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The impact of advanced practitioners on patients in acute care—A mini review

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Background: Acute patient care is becoming increasingly complex due to various factors (e.g., demographic changes, multimorbidity, organizational changes). Educating healthcare professionals as advanced practitioners at Master's level is one response to these challenges. Meanwhile, there are several empirical insights into advanced roles.

Aim: To provide an overview on the impact of advanced practitioners on acute care patients' outcomes and safety.

Methods: We conducted a mini-review. Therefore, a systematic literature search was carried out in the four databases Medline, CINAHL, Cochrane Library, and PEDro. After four researchers screened the results and extracted the data independently, the included studies were analyzed thematically and clustered along patients' outcomes. The results are presented narratively.

Results: 4,332 records were identified in the systematic search, and 67 articles were included in our review. Of these, the majority ($n = 57$) addressed the nursing profession. Advanced practitioners demonstrated an overall positive impact on acute care patients. They improved patients' vital signs, and reduced their mortality and adverse events (e.g., thrombosis, pneumonia, pressure injury). In addition, they shortened patients' length of stay and waiting times, and reduced admission rates. Patient satisfaction also increased after their implementation. When being compared to physicians, advanced practitioners in acute care demonstrated similar to equal patient outcomes and safety.

Conclusion: The identified studies highlight the benefits of advanced practitioners for acute care patients. While most studies were conducted in emergency departments or intensive care units, further research concerning other acute settings (e.g., psychiatry) or clinical conditions (e.g., cognitive impairment) is recommended.

KEYWORDS

acute care, advanced practitioner, advanced nurse, advanced physiotherapist, advanced paramedic, patient safety, patient outcome

1 Introduction

1.1 Background

Worldwide, healthcare professionals (HCP) are facing major changes in healthcare. Especially in acute care (AC), various factors lead to an increasingly complex area of action. On the one hand, demographic changes, multimorbidity, chronic diseases, polypharmacy (1), and more prescribers (2), among other factors, are reasons for the growing number of critically ill patients requiring complex treatment and intervention bundles (3, 4).

On the other hand, healthcare facilities have to deal with innovations, digitalization, and technological advances while considering hundreds of performance indicators, e.g., in the emergency department (ED) and intensive care unit (ICU) (5). The resulting complexity in acute care is defined as a “relational and dynamic phenomenon with multiple, interconnected processes characterized by its level of instability, uncertainty, and variability” (6).

To meet this growing complexity, facilities have to develop new organizational models and adopt these approaches in patient care (7). A key intervention is the renewed team composition (5), as HCPs are facing more complex treatment situations, and the demands and requirements on them are increasing (8–10). In order to ensure patient safety, a response to these increasing challenges is to educate nurses, physiotherapists and paramedics as advanced practitioners (AP), typically through specialized study programs and trainings.

Today, numerous international publications are available discussing the evaluation of APs (11–14). What is still missing, however, is an overview on the impact of APs on patients in AC.

1.2 Aim

The objective of our study is to derive and describe the impact of APs on AC patients' outcome and safety. In detail, we aim to provide an overview of different studies evaluating advanced practice nurses (APN), advanced practice physiotherapists (APPh), and advanced practice paramedics (APPa) in AC.

2 Methods

We designed a mini review. Therefore, two reviewers (LB, FS) independently carried out formative searches in the databases Medline (via PubMed) and Cumulative Index to Nursing and Allied Health Literature (CINAHL) to identify relevant keywords. Following this, we developed a systematic search in the entire research team.

Finally, we conducted the systematic search in the four databases Medline (via PubMed), CINAHL, Cochrane Library and PEDro (see [Supplementary material S1](#)) and documented this search according to the PRISMA methodology (15). The screening process was independently carried out by four reviewers who were or are still working as nurses (FS, LB), a physiotherapist (MF) or a paramedic (PD) in acute care.

In this review, we only included studies considering an AP as a person, who has a master's degree, and advanced knowledge and skills to ensure autonomous, situation-specific action. In their daily work, APs act in an evidence-based manner, and aim to ensure patient safety, improve outcomes, and reduce risks. They lead through complex, acute situations and have advanced decision-making skills. APs promote education in relation to health and illness, recognize training needs in practice, identify research gaps, develop questions from them, and use adequate methods to answer them sufficiently (16–19).

In addition to the reallocation of resources, studies had to define AC by the aspect of time. Most definitions consistently emphasize

the unique characteristic of time pressure. Accordingly, AC encompasses all promotional, preventive, curative, rehabilitative, or palliative therapies whose effectiveness depends largely on time-sensitive and often rapid interventions (20, 21).

Furthermore, we only included English and German empirical studies or reviews that deal with APs in AC and evaluate their impact on patients. Publications were excluded if the description of their methodological approach was insufficient or missing, or if they only aimed to describe AP role development, but not AP evaluation.

After screening and data extraction, we initially subdivided the included studies along the investigated professions to derive better insights into advanced roles of each profession and their impact on patients. Studies were then thematically analyzed and outcomes were clustered using an inductive approach. Finally, the clusters were structured along the care process (diagnosis, treatment, results). As we did not critically appraise the included studies, results will only be presented in a narrative and descriptive form.

3 Results

In our systematic literature search, 4,332 records were identified. After removing 975 duplicates, we screened 3,357 titles and abstracts and 93 full texts. Finally, 67 studies were included in this review. The entire search and screening process is shown in [Figure 1](#). Studies that were excluded during the full-text screening are integrated in [Supplementary material S2](#).

In detail, we included 56 studies concerning advanced nursing roles (22–77), eight studies on advanced physiotherapy roles (78–85), two studies on advanced paramedics (86, 87), and one study concerning both advanced nurses and advanced physiotherapists (88).

[Figure 2](#) illustrates the major clusters of outcomes on which the identified studies and reviews can provide information. Along these clusters, the impact of APs on AC patients is reported below.

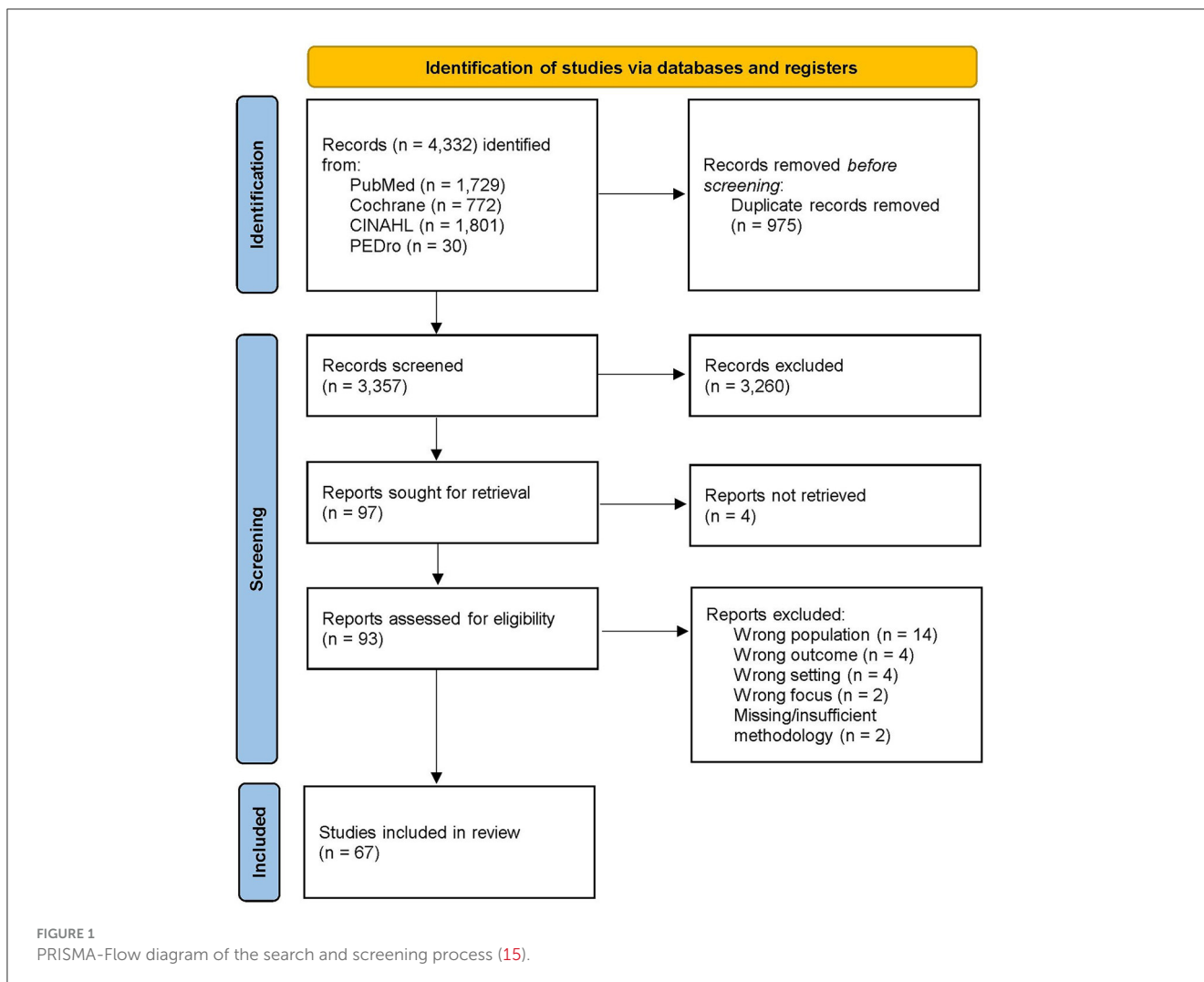
3.1 Impact of advanced practice nurses on patients' outcomes and safety

3.1.1 Diagnostic procedures

A total of 10 studies examined the diagnostic accuracy and competence of APNs. Compared to physicians, APNs ordered an equal number of diagnostic tests (25) and provided similar assessment and clinical examination results (77). APNs were also equally accurate or superior in the diagnosis and interpretation of X-rays in adults and children (28, 59, 69), fractures and other orthopedic injuries (51, 56, 60, 71), and electrocardiograms (61).

3.1.2 Interventional approaches

Another 12 articles reflected on treatments conducted by APNs in various situations. Comparing physicians and APNs, studies highlight equal interventional approaches in adults and children (24, 29, 57, 71, 77). Patients in APN groups received their surfactant sooner (24), were intubated more quickly (24), were offered analgesia more often (69), and reported an increase in



nursing support, visits and provided information (35, 36, 54). The implementation of an APN led to an increased therapy involvement of patients and their families (55), and a decreased number of patients who left without treatment (64). Most minor injuries could also be treated independently by APNs (74).

3.1.3 Treatment outcomes

Six articles examined *adverse events* in patient treatment. Studies point to decreased complication rates after APN implementation (65). Advanced roles provided low complication rates when inserting central venous catheters (22), lower error rates in prescribing medication (27), reduced deep vein thrombosis rates (41), reduced pneumonia rates (41), and lower rates of hospital-acquired pressure injuries (44). While these five studies point to an equally low or decreased complication rate, one study did not examine any difference after the addition of an anesthesia APN (72).

Another five studies examined the impact of APNs on patients' *vital signs*. Neonates and babies were found to maintain or improve their vital signs (oxygen saturation, temperature, blood pressure, heart rate, blood gas) when being cared for by APNs

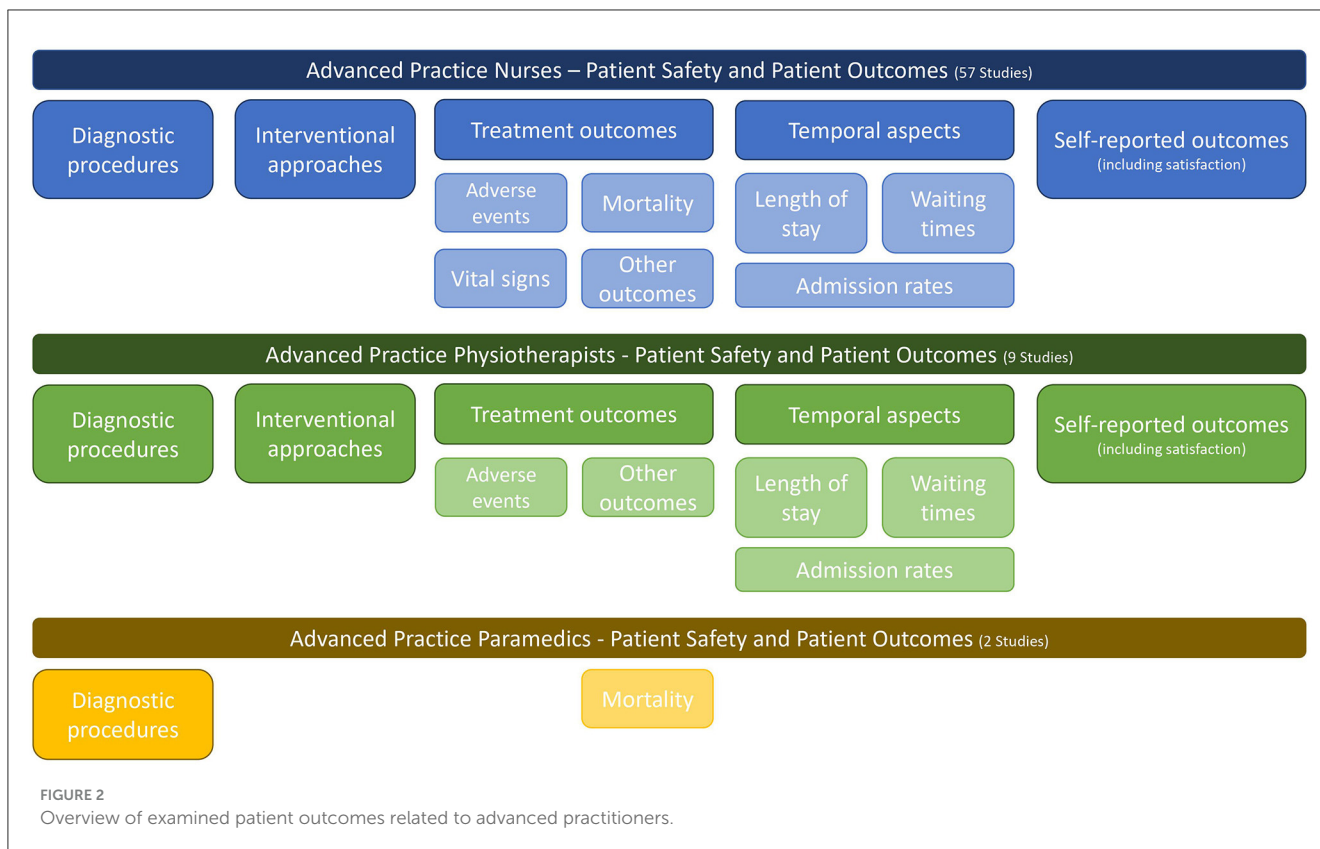
(24, 53, 77). Also adult patients in APN groups experienced equal vital signs when compared to physician groups (52). In COPD patients, the implementation of APNs resulted in a higher oxygen saturation (23).

In addition, the overall *mortality* of AC patients decreased after the implementation of APNs in adults (62, 65, 75) and children (26). Compared to physicians, care provided by APNs resulted in an equal (42) or lower (50) ICU mortality and an equivalent hospital and 90-day mortality rate (50, 75).

Four studies examined *other outcomes*. APNs in an urgent care team could reduce the baseline dyspnea index in COPD patients (23). APNs also performed circumcisions on children, with equal results compared to physicians (39). Furthermore, body and limb functions as well as the ability to return to work were equal in APN and physician groups (88). Hemodialysis patients showed better blood parameters when being cared for by APNs additionally (67).

3.1.4 Temporal aspects

Twenty-one articles investigated patients' *length of stay* (LOS) as an outcome. The overall hospital LOS decreased in all studies reporting on the implementation of APNs (30, 32, 55, 63, 65,



70). When comparing APNs and physicians, studies highlight an either equal LOS (33, 46, 57, 75) or a decreased LOS in APN groups for adults (26, 37, 41, 50, 71, 75) and children (76). The ICU LOS decreased also after the implementation of APNs (38, 41, 62, 65). Compared to physicians, patients' ICU LOS was equal in adults (50) or reduced in children (35) when being cared for by APNs. The ED LOS was also reduced after the APN implementation (62) and when compared to physician-only groups (75). The hospital unit LOS was also decreased after the implementation of an APN (63). Only one study reported no difference in the ED LOS after APN implementation (68).

Another 14 articles examined the impact of APNs on patients' *waiting times* in different settings. Most studies report on overall shorter (28, 31, 45, 68, 70, 75) or equal (46, 68, 69, 71, 75) ED waiting times comparing APNs and physicians. Other studies demonstrate shorter times to first visits, diagnosis, and treatments (58, 62, 75) in the ED and the ICU, e.g., a faster application of analgesia (47) or stroke treatment (75) in APN groups. Concerning children, studies report a faster response to transfers after an APN implementation (53), but no difference in the preoperative preparation time (72).

In addition, a total of 14 studies examined the *admission* to and within a hospital. These highlight a lower hospital admission (49, 58) and readmission rate (66) after APN implementation. Compared to physicians, hospital admission

and readmission rates were lower (26, 33, 43, 61) or equally low (36, 46, 70) in APN groups. Within the hospital, the implementation of APNs led to a reduced (40) or similar (62) ICU admission rate. Following a hospital stay, the time to transfer to rehabilitation could be reduced by implementing APNs (41). Another study found no difference in the transfer rate to follow-up clinics between APNs and physicians (31).

3.1.5 Self-reported outcomes

A further 23 studies investigated the impact of APNs on outcomes reported by patients themselves. While the implementation of APNs seemed to have no effect on patients' self-esteem and the maternal affect (26), it led to decreased psychological distress and increased perceived self-efficacy (73). Quality of life improved after implementation (67) and was equally high when compared to physician groups (88). Another 19 studies reflect on patients' satisfaction with the care provided by APNs. Overall, patients indicate a high (32, 34, 54, 59, 61, 63, 73, 75) or increased (67) level of satisfaction following APN implementation. Compared to physicians, patients in APN groups report an equal (28, 31, 52, 64, 70, 75) or higher (26, 48, 75) level of satisfaction with care. One study found that parental satisfaction did not change after the implementation of an anesthesia APN (72).

3.2 Impact of advanced practice physiotherapists on patients' outcomes and safety

3.2.1 Diagnostic procedures

A total of four studies examined the diagnostic skills of APPhs. As reported in three studies (80, 83, 84), there is a high level of agreement in terms of diagnosis between APPhs and surgeons. APPhs were able to diagnose an equal number of patients compared to physicians (82), and were twice more likely to correctly identify surgical patients in triage (80).

3.2.2 Interventional approaches

Another two studies reflected on the treatment provided by APPhs. One study highlights that APPhs made an autonomous decision regarding patient management in 77% of the included cases, and APPhs managed patients' treatment pathways without referral to a physician in four out of five cases (78). Comparing APPhs and physicians, one study (80) determines an almost equal treatment agreement in orthopedic patients with chronic hip and knee pain.

3.2.3 Treatment outcomes

Overall, two studies examined treatment outcomes. The first study found no difference in *adverse events* when patients were treated by either APPhs or physicians in the ED (79). In the second study, *other outcomes* were compared between APPh and physician groups, resulting in equal functional recovery of patients with tissue injuries and their ability to return to work in the same amount of time (88).

3.2.4 Temporal aspects

Length of stay as an outcome for patients in the ED with musculoskeletal complaints was investigated in two studies. In one study, the implementation of APPhs as primary contact clinicians for patients shortened the time between admission and discharge (79). In another study, a decrease in the LOS of patients treated by APPhs compared to those treated by APNs or physicians was determined (85).

The influence of APPhs on *waiting times* for ED patients was examined in three studies. An overall shorter waiting time, a shorter time to treatment (85) and a shorter time from triage to assessment (79) were reported. Patients with musculoskeletal complaints also received analgesia sooner after the implementation of an APPh (81).

Focusing on *admission rates*, there was a reduced 30-day re-attendance in urgent care centers for patients treated by APPhs (82). Compared to treatment by APNs or physicians, fewer APPh patients were admitted to hospital (85).

3.2.5 Self-reported outcomes

The results of two studies highlighted patients' self-reported experiences. One study indicated an equal quality of life 2–8 weeks after a tissue injury when the patients were treated by either APPhs

or physicians (88). Patients also reported that they were highly satisfied with the treatment provided by APPhs (84).

3.3 Impact of advanced practice paramedics on patients' outcomes and safety

Overall, two studies reported outcomes after an APPa implementation. One study showed a high concordance between APPa diagnosis and in-hospital diagnosis (86). Another study reported an increase in patients' long-term survival rate when an APPa was involved in the treatment of their out of hospital cardiac arrest (87).

4 Discussion

4.1 Summary of evidence

This mini review aimed to provide an overview on the impact of APs in AC. The results of this study emphasize that APs have an overall positive impact on acute patients' outcomes and safety. Included studies point to an improved quality of care after the implementation of APs and similar or equal patient outcomes when comparing APs and physicians. APs could also provide a high quality of care for complex cohorts (e.g., preterm babies), resulting in reduced mortality rates, shorter LOS, or an overall increased patient satisfaction.

These findings are in line with the results of research in other settings. A systematic review on cancer patients indicates that patient satisfaction and symptom management were considerably improved by APs (89). Another study on geriatric outpatients highlights reduced waiting times and faster access to care (90), as also described by our review. An additional review on patients with chronic kidney disease reports improved laboratory parameters and vital signs after the implementation of APs (91).

While most of our included studies were conducted in the ED and the ICU and focused on the implementation of APs into a specific setting, studies on APs that deal with specific conditions (e.g., ECMO, respiration, cognitive impairments) are still lacking. In addition, studies on prehospital or rehabilitative acute care are missing. Moreover, we could only identify one study from the area of psychiatry (73).

The transition between acute and long-term care is fluid and not sharp in many places. While our review was rigorous in its approach and only included studies when highlighting the factor "time", we also identified studies reflecting on APs in subacute and long-term patient care (92–95).

Most of the studies in our review deal with APNs. While 57 studies are available for this group in AC and numerous findings on patient outcomes can be identified, there is a lack of further evidence for APPhs ($n = 9$) and APPas ($n = 2$). This is certainly due to the much later development of advanced roles in the field of physiotherapy and paramedicine.

The methodological approach of these studies was quite similar. On the one hand, observational designs were used to evaluate the implementation of APs using a pre/post comparison. On the other

hand, patients were grouped, treated by APs or physicians, and then compared with each other. Whether it is always appropriate to compare APs with physicians is open to debate. The results of the studies are convincing and indicate that some activities can be taken over by APs. This can also reduce the workload of physicians and free up their resources. It must be the clear objective to work together in order to ensure high-quality care for patients and not to be irritated by these comparisons against each other.

4.2 Limitations

The quality of included studies varies widely. However, due to the mini review design, we did not conduct a critical appraisal of the retrieved results. Therefore, our findings have to be interpreted with caution. In addition, we only included German and English articles. Relevant studies published in other languages may have been excluded. Publication bias can also not be ruled out.

Furthermore, we chose a one-sided perspective on the subject. While we were only concerned with the role of the APs, it remains unclear what other HCPs were doing in the care of the patients. In addition, we only extracted the outcomes relevant to the patient. We did not consider any further aspects such as cost effectiveness, which may also be relevant to the process.

5 Conclusion

The results of this review demonstrate the overall and differentiated benefits of APs. In the vast majority of included studies, their implementation in AC led to improved patient outcomes and safety or to equivalent results when compared to physicians. Thus, the assumption that APs are a key response to the increasing complexity in AC can be confirmed.

Therefore, we highly recommend the development and implementation of AP roles in acute settings. Nevertheless, an appropriate implementation process for APs is crucial to effectively provide high-quality care to patients. The integration of new roles is therefore an overall task for the entire healthcare facilities and their respective AC teams.

While APNs appear to be widely investigated, research on APPhs and APPas is still lacking. Future studies should therefore focus on the evaluation of advanced roles in physiotherapy and paramedicine. Furthermore, specific acute settings (e.g., psychiatry) and conditions (e.g., cognitive impairment) need to be addressed.

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Author contributions

LB: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing, Validation. MF: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing, Validation. PD: Conceptualization, Data curation, Formal analysis, Methodology, Visualization, Writing – original draft, Writing – review & editing, Validation. CR: Conceptualization, Formal analysis, Methodology, Validation, Writing – original draft, Writing – review & editing, Supervision. FS: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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Conflict of interest

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/femer.2024.1399779/full#supplementary-material>

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