

What are the key risk factors for drug-related problems in Emergency Departments? A multinational modified Delphi study

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Title page

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What are the key risk factors for drug-related problems in Emergency Departments? A multinational modified Delphi study

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Abstract

Introduction

Drug-related problems (DRP) are common in emergency departments (ED) and may compromise patient safety, highlighting the need to identify patients at greatest risk and prioritize pharmaceutical care.

Aim

To determine the levels of multidisciplinary consensus on the relevance of candidate factors for identifying patients at risk of DRP in ED, and on the real-time availability and ease of retrieval of the corresponding data in clinical practice.

Method

Multinational, multidisciplinary consensus study using a modified Delphi method (RAND/UCLA Appropriateness Method) involving healthcare professionals from a wide range of hospitals, predominantly in Spain, with additional representation from Australia and the United States. Participants were recruited from secondary and tertiary care settings across different healthcare systems, providing a diverse representation of emergency care practice. A total of 51 healthcare professionals with expertise in emergency medicine and pharmacotherapy were invited to participate. Response rates were 75% (n=38) during the open consultation, 84% (n=43) in Round 1, and 78% (n=40) in Round 2. The panel included hospital pharmacists, physicians, nurses, and other healthcare professionals involved in emergency care.

The primary outcome was consensus on the appropriateness of each DRP risk factor, defined using the RAND/UCLA method based on median scores and interpercentile range analysis. Secondary outcomes included the assessment of real-time data availability and ease of data retrieval in clinical practice. Participants were selected based on their clinical expertise and active involvement in emergency care.

Results

Following an open consultation, 53 risk factors were evaluated. Participants added 22 new factors, modified 1, and excluded 2. After Round 2, 1 factor (employment status) was classified as inappropriate, 7 as uncertain, and disagreement was observed in 21 factors. High-risk prehospital drug administration, pharmacist intervention requests, and chronic drug use identified by STOPP criteria were among the most relevant factors.

Conclusion

This study provides a consensus-based set of clinically relevant DRP risk factors in ED. The variability in agreement highlights the complexity of DRP risk stratification and underscores the need for prospective validation studies. These findings support the future development of screening tools to prioritise pharmaceutical care in emergency settings.

Keywords

Hospital Emergency Service; Delphi Technique; Safety; Risk assessment; Clinical Pharmacology, Pharmacists.

Impact statements

- A consensus-derived set of candidate factors may support the development of screening tools that help emergency department pharmacists prioritise patients for medication review.
- Including real-time data availability and ease of retrieval may facilitate the future integration of prioritisation tools into electronic health records and routine emergency department workflows.
- Prospective validation of these factors could enable earlier identification of drug-related problems and more efficient allocation of limited pharmacy resources.

Introduction

Drug-related problems (DRP) are a major public health concern in Western countries and include pharmacotherapy failures due to ineffectiveness, safety issues, or unnecessary drug use [1]. Such problems account for a considerable proportion of morbidity and mortality among hospitalized patients: up to 16.6% of admissions are associated with adverse events, of which half are preventable, and approximately 10% are drug-related [2-3]. Furthermore, nearly 28% of hospitalized patients experience at least 1 DRP [4]. A multicenter, prospective study conducted across 9 Australian Emergency Departments (ED) identified prescribing errors, adherence and knowledge issues, and adverse drug reactions as the most frequent types of DRP [5]. The early recognition of patients at higher risk of DRP and identification of associated factors could facilitate targeted interventions and improve patient outcomes [4].

Emergency Medicine Clinical Pharmacists (EMCP) play a key role in improving medication safety through prospective reviews and interventions, which improve outcomes and reduce healthcare costs [1-14]. International guidelines on pharmaceutical care in ED emphasize the need to implement all feasible pharmacy-led safety activities, including prioritizing patients at the greatest risk of DRP. However, most ED lack 24-hour pharmacist coverage, making it impossible to provide medication review for all patients [6,15-20]. These activities include prioritizing pharmaceutical care in ED [18]. Current predictive models for DRP are based on low-level evidence and include factors for which data are not readily available in real time, thereby limiting their clinical applicability [19-20]. Qualitative studies have shown that ED clinicians use variable, experience-dependent and locally developed processes to identify patients requiring medication review, reinforcing the need for structured prioritisation tools [21-22]. Existing tools address related but distinct clinical questions. AT-HARM10 showed high sensitivity but a modest positive predictive value for identifying medication-related ED visits [23], whereas MERIS and mART showed low sensitivity when compared with pharmacists' selection for medication review [24]. Neither approach prospectively stratifies patients according to their overall risk of DRPs using data readily available during ED care.

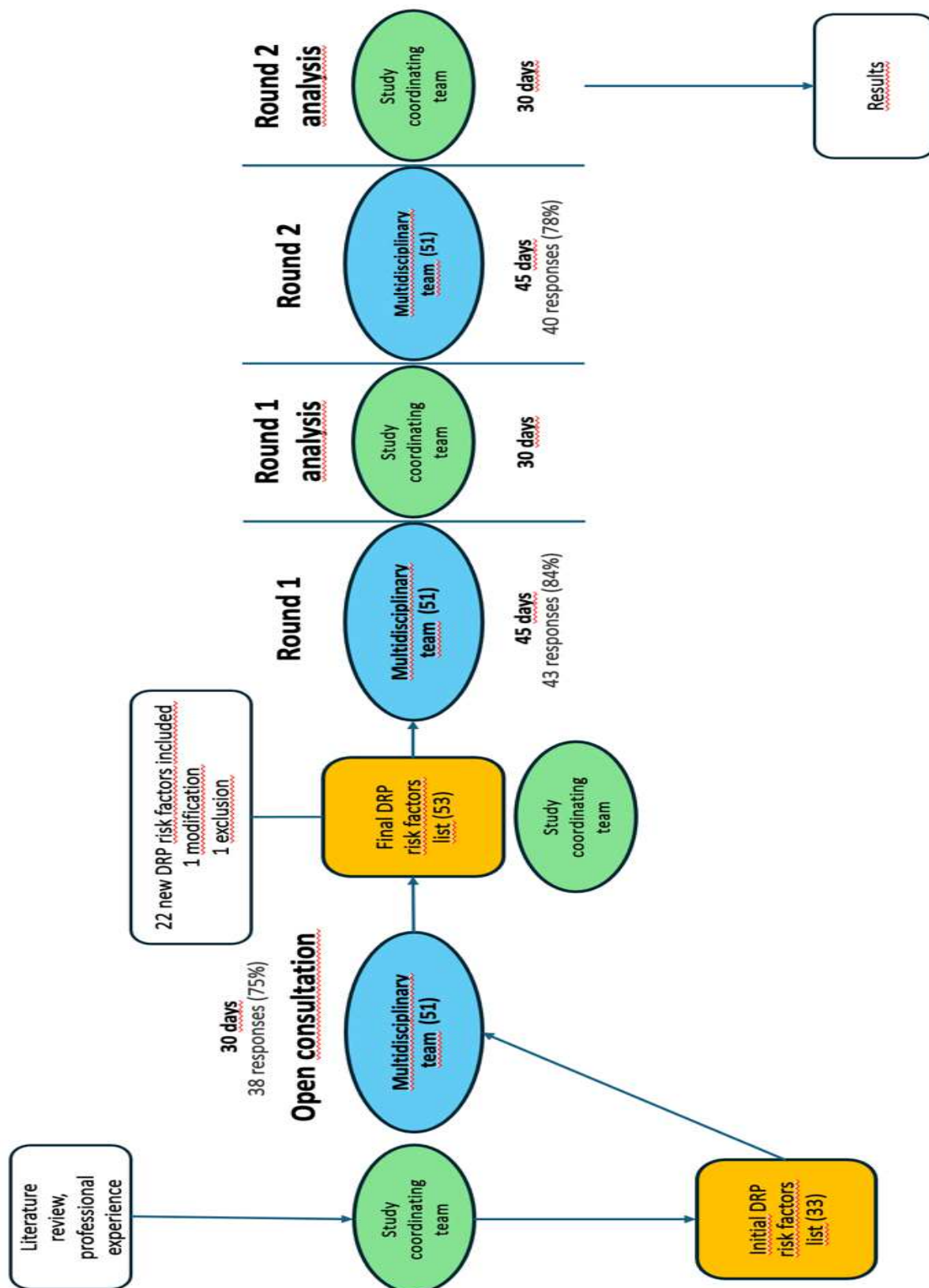
Aim

The main objective was to determine a multidisciplinary consensus on the most relevant risk factors that could be associated with DRP in ED and on the real-time availability and ease of retrieval of the corresponding data in clinical practice as perceived by healthcare professionals. These factors could form the basis of a predictive screening tool that identifies patients at high risk of DRP and prioritizes pharmaceutical care in ED settings

Methods

We conducted this international, multidisciplinary consensus study using the RAND/UCLA modified Delphi method, which combines the Delphi technique with elements of the nominal group technique [21]. The study consisted of 2 iterative rounds of structured evaluation and feedback using this method, aiming to reach agreement among experts on the most relevant risk factors for DRP in ED and on the ease of accessing the corresponding data in daily practice (see Figure 1 for study flowchart).

Figure 1. Study flowchart



To minimize bias and maintain independent judgment, participants were blinded to each other's identities throughout the process. Only the coordinating team had access to de-identified aggregate data for analysis and round-to-round comparison. After the first round, the team provided participants with a summary of the group's responses (the median and interpercentile range for each factor) and invited them to re-evaluate their own ratings in light of the panel's feedback.

The coordinating team generated an initial list of 33 DRP risk factors and sent it to 51 healthcare professionals with recognized clinical expertise and active involvement in emergency care and pharmacology, inviting them to participate in the study. The panel included a broad range of hospital pharmacists, physicians, surgeons, nurses, and social workers from multiple hospitals in Spain (49 professionals), Australia (1), and the United States (1), thus ensuring that almost all roles directly involved in emergency medicine were represented. All invitations were sent by email and summarized the study objectives, methodology, and expected time commitment. Participation was voluntary, and completion of the online survey implied consent. Oversight of recruitment and methodology was provided by 3 coordinating team members: an EMCP, a hospital pharmacist with a PhD in pharmacology, and an emergency medicine physician with expertise in clinical management and value-based care. Table 1 shows the composition of the multidisciplinary panel.

Table 1. Participating healthcare professionals

Coordinating team (3)	1 Emergency Medicine Clinical Pharmacist 1 Hospital pharmacist with a PhD in pharmacology 1 Emergency medicine physician and clinical management and value-based care coordinator
Healthcare professionals (51)	12 hospital pharmacists, 2 intensive care physicians, 1 anesthesiologist, 1 psychiatrist, 1 cardiologist, 1 gastroenterologist, 1 hepatologist, 1 neurologist, 2 medical oncologist, 2 internal medicine physicians (1 of them specialized in home health care), 1 hematologist, 1 nephrologist, 1 infectious diseases physician, 2 pneumologists, 1 rheumatologist, 2 general and digestive system surgeons, 1 vascular surgeon, 1 traumatologist, 1 urologist, 2 geriatricians, 1 palliative care physician, 1 laboratory analyst, 1 radiologist, 4 emergency medicine physicians, 6 nurses, and 1 social worker

This study evaluated potential DRP risk factors in ED. We developed the initial list of 33 risk factors based on literature review and expert experience, categorized them into 3 domains: clinical situation, patient characteristics, and chronic treatment characteristics.

During the open consultation preceding Round 1, participants could add, modify, or remove items. The final list contained 53 factors (see Table 2). Each factor was rated across 3 dimensions:

1. Relevance/scientific evidence: 10-point Likert scale (1 = very low, 10 = very high).
2. Real-time availability of corresponding data: binary response (yes/no).
3. Ease of retrieving the corresponding data in clinical practice: 10-point Likert scale (1 = very difficult, 10 = very easy).

Table 2. Final proposed risk factors

Clinical situation	Patient characteristics	Chronic treatment characteristics
Emergency Severity Index Prehospital drug administration High-risk prehospital drug administration Reason for consultation Working diagnosis Code activation Request for hospital admission Request for surgical intervention Request for non-surgical intervention Length of stay in the ED Mode of transport to the ED Junior physician prescription Pharmacist care request	Age 18–39 y / 40–65 y / 66–79 y / ≥80 y Gender Employment status Private insurance Language barrier Cardiovascular disease Respiratory disease Heart failure Renal impairment Psychiatric disease Hepatic impairment Diabetes HIV Audiovisual deficit ED visit within previous 30 d Admission within previous 90 d Surgery within previous 30 d Last general physician visit > 6 mo Specialist visit within previous 180 d MDR colonization 6 mo Body Mass Index Fragile-VIG Index Health care facility Social problems Barthel Index Pfeiffer Index Patient not a candidate for invasive measures	Age >65 y PLUS 3 or more chronic diseases PLUS using 5 or more chronic drugs Chemotherapy within the previous 30 d Chronic treatment with high-risk drugs Drug use based on STOPP criteria Chronic treatment with immunosuppressive drugs Self-medication Drug allergies ED visit related to drug misuse Treatment adherence problems Previous DRP Number of chronic drugs before ED visit Illicit drug use Organ transplantation

ED, emergency department; HIV, human immunodeficiency virus; MDR, multidrug resistant; VIG, Spanish abbreviation for comprehensive geriatric assessment; STOPP, Screening Tool of Older Person's Prescriptions; DRP, drug-related problems; d, days; mo, months

We addressed missing responses through listwise deletion, excluding unanswered items from analysis while retaining the participant's responses to other items. We verified the precision and consistency of the ratings using interpercentile range (IPR) analysis across rounds. The coordinating team monitored data integrity and completeness.

The primary outcome was the degree of consensus among experts regarding the appropriateness of each risk factor for predicting DRP in ED.

We determined consensus using the RAND/UCLA Appropriateness Method by comparing the IPR with the IPR adjusted for symmetry (IPRAS). We considered consensus on a factor to have been reached when the IPR was less than or equal to the IPRAS. We classified each factor according to the median of the panelists' scores on the 10-point Likert scale regarding the relevance/scientific evidence dimension as follows:

- Appropriate (median >6)
- Uncertain (median between 4 and 6)
- Inappropriate (median <4)

We conducted quantitative analyses using Microsoft Excel (Microsoft, Redmond, WA). We evaluated agreement among panelists according to the RAND/UCLA methodology, using the relationship between the IPR and the IPRAS. We calculated this as follows: $IPRAS = 2.35 + 1.5 \times IA$, where IA (index of asymmetry) represents the distance between the midpoint of the IPR and the central point (5) on the 10-point rating scale. We defined disagreement as occurring when the IPR was greater than the IPRAS.

Patients and the public were not involved in the design, conduct, reporting, or dissemination plans of this research. This study was based on expert consensus among healthcare professionals involved in emergency care.

Ethics approval

The study protocol was approved by the Ethics Committee for Research with Medicinal Products of Parc Taulí University Hospital (Sabadell, Barcelona, Spain) on May 30, 2023 (approval code: 2023/5047). We used REDCap v14.0.6 (Vanderbilt University, Nashville, TN) for data collection, with the coordinating team managing the anonymous responses. We did not perform any clinical intervention. This study was reported in accordance with the STROBE statement for observational studies

Results

After the open consultation, we received 38 responses (75% of those invited to participate). During the open consultation, the participants modified the initial list of risk factors related to clinical situation, patient-specific characteristics, and chronic treatment characteristics. They added 22 new risk factors, modified 1, and eliminated 2, resulting in 53 risk factors to be rated in Round 1 (see Table 2).

Seven of the new DRP risk factors were related to clinical situation: prehospital drug administration, high-risk prehospital drug administration, reason for ED visit, working diagnosis, code activation (e.g. stroke, trauma, cardiac arrest), requests for non-surgical intervention (e.g. endoscopy, bronchoscopy, lumbar puncture), and requests for pharmacist intervention during the initial physician/nurse evaluation. Although patient transport to the hospital was included in the initial proposal, one panelist suggested subdividing the item "ambulance" into advanced or basic life support. However, this risk factor was not modified after the open consultation.

Ten of the new DRP risk factors were related to patient-specific characteristics: respiratory disease, heart failure, psychiatric disease, diabetes, HIV, audiovisual impairment, a primary care physician visit more than 6 months ago, infection with a multidrug-resistant microorganism within the last 6 months, Frail-VIG index (the Spanish abbreviation for Comprehensive Geriatric Assessment), and patients who are not candidates for invasive measures. The initial list included patient age with ranges of 18 to 39, 40 to 70, 71 to 79, and 80 years and over. One panelist suggested changing the age ranges to 18 to 39, 40 to 65, 66 to 79, and 80 and over, which was accepted and implemented. The initial list also included the Charlson Comorbidity Index, but a panelist suggested eliminating the item because it gives too much weight to chronic diseases that have a much better prognosis nowadays than they did 20 years ago when the scale was created. Therefore, the item was eliminated from the final list. Five of the new DRP risk factors were related to chronic treatment characteristics: chronic drug use according to the STOPP criteria, self-medication, previous DRP, illicit drug use, and organ transplantation. The initial list included the types of chronic drugs used, classified according to the Anatomical Therapeutic Chemical system. However, a panelist suggested eliminating this item because accessing such data during daily ED clinical practice would be very complex and essentially unfeasible. The item was therefore removed from the final list.

After completing the list of DRP risk factors, we initiated the 2 consecutive rounds using this list, with participation rates of 84% in Round 1 (N = 43) and 78% in Round 2 (N = 40).

Table 3 shows the complete results after Round 2. In summary, employment status was considered inappropriate as a DRP risk factor, with a median relevance/scientific evidence dimension score of 3 on the 10-point Likert scale. Seven DRP risk factors were considered uncertain: requests for non-surgical intervention (6), mode of transport (5), gender (4), private insurance (4), a primary care physician visit more than 6 months ago (5), outpatient consultation with a specialist within the last 3 months (5), and body mass index (6). There was disagreement on 21 risk factors.

Table 3. Results

	DRP Risk Factor	Round 1			Round 2			IPR-IPRAS Relevance/scientific evidence
		Relevance/scientific evidence (median)	Real-time availability (affirmative response, %)	Ease of data retrieval in clinical practice (median)	Relevance/scientific evidence (median)	Real-time availability (affirmative response, %)	Ease of data retrieval in clinical practice (median)	
Clinical situation	Emergency Severity Index (D)	8	95	9	8	98	9	0.40
	Prehospital drug administration	8	91	8	8	98	8	-1.64
	High-risk prehospital drug administration (D)	9	86	8	9	88	8	0.48
	Reason for consultation (D)	6	88	9	7	90	9	0.17
	Working diagnosis (D)	7	93	9	7	95	9	0.04
	Code activation	9	100	10	8	100	10	-0.69
	Request for hospital admission (D)	7	79	9	8	75	9	0.43
	Request for surgical intervention (D)	7	88	9	7	90	9	1.07
	Request for non-surgical intervention* (D)	6	53	8	6	35	8	0.53
	Length of stay in the ED (D)	8	63	8	8	65	8	0.83
	Mode of transport to the ED [†]	5	47	8	5	25	8	-1.86
	Junior physician prescription	8	60	8	8	63	8	-0.64
	Pharmacist care request (D)	8	93	9	8	98	9	0.79
	Age 18–39 y / 40–65 y / 66–79 y / ≥ 80 y (D)	8	93	10	9	95	10	2.78
	Gender [‡]	4	70	10	4	78	10	-1.37
Patient characteristics	Employment status*	4	14	5	3	10	4	-0.85
	Private insurance [§]	5	26	5	4	20	5	-0.06
	Language barrier (D)	8	84	8	8	90	7	1.88
	Cardiovascular disease	8	95	9	8	98	9	-1.49
	Respiratory disease	7	93	9	7	98	9	-2.02
	Heart failure	8	93	9	8	98	9	-3.01
	Renal impairment	9	95	9	9	98	9	-2.00
	Psychiatric disease	8	98	9	8	98	9	-0.81
	Hepatic impairment	8	95	9	8	98	9	-0.42
	Diabetes	8	93	9	8	98	9	-2.58
	HIV	7	93	9	7	95	9	-1.32
	Audiovisual deficit	7	74	8	7	80	7	-1.81
	ED visit in the previous 30 d (D)	8	74	8	8	88	8	0.80
	Admission within the previous 90 d (D)	7	67	8	7	75	8	0.32
	Surgery within the previous 30 d (D)	7	81	9	7	88	9	0.56
Chronic treatment characteristics	Last general physician visit >6 mo [¶]	5	30	7	5	18	6	-2.61
	Specialist visit within the previous 3 mo [¶]	5	26	7	5	23	6	-2.28
	MDR colonization in the previous 6 mo	8	86	8	8	95	8	-0.99
	Body Mass Index [¶]	6	58	8	6	60	7	-0.04
	Frail VIG-Index (D)	8	81	8	8	88	7	1.38
	Health care facility (D)	7	30	7	8	25	7	1.81
	Social problems	7	47	6	7	43	6	-0.94
	Bartel Index (D)	8	70	7	8	80	7	2.11
	Pfeiffer Index (D)	8	65	7	8	63	7	2.08
	Patient not a candidate for invasive measures	6	86	8	7	95	8	-1.34
	Age >65 y PLUS 3 or more chronic diseases PLUS 5 or more chronic drugs (D)	9	91	9	9	98	9	0.55
	Chemotherapy within the previous 30 d	9	95	9	9	98	9	0.00
	Chronic treatment with high-risk drugs	9	95	9	9	98	8	-1.36
	Drug use based on STOPP criteria	9	70	8	9	80	8	-0.91
	Chronic treatment with immunosuppressive drugs (D)	9	93	8	9	98	8	1.93
	Self-medication (D)	9	49	6	8	48	6	0.31
Chronic treatment characteristics	Drug allergies	9	98	10	9	98	10	-0.09
	ED visit related to drug misuse	9	86	8	9	95	8	-0.54
	Treatment adherence problems	8	70	6	8	75	6	-0.48
	Previous DRP	8	88	9	8	93	8	-0.54
	Number of chronic drugs before ED visits	9	88	9	9	93	8	-0.78
	Illicit drug use	8	81	8	8	85	7	-2.38
	Organ transplantation	9	95	9	9	98	9	-0.82

* Inappropriate as a final DRP risk factor in the relevance/scientific evidence dimension
[†] Inappropriate as a final DRP risk factor in the relevance/scientific evidence dimension
[‡] Disagreement: IPR > IPRAS in the relevance/scientific evidence dimension
[§] Disagreement: IPR > IPRAS in the relevance/scientific evidence dimension
[¶] DRP, drug-related problem; ED, emergency department; HIV, human immunodeficiency virus; MDR, multidrug resistant; VIG, Spanish abbreviation for Comprehensive Geriatric Assessment; STOPP, Screening Tool of Older Person's Prescriptions; IPR, Interpretable score adjusted for outcomes.

Discussion

This study provides a multidisciplinary consensus on clinically relevant risk factors for DRP in ED, highlighting both areas of agreement and uncertainty. Before Round 1, the coordinating team held an initial open consultation, during which they developed an expanded list of factors. This broadened the initial literature-based proposal and incorporated risk factors that were not previously described, but which are relevant to first-line professionals. Several issues emerged during this preliminary step, such as the view that employment status is inappropriate as a DRP risk factor. This result was unexpected, since several studies have included social risk factors as possible DRP risk factors [5,22-23]. Although Geeson et al. excluded socioeconomic status because its measurement can be difficult, socioeconomic data are available in health records in our setting. Socioeconomic situation is a recognized health determinant that has been associated with poor individual care and limited family support [24]. Thus, the item was included in the initial proposal. This aspect warrants further analysis in future research.

During the open consultation, the panelists proposed 'code activation' and 'requests for pharmacist intervention during the initial physician/nurse evaluation' as DRP risk factors. The coordinating team did not initially include these items. Although the panelists did not reach a consensus on these items, the literature shows that interventions by EMCP can reduce medication errors and improve safety during stroke alerts, myocardial infarctions, cardiac and respiratory arrests, airway compromise requiring rapid sequence intubation and postintubation care, and other emergencies [1,15,25-37]. The multidisciplinary team considered that including EMCP as new members of rapid response teams would be straightforward. However, the participants did not reach a consensus on the need for pharmacy care related to the Emergency Severity Index, the reason for consultation, the working diagnosis, or requests for surgical or non-surgical intervention. However, the coordinating team considered that acute and severe patients are likely to require some type of intervention upon arrival due to the high complexity of their clinical condition.

The results of Round 1 showed that the main reason for ED visit—one of the items proposed by panelists in the open consultation—was considered uncertain as a DRP risk factor. Although this item received a higher rating in Round 2 and reached the “appropriate” score, the final analysis revealed disagreement among the participants. There is scientific evidence demonstrating the usefulness of certain warning diagnoses in comprehensively identifying DRP that lead to ED visits [42-43]. Similarly, although prehospital high-risk drug administration was added as a DRP risk factor during the open consultation, there was disagreement among the panelists during the consensus rounds. According to the recommendations of the Institute for Safe Medication Practices, potential sources of DRP include duplicating drugs already administered in the prehospital setting, or errors in drug dilutions for continuous infusion pumps managed by healthcare out-of-hospital professionals. Although these potential sources are primarily relevant to acute care, ambulatory/community care, and long-term care settings, they are also deemed relevant in emergency care settings [44]. The participants considered the item 'requests for surgical and non-surgical intervention' to be appropriate. This result is consistent with those of the FARM-URG project, which identified antithrombotic

drugs as responsible for most adverse drug events in ED, and with recommendations to perform a detailed assessment of the patient's thrombotic and bleeding risk before, during, and after invasive procedures [45]. In Round 2, the participants considered including an item on the need for a non-surgical intervention (e.g. gastrointestinal endoscopy) as a DRP risk factor to be uncertain, and the final analysis showed disagreement on this item. Thus, it remains unresolved whether this item may add predictive value. During the open consultation, the participants also suggested adding chronic drug use based on STOPP criteria, self-medication, previous DRP, and illicit drug use. During the final analysis, all of these items were accepted, except for self-medication. The updated version of the STOPP/START criteria defines clinically important, potentially inappropriate drugs and potential prescribing omissions as relevant to medication review in older people [46]. It is therefore considered extremely useful for identifying DRP [42-43]. Similarly, poor treatment adherence, self-medication, and drug misuse are recognized sources of DRP [44].

During the final analysis, the participants did not reach agreement on the item 'ED visit in the previous 30 days'. However, previous studies have shown that patients with a DRP-related ED visit within the last 30 days are at high risk of ED revisits, making this a useful factor when prioritizing interventions at discharge [1]. Onder et al. found that previous DRP and the number of concurrent drugs were the two strongest candidate factors of DRP, and identified heart failure and 4 or more comorbid conditions as candidate factors of DRP in their final model [44]. Previous studies have investigated the use of antipsychotic or antidepressant drugs, as well as psychiatric conditions, as risk factors [27,45-46]. In summary, the participants rated 1 factor (employment status) as inappropriate, 7 factors as uncertain in the relevance/scientific evidence dimension, and disagreed on 21 factors during the final analysis. These results underscore the need for further research. The participants identified the STOPP criteria, number of chronic drugs, renal impairment, and polypharmacy with multimorbidity as the most robust potential candidate factors of DRP. A recent study published after completion of our Delphi used Nominal Group Technique with 14 clinicians from two Australian EDs to identify six medication-management criteria for presentations potentially related to medication harm or at risk of such harm [47]. Our study placed greater emphasis on a broader set of patient-level factors for stratifying DRP risk after ED arrival. It included 51 invited professionals (40 in Round 2) from pharmacy, medical, surgical, nursing and social-work disciplines; non-pharmacist participants were mainly from one institution, whereas pharmacists represented multiple hospitals. The open consultation expanded the list from 33 to 53 factors, and we additionally assessed real-time data availability and ease of retrieval, supporting future electronic implementation.

The low level of agreement on certain social factors may be due to the perception that this type of data is not readily available in electronic health records. This perception makes them seem impractical and difficult to obtain in routine medical practice.

This study has several limitations that should be considered when interpreting the results.

First, the open consultation phase yielded more potential risk factors than initially anticipated, which increased the complexity of the Delphi rounds, and potentially introduced fatigue-related bias. Although

participation remained high (>75%) across all phases, the increased number of factors may have weakened consensus and prolonged the study.

Second, the issue of the real-time availability of data for each risk factor may have been interpreted ambiguously. Fewer than 50% of participants responded positively to 9 of the 53 factors, suggesting that this item may have been misinterpreted, leading to potential misclassification bias regarding the ease of accessing the corresponding data in clinical practice.

Third, although the study included a broad, multidisciplinary range of healthcare professionals, the team did not invite patient representatives or nursing assistants to participate. The absence of their perspectives may have limited the external validity of our findings and restricted their applicability to patient-centered and operational aspects of emergency care.

Fourth, as a consensus-based study, the results rely on expert opinion rather than empirical data. This reliance may introduce subjectivity and limit internal validity because predictive performance was not tested prospectively. Consequently, the strength of the association between the factors that reached agreement and the occurrence of actual DRP remains hypothetical. Any bias would likely lead to an overestimation of the predictive value of the factors endorsed by the experts.

Finally, the findings may be generalizable only to healthcare systems with comparable electronic health record infrastructures and pharmacist involvement in ED. Despite these limitations, this study provides a valuable foundation for developing and validating future predictive models and decision-support tools to help identify high-risk patients who could benefit from pharmacist intervention in emergency care settings.

Conclusion

This multidisciplinary consensus study identified candidate factors that may help stratify DRP risk in ED and highlighted the variability of professional judgement in this complex setting. Considering both clinical relevance and the practical availability of data provides a basis for developing electronically supported screening tools to prioritise pharmaceutical care. These findings should be regarded as a foundation for model development rather than a validated prediction rule. Prospective multicentre validation is required to evaluate predictive performance, clinical utility, and the potential impact on medication safety and resource allocation.

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Declarations

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Competing Interests

The authors declare that they have no competing interests

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Data availability

De-identified data and statistical code are available upon reasonable request. Data may be made publicly available in a suitable repository upon publication.

Ethics approval

The study protocol was approved by the Ethics Committee for Research with Medicinal Products of Parc Taulí University Hospital (Sabadell, Barcelona, Spain) on May 30, 2023 (approval code: 2023/5047).

Consent to participate

Participation was voluntary. Participants received written information about the study, and completion of the online survey constituted informed consent in accordance with the ethics committee-approved procedure