Chapter

Patient Safety in Physiotherapy: Are Errors that Cause or Could Cause Harm Preventable?

Griselda Gonzalez-Caminal, Aida Camps Gomez and Carmen Gomar-Sancho

Abstract

The concept of patient safety is less developed in physiotherapy than in other areas of health care. Standard physiotherapy care, whether active or passive, is largely viewed as harmless as it is not associated with serious adverse events. Physiotherapists, however, are increasingly involved in the care of in-hospital patients, in particular for early rehabilitation for patients who are critically ill or have undergone complex surgery. The increased risk of serious adverse events in such settings has contributed to an increased awareness of safety in physiotherapy. Most practitioners, however, operate in non-hospital settings, where the idea that physiotherapy causes little or no harm is more deeply entrenched and does little to foster a culture of risk awareness or encourage practitioners to report or record errors. Error reporting and recording are two basic pillars of patient safety and should be extended to all health care areas. Heightened awareness and the creation of systems that encourage reporting will gradually lead to the creation of a culture of safety in physiotherapy.

Keywords: physiotherapy, patient safety, adverse events, rehabilitation, errors, risk of harm

1. Introduction

Patient safety is a fundamental principle of health care derived from the Latin dictum *primum non nocere* (First do no harm) [1]. Despite common belief, this phrase was not part of the original Hippocratic Oath; it is deeply embedded in the medical profession [2, 3] and one of the pillars of the bioethical principle of nonmaleficence. Nonmaleficence, which was included in the Hippocratic Oath, is an umbrella principle under which medicine is practiced and should be applicable to all health care professions [4].

The axiom "do no harm" lies at the center of patient safety, which is defined by the World Health Organization (WHO) as "a framework of organized activities that creates cultures, processes, procedures, behaviors, technologies, and environments in health care." [5] According to Rocco and Garrido [6], this framework represents a

"conscious attempt to avoid injury to the patient caused by care [...] and is the precondition for the performance of any clinical activity."

Safety is a primary concern in any activity involving risk. Safety systems originated in the aviation and nuclear industries and were introduced into medicine in the late 1950s by anesthesia practitioners facing costly insurance plans to cover liability for damages relating to anesthesia-related complications and deaths, which were frequent at the time [7]. The push for patient safety in mainstream medicine, however, began with the publication of the 2000 landmark report "To Err is Human: Building a safer health system," which brought attention to the high rates of medical errors in the US health care [8]. This report led to studies in other countries, which revealed similar findings, prompting the creation of the WHO World Alliance for Patient Safety in 2004 and the first concerted efforts to create mechanisms and systems aimed at reducing errors and improving safety.

Unsafe care remains one of the top ten causes of death and disability worldwide, with recent data suggesting that unsafe hospital-based care causes 134 million adverse events (AEs) each year and contributes to 2.6 million annual deaths in low- and middle-income countries [9]. Berner and Graber [10], in their study of overconfidence as a cause of diagnostic error in medicine, reported that 35% of physicians surveyed stated that they or a family member had experienced a medical error in the past five years. An estimated 10–15% of health care expenditure has been directly linked to patient harm [11], which on a global scale is the equivalent of US$ 1 trillion to 2 trillion every year [9]. Similar findings have been reported in Spain [12, 13], as well as in many countries.

Early reports on safety risks in health care focused on adverse effects (AEs) results of the individual work of doctors, but they also brought to light an increasingly complex, interacting, and health care system in which AEs were caused by both doctors and other members of the health care team. The reports, however, also identified opportunities for teams to proactively work together to protect patients from preventable adverse outcomes.

As nurses work in tandem with doctors across all areas of care delivery, patient safety has steadily become an integral part of their practice. This is not the case, however, with physiotherapy. One of the reasons why patient safety is still in its early stages is the scarcity of data and resulting lack of awareness about error and safety. Combined, this impedes a culture where physiotherapists are inclined to disclose or report incidents, a practice that in medical practice has allowed their analysis and led to the implementation of preventive patient safety strategies and actions [14–17].

The objective of this chapter is to show that physiotherapy has not been integrated into the patient safety culture that is integrated into the daily activity of other branches of health sciences. The scarcity of information in the literature or the field of professional societies does not mean that physiotherapy does not have adverse effects. Lack of evidence does not mean absence, and absence does not mean evidence. The data search comes from the interest, and the interest comes from awareness of the problem. Our goal is to arouse interest in the possibility of adverse effects in physiotherapy and its study and to provide the concepts of patient safety that are applied in other professions.

2. Methods

Review chapter. Pubmed and PEDro databases were searched through June–July 2022 to identify relevant articles related to patient safety in physiotherapy field.

KEYWORDS
"physiotherapy" or "rehabilitation" AND "patient safety"
"physiotherapy" AND "malpractice"
"physiotherapy" AND "patient safety" AND "treatment effects" OR "secondary effects"
"physiotherapy" AND "intensive care unit" AND "patient safety"
"physiotherapy" AND "patient safety" OR "effects" AND "manipulation"

Table 1.
Search strategy.

All databases were searched by using the following keywords: patient safety and physiotherapy or rehabilitation combined with keywords related to physiotherapy and patient safety, such as treatment effects, malpractice, secondary effects, consequences, manipulation, and intensive care unit. The search strategy is presented in **Table 1**.

To obtain relevant articles, the search results were screened, using the following inclusion criteria: (1) the study is published after January 2007, (2) articles are published in English, Portuguese, or Spanish, and (3) the physiotherapy intervention is described in papers, where treatment is implemented. Screening for eligibility was

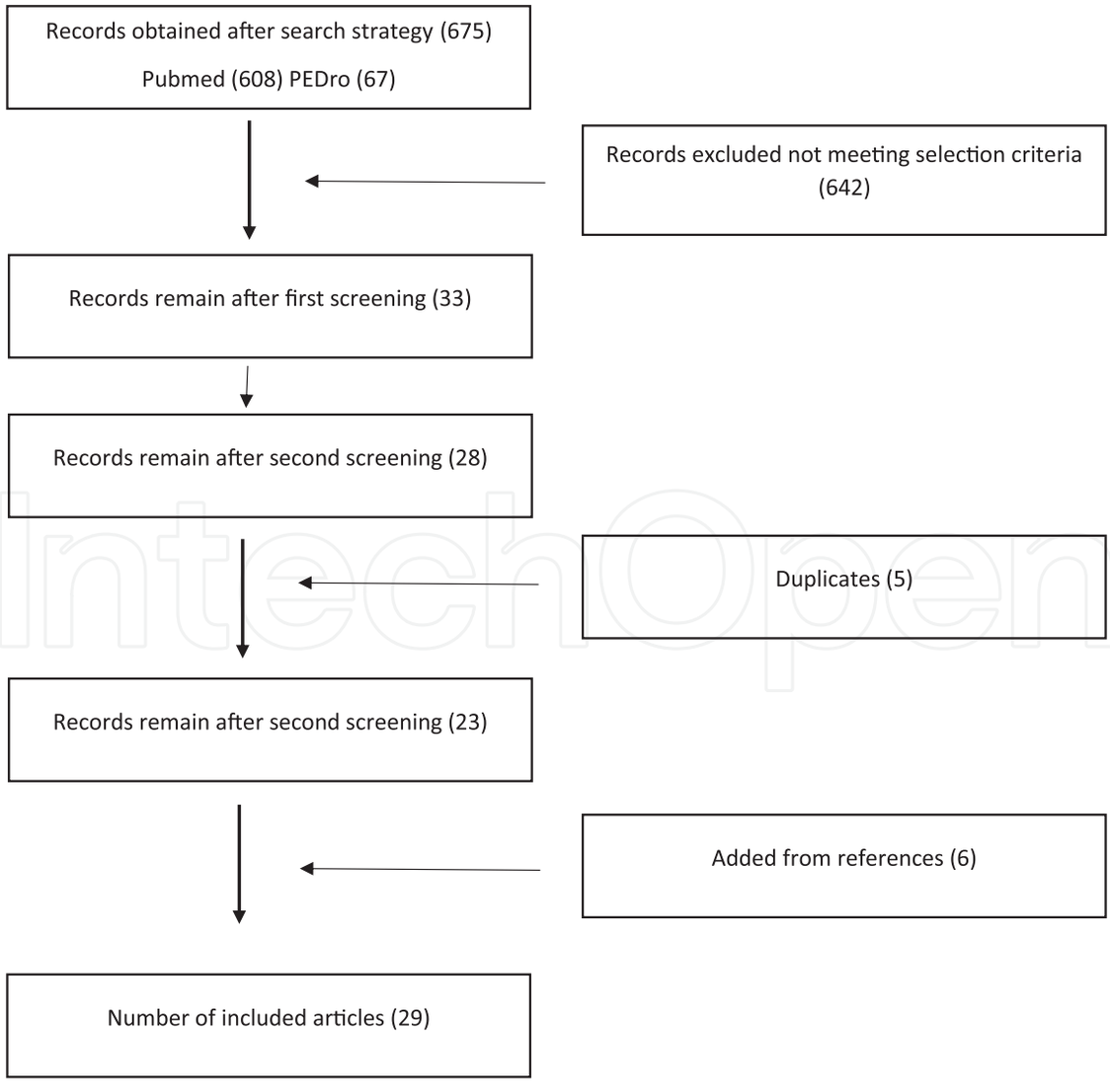

Figure 1.
Flow Chart of study selection.

first performed on title and abstract. Then, full-text versions were obtained. In the second phase, the full-text version was screened. Books and other documents were excluded. The reference lists of reviewed articles were also searched for relevant citations. Relevant literature from medical side was also included to complete general concepts in the introduction based on patient safety health care perspective. The final search provided a total of 29 studies (see **Figure 1**: flow chart of the study selection) directly related to physiotherapy. All other sources use in the paper are from other fields and or directly related to patient safety, bioethics, and malpractice as concepts and/or analyzed in a medical or other health professions.

3. Physiotherapy and patient safety

Physiotherapy is a much more recent profession than either medicine or nursing. Although it has gained widespread acceptance and is increasingly understood, greater efforts are needed to increase awareness of its function and role among the general population and other health care professionals [16, 18–20].

The World Confederation of Physical Therapy (WCPT) is the sole international voice for physiotherapists. Through national member organizations, it represents, regulates, and coordinates both profession and its practitioners, and its mission is to promote high standards of practice, education, and research [21–23]. The WCPT defines physiotherapy as services provided "to develop, maintain and restore maximum movement and functional ability throughout the lifespan", including "services in circumstances, where movement and function are threatened by aging, injury, pain, diseases, disorders, conditions, and/or environmental factors and with the understanding that functional movement is central to what it means to be healthy." [21].

The process of physiotherapy care involves the following stages: examination, evaluation, diagnosis and prognosis, intervention or treatment, re-examination, and discharge. Interventions and treatments include therapeutic exercise; functional training in self-care and home management; functional training in work, community and leisure; manual therapy (including mobilization and manipulation); prescription, application, and, as appropriate, fabrication of devices and equipment (assistive, adaptive, orthotic, protective, supportive, and prosthetic); airway clearance; integumentary repair and protection; electrotherapeutic modalities; physical agents and mechanical modalities; patient-related instruction; and coordination, communication, and documentation [21]. Services also include specialized interventions, such as intravaginal exercises for incontinence and dry needling.

Physiotherapists are autonomous practitioners who manage and treat chronic, subacute, and acute conditions. Direct access to physiotherapy (the ability to consult a regulated physiotherapist without the need for referral) is now an option in some (Australia, The Netherlands, or Canada) countries [20, 24–26]. Enormous advances have been made in professional autonomy and evidence-based practice in physiotherapy [4, 21, 27]. Nonetheless, while evidence-based practice is now widely recognized in this field, awareness of a number of basic bioethical principles that have been fully integrated into other professions, such as medicine or nursing is still lacking in physiotherapy [14, 16, 19, 28, 29].

The practice of physiotherapy involves the application of active and passive techniques, as described above. These techniques are generally viewed as harmless, as they do not result in serious AEs [22]. The perception, however, that standard physiotherapy care causes minimal or no harm favors a culture where errors are not recognized,

reported, registered, or analyzed for corrective or preventive action. Physiotherapists are increasingly involved in the care of in-hospital patients, particularly intensive care patients and those requiring early rehabilitation after complex surgery [30–32]. Because work of this nature can significantly interfere with the outcomes of physiotherapeutic treatments and result in serious AEs, general awareness of patient safety is increasing in these settings [14, 17]. Like in other health care professions, errors can also occur during the application of increasingly sophisticated technologies. That said the vast majority of physiotherapists work in non-hospital settings and private practices [33]. Private practice work could be a barrier to the development of effective data collection processes and creates a reliance on internal control systems for reporting and recording incidents and notifying the pertinent authorities.

AE reporting, recording, and analysis are the pillars of patient safety systems [9] and must be implemented across all areas of health care, both in and outside hospitals and in the public and private sectors [7].

4. Critical concepts: the link between malpractice and patient safety

Data are essential for guiding the implementation of patient safety systems but are very scarce in the field of physiotherapy [17]. Information on errors and AEs in the health sciences comes from critical incident reports, complaints, malpractice or fraudulence claims, preventable death reports, and audits. While these reports contain indirect indicators of safety failures, [9, 17] they show just the tip of the iceberg. In addition, they focus on outcomes rather than processes.

A clear understanding of what constitutes an error and an AE is necessary for effective reporting and recording, and in the framework of patient safety, it is particularly important to distinguish between malpractice and error. The literature contains reports of malpractice in physiotherapy [34]. Malpractice is wrongful conduct by a health care professional that causes injury to a patient. It always involves negligence and legal responsibility [35]. Most AEs, however, are unintended and caused by human error or latent system errors missed by humans [36–38].

According to Reason's theory of human error, safety is a complex and multilayered system [39]. The basic premise is that humans are fallible and as a result, errors will occur, despite attempts to prevent them. This is why it is imperative to implement effective detection, prevention, and mitigation systems [40].

The predominant focus on assigning individual blame for AEs impeded advances in patient safety for many years, as the tendency was to cover up errors out of fear of personal consequences. In the present culture of patient safety, it is recognized that errors will occur because humans are fallible; biological systems are inherently complex (systemic alterations, for example, can occur during respiratory physiotherapy of patients with neurological disorders), and organizational and working systems have functional weak points (latent errors). The goal of patient safety is to identify weaknesses in each of the above dimensions and evaluate and decide which measures should be implemented to safeguard against what are mostly preventable errors [9, 17, 40]. As WHO has stated in several of its documents, most AEs are preventable [1, 5, 8].

In professions, such as physiotherapy, where patient safety is still in its infancy and error perception and recognition are lacking, error analyses tend to focus on individual blame rather than on the components of the process leading up to the error. These analyses thus tend to be based on a deficient understanding of the care process and an

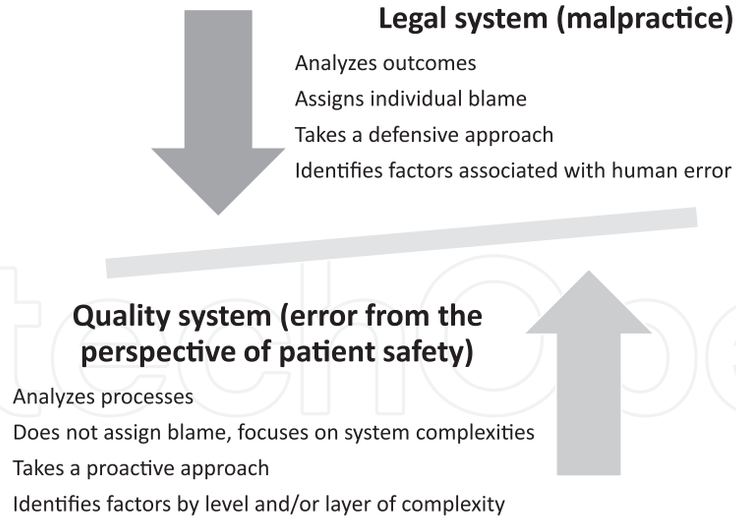

Figure 2.
Scales comparing the legal and quality systems.

excessive focus on "intentionality" (active errors). The focal point is, therefore, one malpractice, which is a criminal act that is directly or indirectly punishable [41].

Without a climate of trust in which errors are viewed as an opportunity for learning and improvement rather than a cause for blame, it is difficult to create a safety culture [9, 40]. Patient safety is not about malpractice, it is about human factors and systems, which both have their limitations. It is about detecting problems that could have been prevented and implementing the necessary steps to ensure that they do not recur [38, 42]. It is about being proactive rather than defensive, which is the typical approach in malpractice cases [43].

As stated by Di Luca et al. [36] "The healthcare disciplines of patient safety and risk management are deeply interrelated and interdependent. Patient safety alone is blind to consequences beyond outcome, and risk management alone can manage and mitigate but not prevent errors" [36]. Actions were taken to reduce the risk of malpractice, and its legislative consequences have not resulted in improved patient safety indicators [35, 38]. It is thus important to understand the differences between the two concepts. It would, however, also be interesting to analyze their interconnections, as they probably have overlapping or complementary features (**Figure 2**) [36, 37]. When faced with a malpractice claim, it is essential to conduct a root-cause analysis of what occurred from the perspective of patient safety to gain an overall picture that captures the complementary aspects of both the legal and the quality system.

Investigations into patient safety and AEs serve to minimize risks and errors in care processes and/or related administrative processes. Scheirton et al. [44] identified six types of errors and AEs in the field of occupational and physical therapy practice:

- Faulty material that results in a patient falling and is not reported
- False reporting of data and cover-up of a colleague
- Substandard care and fraud whereby a practitioner records treating a patient seen by another practitioner due to staff shortages

- Poor communication during patient handover
- Forgetting about and neglecting the needs of a patient
- Ill-treatment of a patient and cover-up of the practitioner responsible for this treatment

Other authors in the field have analyzed AEs, risk factors, and effects associated with different types of physiotherapy techniques, modalities, and situations, such as dry needling [45], manual therapy [46–51], hospital falls, and early mobilization in orthopedic [30, 32, 52] and/or intensive care patients [31].

Data collection is also useful for determining procedures and techniques, in addition to being beneficial, which are effective and safe to implement, such as mobilization and rehabilitation in intensive care units [53], active mobilization in patients requiring continuous renal replacement therapy [54], cancer rehabilitation [55], lower limb plyometric training in older adults [56], and cervical traction and exercise in patients with neck pain (clinical prediction rule to identify, which patients are most likely to benefit) [57].

Most studies of AEs in physiotherapy have focused on the intervention stage of the care process, but many techniques used for treatment are also used for diagnostic purposes (e.g., neurodynamic tests) [58, 59]. Accordingly, data collected on interventions could be extrapolated to other stages of the care pathway (e.g., evaluation). Errors that occur in later stages of the process are linked to errors or decisions made earlier on. A poor evaluation thus can lead to misdiagnosis (**Table 2**). If efficient reporting and recording systems are to be created, physiotherapists must be involved in the development of quality systems [17, 60] and have a clear understanding of the data generated.

Examination	Inappropriate facilities Insufficient time Lack of information on previous procedures (e.g., surgical approach used)
Evaluation	Inappropriate facilities Incorrect manipulation Insufficient or excessive tissue stretching Inappropriate use of material or equipment Lack of patient information due to lack of expertize (e.g., not asking for comorbidities focusing on current situation)
Diagnosis prognosis	Incorrect diagnosis
Intervention – treatment	Inappropriate facilities Incorrect manipulation Insufficient or excessive tissue stretching Inappropriate use of material or equipment
Re-Examination	Insufficient or excessive tissue stretching Inappropriate use of material or equipment
Discharge	Any error from the previous stages resulting in poor re-evaluation, inadequate treatment, or early termination of treatment

Table 2.
Errors that can occur during the different stages of physiotherapy care process.

5. Potential errors: from minor to major consequences

Most in-hospital care have a strong safety culture in which the different components and layers of patient safety are strongly embedded in both medical and nursing practice [61], probably because working in these settings carries more risks as it involves more invasive and complex techniques and procedures. In physiotherapy, by contrast, AEs are generally classified as minor (no-harm) events or near misses (incidents that do not cause harm to the patient) [42]. Examples are interference with equipment or devices during mobilization of a critically ill patient, a mild burn sustained during heat therapy, or a near fall when transferring a patient from one chair to another. Interprofessional and multiprofessional collaboration is also at a more nascent stage in physiotherapy than in medicine, where the doctor/nurse tandem is well established [61].

Although no-harm and near-miss events may be anywhere between 7 and 100 times more common than AEs, systems for reporting them are much less common [62]. These less-impactful events represent latent system risks that must be reported to prevent serious consequences in the future [63]. High incidence rates have been reported for these events in physiotherapy, but the fact that they cause few consequences has probably contributed to general perception of physiotherapy care being harmless [50].

Invasive procedures, such as dry needling, however, are becoming more common in physiotherapy and certain rehabilitation treatments with the potential to cause serious AEs (e.g., early rehabilitation of orthopedic surgery patients, respiratory and neuromuscular physiotherapy in intensive care patients, and manual treatment of spinal cord injuries) are already in wide use [32, 51]. Incorrect mobilization after prosthetic orthopedic surgery can undo the results of surgery [52], while detailed knowledge and extreme care are needed when delivering treatment to a critically ill patient whose life depends on certain machines or devices (e.g., respirators, intravascular catheters, or hemodialysis machines) [32, 53]. Patients in intensive care units or orthopedic departments after surgery require specialized and highly protocolized care. In such environments, the therapeutic development of physiotherapy will be safe as long as the patient safety culture is well established. Recommendations in those fields need to be more extensively practiced and researched to deepen the discussion.

To manage the risks associated with a given treatment, one must not only be aware that they exist but also understand their severity (see example in **Figure 3**) and potential impact. Such an awareness will favor the reporting of incidents by both physiotherapists and other agents [64].

Analyses of risk prevention should also incentivize reporting [9]. Research in physiotherapy has been increasing in recent decades. This means that more and more information is available on the effectiveness of the applied treatments. Information is also available on their risks. Creating this scientific awareness should, little by little, help to also build an awareness of patient safety, which inevitably includes proper reporting. The notification of incidents and adverse effects has been essential to implement prevention strategies in medicine or nursing. Without knowing what is really happening and the associated factors, it is not possible to apply effective measures. The SdP culture, which is not based on searching for the guilty professional but on the human factor and the organization of the system, has encouraged the communication of incidents and adverse effects, therefore their analysis and prevention. In physical therapy, the same process of encouraging communication should be applied. AEs associated with physiotherapy is sometimes reported by other health care professionals, such as emergency department doctors. The problem in such cases

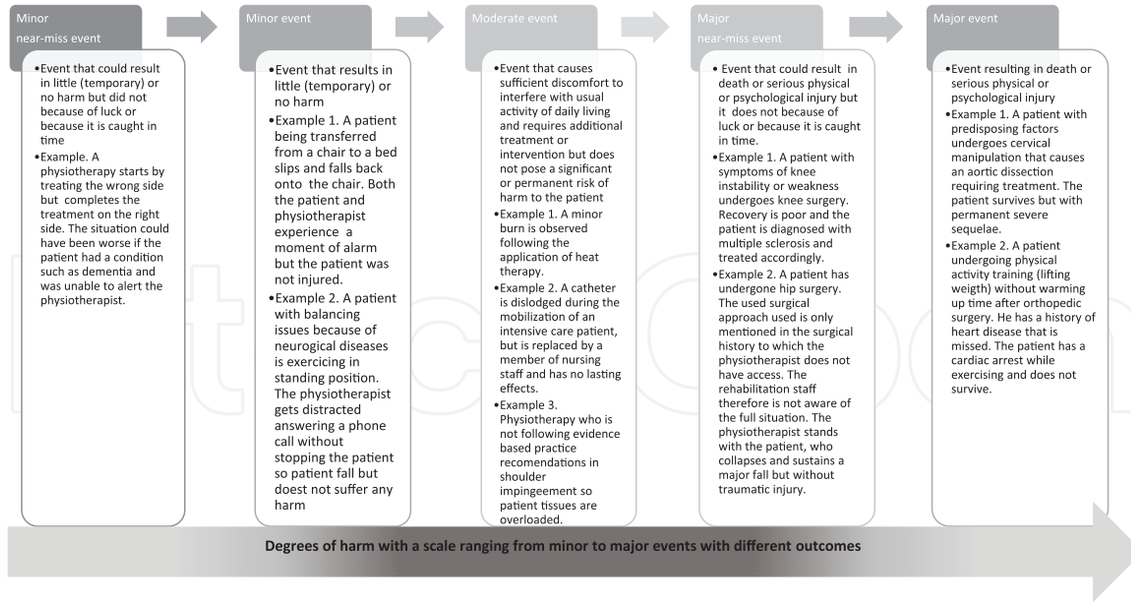

Figure 3.
Continuum of error occurrence with examples from the physiotherapy field. Adapted from Ginsburg et al. [64].

is that reports will probably be incomplete as the attending doctor may not be aware of the patient's history (i.e., the link with physiotherapy) and will not conduct a full root-cause analysis [50].

There is a direct link between the trivialization of possible adverse treatment outcomes and underreporting of errors. Viewing a physiotherapy intervention with inherent risks (however slight) as safe jeopardizes professional autonomy and self-affirmation and impedes acknowledgment of the importance of physiotherapy among other health care professionals and the creation of a culture of safety. It is a vicious circle that needs to be broken if the concept of patient safety is to be integrated into routine physiotherapy practice. Physiotherapy associations and experts in patient safety from other disciplines must strive to foster a culture of patient safety in physiotherapy and lay the bases for the creation of effective systems for reporting incidents, AEs, and near misses. Concerted efforts in this regard should also help reduce the wide variability observed to date [65]. Due to the paucity of evidence on patient safety and physiotherapy and the not well spread consciousness of the situation among the professionals, it is difficult to state which populations receiving physiotherapy are more at risk for medical errors and adverse events in this field.

6. Key directions for the future of patient safety in physiotherapy

Education and training are keys to fostering a culture of safety in physiotherapy [9, 44]. Proper training will ensure correct assessment and inform decisions on when a given treatment is warranted or not. Unfamiliarity with a technique or its potential outcomes could result in injury and should constitute a reason for withholding treatment. Patient safety needs to be incorporated into standard physiotherapy education and training programs, as university graduates receive little or no training in this area. As stated by Boohoo et al. [66] "Many professionals that are performing teaching functions in the health area carry with themselves rich practice baggage from the work environment, with technical knowledge coming from Master and Ph.D. courses,

What you should do in the event of an incident/AE resulting from your or a colleague's conduct	What you should not do in the event of an incident/AE resulting from your or a colleague's conduct
• Eliminate as far as possible all immediate dangers to make the situation safe for patients and personnel. • Close off any areas that pose risk. • Alert the necessary authorities (e.g., emergency services). • Arrange for immediate medical assistance. • Report all incidents/AE immediately to minimize the risk of recurrence (inform your manager or another senior person as soon as possible). • Record what happened in the clinical registered history and log the event in the accident/ incident book with a senior member of staff. • Learn from the incident – what was its roo- cause? Could it be prevented from recurring with a different/improved approach? Managers should conduct a new risk assessment and make any necessary amendments to risk management measures to minimize the likelihood of recurrence.	• Ignore any concerns you may have. • Engage in or condone poor or illegal practice. • Continue with the same risk. Assessment of existing control measures in place failed. • Fail to put patient health first. • Fail to report or record the event. • Assume someone else will take responsibility. • Fail to follow the procedure in place if it is possible and safe to do so. • Cover up the event or destroy records or evidence. • Engage in an activity that is not permitted by current regulations.
What you should do in the event of an error made by you or a colleague	What you should not do in the event of an error made by you or a colleague
• Report it to your group leader and file a written record. • Assess with your manager whether preventive measures in place were clear enough to have prevented the error re-assess or re-word as necessary. • Learn from the error.	• Ignore it. • Fail to assess current risk. Assessment/ management plan. • Continue to work in the same way without analyzing what caused the error. • Cover up the error or hide or destroy evidence.

Table 3.
Actions following observation of incidents or adverse effects (AE)s in physiotherapy.

and participation in congresses and scientific events. But this does not mean that they are trained for a systematic approach to error sources and events that may happen in the health care system or that they are concerned with the reporting of events to promote quality improvement processes in the environment where they perform their activities…."

Clinical simulation training is a widely accepted teaching methodology in the health sciences and is recognized by the WHO as a basic and necessary tool. The simulation of real-life clinical scenarios allows participants to practice aspects of their profession, engage in joint discussions and reflections, and transfer lessons learned to the real world. It is based on experiential learning and has been linked to favorable PS outcomes and effective team communication [5, 67].

Systems and strategies for reporting incidents and near-miss events, which account for most errors detected in physiotherapy, are also crucial if progress is to continue. The future of PS in physiotherapy also depends on our ability to transfer awareness and knowledge beyond the hospital setting. Appropriate and inappropriate actions in the event of an incident or near-miss event are summarized in **Table 3**.

7. Conclusions

Thoughtful discussions on the importance of systematic approaches to patient safety are needed in the physiotherapy profession. One key concern should be to gather robust information on the risks associated with physiotherapy practices and explore first-hand experiences through for example, professional societies. Early training in patient safety, particularly in university courses, is also crucial.

Hospital patient safety and quality improvement programs and actions must include physiotherapy and foster awareness of the importance of safety among both physiotherapists and other health care professionals.

It is also necessary to instill a strong patient safety culture outside hospital settings, which is where most physiotherapists practice. Training actions should strive to better visualize near-miss events and facilitate their recognition and systematic reporting to produce data that can be used to develop reliable indicators, foster the growth of patient safety in physiotherapy and heighten awareness of this profession among practitioners from other fields.

The continued idea that standard physiotherapy interventions cause little or no harm is a serious impediment to the detection, reporting, and recording of inherent risks. The key lies in the collection of robust data as only this can drive true change. Finally, professional societies need to foster a culture of patient safety among their members and lay the bases for effective reporting systems and widespread dissemination of near-miss and AE.

Conflict of interest

The authors declare that they have no conflicts of interest. Authors have no financial support to be declared and ethical declarations are not applicable.

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Author details

Griselda Gonzalez-Caminal*, Aida Camps Gomez and Carmen Gomar-Sancho
University of Vic-University of Central Catalonia, Manresa, Spain

*Address all correspondence to: ggonzalez@umanresa.cat

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