calculate the proportion of experts who considered each factor to be important for the development of IAD. The proportion of experts who rated each factor as "important" (i.e., answered "Yes") was calculated and summarised in a frequency table.

Experts were also asked to rank the factors they selected as important. The average rank for each factor was calculated by taking the mean of its assigned numerical ranks across all respondents who included that factor. Additionally, a composite score for each factor was derived by summing all the individual ranks it received. The factors were then ranked from most important (lowest average rank) to least important (highest average rank). Any data missing from the dataset were excluded from the analysis.

2.5. Ethical considerations

The Swedish Ethics Review Board concluded that the expert survey does not fall under the Ethical Review Act (2003:460) since it does not involve sensitive personal data (Dnr: 2022-05417-01). Participation was voluntary, with informed consent given by completing the survey. To ensure confidentiality, the survey was administered using Qualtrics, which generated unique survey links for each invited expert. This mechanism ensured that individual responses could not be directly linked to specific individuals. Although participants were not completely anonymous, as they were selected from the research team's professional network, their responses remained confidential.

3. Results

3.1. Respondent characteristics

A total of 45 experts participated in the consultation process, resulting in a response rate of 39 %. One respondent completed only the demographic section but did not provide ratings or rankings of prognostic factors and was therefore excluded from the main analysis. Reasons for non-participation among the invited experts were not systematically collected. The expert panel was comprised of 39 women (86,7 %) and six men (13,3 %). The majority of participants was 45 years or older (80,0 %). The experts represented several countries, with the majority being from Europe and North America. The largest number of participants was from Belgium (13,3 %), followed by the United States (11,1 %) and the United Kingdom (8,9 %). Most participants identified themselves as both healthcare providers and researchers (51,1 %), while others were researchers (20,0 %) or healthcare providers (28,9 %). Most participants had considerable experience in the field, with 75,5 % reporting more than 20 years of experience, followed by 11,1 % with 10–19 years and 8,9 % with 5–9 years. A smaller percentage had less than 5 years' experience (4,4 %). (See Table 2)

Table 2
Demographic Characteristics of expert panel participants (n = 45).

Demographic characteristics	Category	n (%)
Gender	Male	6 (13,3 %)
	Female	39 (86,7 %)
Age	18–24	0 (0,0 %)
	25–34	2 (4,4 %)
	35–44	7 (15,6 %)
	45–54	8 (17,8 %)
	55–64	21 (46,7 %)
	65 and over	7 (15,6 %)
Country	Ireland	3 (6,7 %)
	South Africa	3 (6,7 %)
	USA	5 (11,1 %)
	UK	4 (8,9 %)
	Italy	2 (4,4 %)
	Australia	1 (2,2 %)
	Denmark	2 (4,4 %)
	Slovenia	1 (2,2 %)
	Belgium	6 (13,3 %)
	Canada	3 (6,7 %)
	Finland	2 (4,4 %)
	Norway	2 (4,4 %)
	Switzerland	1 (2,2 %)
	Turkey	1 (2,2 %)
	China	1 (2,2 %)
	Austria	1 (2,2 %)
	France	2 (4,4 %)
	Brazil	1 (2,2 %)
	Sweden	2 (4,4 %)
	Germany	1 (2,2 %)
	Spain	1 (2,2 %)
Stakeholder group	Researcher	9 (20,0 %)
	Healthcare provider	13 (28,9 %)
	Both researcher and healthcare provider	23 (51,1 %)
Years of experience	Under 5 years	2 (4,4 %)
	5–9 years	4 (8,9 %)
	10–19 years	5 (11,1 %)
	20–29 years	14 (31,1 %)
	30–39 years	14 (31,1 %)
	40–49 years	6 (13,3 %)
	50 years or more	0 (0,0 %)

3.2. Descriptive results

The detailed survey results are presented in Appendix 1 and 2, and a summary of the top 10 ranked importance is shown in Table 3 and Fig. 1. Several prognostic factors were identified by the expert panel as highly important in relation to the risk of developing IAD. Double incontinence, faecal incontinence, impaired mobility and self-care deficits emerged as the most important factors, with all experts (100 %) rating them as important. In addition, factors such as loose/liquid stools, urinary incontinence and stool frequency were considered important by over 90 % of respondents.

Several other factors were considered important by a high proportion of experts (80 % or more), including advanced age, friction and shear problems, gastrointestinal infections with Clostridioides difficile (*C. difficile*), poor nutritional status, cognitive impairment and being overweight.

Other factors considered important by more than half of the experts included female sex, diabetes mellitus, fever above 38 °C, enteral feeding, dermatological conditions, dry skin, use of sedatives and use of antibiotics. Factors such as male sex, underweight status, smoking and use of vasopressors were considered important by less than half of the experts, suggesting that they may play a less central role in the risk of IAD according to the expert perspectives collected.

3.3. Additional prognostic factors

In the open-ended section of the survey, several experts suggested additional prognostic factors. These factors and the number of experts who suggested each are summarised in Table 4.

4. Discussion

The objective of this study was to evaluate the importance of prognostic factors in the development of IAD from an expert perspective. Overall, the results show that the majority of respondents considered double incontinence, faecal incontinence and loose or liquid stools to be the most important factors. These findings highlight the impact of prolonged and combined skin exposure to moisture, bacteria and irritants present in both urine and faeces. Dual incontinence combines the effects

Table 3
Top 10 prognostic factors for incontinence-associated dermatitis based on expert ranking.

Rank	Prognostic factor	Average rank
1	Double incontinence	2
2	Faecal incontinence	4
3	Loose/liquid stool	4
4	Urinary incontinence	6
5	Stool frequency	6
6	Gastrointestinal infection with C. Difficile	8
7	Compromised mobility	10
8	Self-care deficits	11
9	Higher age	12
10	Cognitive awareness	13

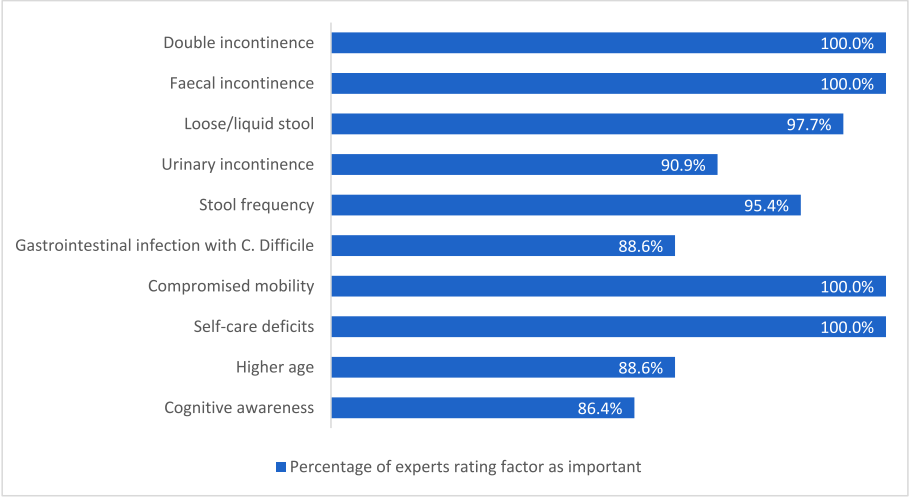

Fig. 1. Top 10 Prognostic Factors for Incontinence-Associated Dermatitis: Percentage of experts rating factor as important.

Table 4
Expert-suggested prognostic factors for IAD.

Prognostic factor	Number of experts who suggested this factor
Staff shortages	3
Lack of knowledge among caregivers	3
Palliative care patients	2
Lack of necessary products (insufficient access to skin care products that help prevent IAD)	2
Use of occlusive products	1
Presence of pain	1
Critical illness	1
Connatal cyst (Frontal horn cyst)	1
Age under 6 months	1
Poor skin condition	1
Hospital setting: NICU, PICU, ICU	1
Low gestational age (the number of weeks of pregnancy at birth)	1
Birth weight under 1.5 kg	1
Use of multiple layers of incontinence pads or underpads	1
Non-use of absorbent materials	1
Presence of a Foley catheter with constant stool leakage	1
Alterations in the skin's microclimate	1
Other stressors affecting the skin (e.g., excessive sweating, chemotherapy treatments, or other factors that increase skin moisture and sensitivity)	1
Inadequate skin care protocols (lack of or poorly followed procedures for maintaining skin health and preventing IAD)	1

NICU = Neonatal Intensive Care Unit.
PICU = Paediatric Intensive Care Unit.
ICU = Intensive Care Unit.

of urine and faecal exposure, creating a particularly damaging environment for the skin. Urine, through the breakdown of urea into ammonia, raises the skin's pH and weakens the skin's natural barrier function [28–30]. In addition, the presence of faeces, particularly loose stool, leads to the exposure of digestive enzymes and bacteria that further disrupt skin integrity. Collectively, these elements contribute to an environment that raises skin pH, increases moisture, and compromises the skin's protective layers, thus supporting the experts' high ranking of these factors as contributors to IAD [31].

The survey results align with findings from our recent systematic review, which used an adapted GRADE approach to identify key prognostic factors for IAD development [12]. Moderate-quality evidence supports that higher stool frequency, impaired mobility, and friction and shear problems are predictive of IAD development. The experts corroborated these findings, with 95 %, 100 %, and 89 % agreement, ranking all three among the top 10 risk factors. In areas where the evidence is less robust, our review found that certain factors were supported by low-quality evidence but were still considered important by experts. For instance, despite low-quality evidence in the systematic review, experts identified older age and loose or liquid stools as important risk factors, with 89 % and 98 % agreement, respectively, ranking them within the top 10. Additionally, the diversity of clinical settings represented in our expert panel (e.g., intensive care, geriatric care, research) may have influenced the prioritisation of certain factors based on the unique clinical challenges encountered in each setting. This suggests that, although research gaps exist, these factors have significant clinical relevance. The presence of low-quality evidence in our systematic review does not mean that these factors are not true risk factors but rather reflects the limitations of the available body of research.

The results of our systematic review indicated a strong positive association between female sex and IAD development, although the evidence supporting this finding was of low quality [12]. However, only 57 % of experts rated female sex as important, and it was not among the top factors. This discrepancy may be because experts prioritise modifiable risk factors over less modifiable ones, such as biological sex, when assessing IAD risk. Although female sex is associated with a higher risk of IAD in the literature, it is an unchangeable factor, which limits its usefulness in clinical decision making and prevention strategies. Instead, professionals may focus on factors such as type of incontinence, stool consistency and skin care practices, which are more directly manageable in the clinical setting and can be actively targeted to reduce the risk of IAD.

Experts also highlighted *C. difficile* infection as an important risk factor for IAD, ranking it sixth overall. *C. difficile* infection often results in frequent, loose stools that contribute to skin breakdown. This ranking may reflect not only the direct impact of *C. difficile* on skin integrity, but also the practical challenges it poses in care. Due to the high prevalence of resistant bacteria in healthcare settings, *C. difficile* infections require strict contact isolation protocols. The requirement for protective equipment such as gloves and gowns can reduce the frequency and thoroughness of continence and skin care, as each interaction with an isolated patient is more time consuming. This structural constraint may contribute to the prioritisation of *C. difficile* as an IAD risk factor, as it affects the provision of timely skin surveillance and care.

Experts also proposed additional factors in the open-ended section of the survey, such as caregiver knowledge gaps, staff shortages, and insufficient or poorly implemented procedures for maintaining skin health. Although only a limited number of experts cited these factors, leading to their exclusion from the final ranking, these insights

nonetheless highlight structural and procedural influences that can indirectly affect IAD risk.

For instance, factors like caregiver knowledge and staff resources fall into the category of structural or procedural factors that do not directly cause IAD but create conditions in which direct risk factors, like incontinence and impaired skin care, become more likely to contribute to IAD development. Reduced staffing levels often lead to increased workload and time pressures, which can result in less frequent or inconsistent skin assessments and cleansing. This can delay the identification and management of early skin damage or irritant exposure. Additionally, caregivers who lack specialised knowledge about IAD prevention may be unaware of best practices, such as the importance of gentle cleansing, prompt diaper changes, or the correct application of barrier products. These gaps in knowledge and practice can prolong the skin's contact with urine or faecal matter, increasing the risk of irritation and breakdown [32–34].

In addition to structural factors, experts identified clinical and situational factors that could make specific populations more vulnerable to IAD. These include critical illness, pain, the use of occlusive products, an altered skin microclimate (e.g. due to excessive sweating or chemotherapy), and the use or non-use of absorbent materials. Some comments referenced highly specific scenarios, such as the presence of Foley catheters with constant stool leakage or the use of multiple incontinence pads, which can trap moisture and exacerbate skin damage.

Several experts also raised factors relevant to neonatal and paediatric populations, including low birth weight, low gestational age, NICU or PICU settings, and age under six months, which fall outside the defined scope of this study.

In understanding the roles of these factors, it is helpful to consider three categories: direct causal factors (such as faecal incontinence and stool consistency) [1,28,29], indirect factors that exacerbate risk when direct factors are present (like mobility impairments, which increase exposure to irritants), and structural factors (like caregiver shortages and procedural gaps) that do not directly cause IAD but shape the clinical context in ways that may increase risk [35,36]. For example, indirect factors like impaired mobility interact with direct factors by prolonging skin contact with irritants, while structural limitations—such as a lack of trained staff—can compromise regular skin care routines and timely interventions.

The decision to exclude these factors from the final ranking was taken to ensure that the ranking reflected factors that had broad support from the experts, rather than those mentioned by a limited number of participants. Nevertheless, these suggestions highlight potential areas for further investigation and underscore the complexity of IAD risk assessment in diverse clinical contexts.

4.1. Strengths and limitations

A key strength of our study is the international and multidisciplinary nature of the expert panel, which provided a broad spectrum of perspectives from both researchers and healthcare providers.

However, the study is not without limitations. Despite the efforts made to recruit a diverse panel of experts, the sample size was relatively small (n = 45), reflecting a response rate of 39 %. While this may not have had a significant impact on the ranking process itself, it is possible that it has restricted the range of perspectives that are represented. This response rate raises the possibility of non-response bias, which could affect the representativeness and generalisability of the findings. Recent evidence, however, suggests that Delphi and expert consultation studies can still achieve good replicability with panel sizes comparable to ours, suggesting that our sample size was within an acceptable range [37].

To minimise the risk of non-response bias, several strategies were implemented. Firstly, the study was promoted by a recognised, internationally active research team to enhance its perceived legitimacy. Secondly, two reminder emails were sent to non-responders to improve engagement. Third, the questionnaire was carefully structured to reduce participant burden. It was concise, and the estimated completion time was communicated to participants in advance.

Experts were identified and recruited using convenience sampling through the research team's professional networks. While this approach enabled efficient access to qualified participants with clinical and academic expertise in IAD, it may have introduced selection bias. In particular, experts with existing professional ties to the research team or greater visibility in the field may have been more likely to be included, which could limit the generalisability of the findings. Nevertheless, clear inclusion criteria were applied, and efforts were made to ensure geographical, disciplinary and professional diversity to enhance the credibility and relevance of the panel's input.

Only a minority of experts proposed additional factors in the open-ended section. This approach may have the potential to exclude factors that, although less commonly reported, may still be significant in certain populations or specific settings.

In addition, the variation in experience levels and geographical locations of the participants may have introduced discrepancies in the interpretation of the importance of certain factors, given the variability of healthcare systems and practices across different global contexts.

4.2. Implications for practice and future research

By identifying and prioritising the most critical IAD risk factors, such as incontinence type, stool type, self-care deficits and mobility limitations, healthcare professionals can improve early risk assessments and target interventions more effectively. The discrepancies between expert opinions and certain findings from the systematic review highlight the need for further research to explore how different healthcare settings influence the relevance of specific prognostic factors.

The results of this consultation will directly inform the design of a large-scale cohort study. The objective of this study is to examine the association between the identified risk factors and the development of IAD. Furthermore, future research should investigate some of the expert-suggested factors, such as some of the suggested organisational factors like staff shortages and lack of skin care protocols. These factors have the potential to significantly influence the risk of IAD in a range of healthcare settings [38]. Investigating these factors separately could provide valuable insights into how institutional structures, staffing levels, and adherence to preventive protocols influence the effectiveness of IAD prevention and management strategies.

Future research on these organisational aspects could help identify systemic barriers to optimal skin care practices, highlight gaps in staff training or resource availability, and evaluate the impact of protocol-driven interventions on patient outcomes. The identification of these dynamics may inform policy changes, improve workplace guidelines, and support the implementation of standardised care practices, ultimately enhancing the quality and consistency of IAD prevention across different healthcare settings.

5. Conclusion

This expert survey confirmed key prognostic factors for IAD, including limited mobility, stool frequency, and friction and shearing forces. Additionally, experts identified other factors—such as higher age and the presence of loose or liquid stool — that are considered relevant by experts but are not yet fully supported by empirical evidence [12]. Well-designed representative cohort studies are needed to explore the predictive validity of the identified risk factors. Future research should also explore the role of contextual and organisational factors, such as staffing levels and availability of skin care protocols, to better understand their influence on the risk to develop IAD.

By integrating expert opinion with empirical research, this study contributes to the ongoing effort to refine risk assessment and improve preventive strategies for IAD, ultimately enhancing patient care across diverse healthcare settings.

CRediT authorship contribution statement

Julie Deprez: Writing - original draft, Writing – review & editing, Methodology, Software, Conceptualization, Visualization, Validation, Investigation, Formal analysis, Data curation. Jan Kottner: Writing – review & editing, Conceptualization, Methodology, Funding acquisition, Supervision, Validation, Resources, Project administration. Alexandra Eilegård Wallin: Writing – review & editing, Conceptualization, Methodology, Supervision, Project administration. Carina Bååth: Writing – review & editing, Conceptualization, Funding acquisition, Resources. Ami Hommel: Writing – review & editing, Conceptualization, Funding acquisition, Resources. Lisa Hultin: Writing – review & editing, Conceptualization, Funding acquisition, Resources. Anna Josefson: Writing – review & editing, Conceptualization, Funding acquisition, Resources. Dimitri Beeckman: Writing – review & editing, Conceptualization, Methodology, Funding acquisition, Supervision, Validation, Resources, Project administration.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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