

Correlation between injury prevention and safety culture in athletes attending physiotherapy

Correlación entre prevención de lesiones y cultura de seguridad en deportistas que acuden a fisioterapia

Lesly Julianna Santos Zapata^{1*} <https://orcid.org/0009-0009-9540-3067>

¹ Universidad Nacional Mayor de San Marcos. Faculty of Medicine. Lima. Peru

*Corresponding author. Email: lesly.santos@unmsm.edu.pe

ABSTRACT

Background: knowledge about injury prevention is important for health and optimal well-being. Awareness of risks leads to a reduction in accidents or musculoskeletal physical injuries, making it necessary to promote a permanent safety culture.

Objective: to establish the correlation between knowledge about injury prevention and safety culture in athletes attending a physiotherapy center, Lima 2024.

Methods: a descriptive, observational, cross-sectional study was conducted at a physical therapy and rehabilitation center in Lima during the period January–April 2025. Theoretical methods were used: historical-logical, analysis-synthesis, and induction-deduction for the theoretical foundation of the research; empirical method: questionnaire; and mathematical-statistical methods: for data analysis and presentation in tables and figures.

Results: males predominated; in the dimensions assessed in injury prevention, the highest percentage was observed in knowledge about Implicit Nutritional Factors, followed by Human Body Movement; the lowest percentage was in Self-knowledge of the body concept. Regarding equivalence, the majority (40%) exhibited a Medium level of knowledge and a Regular safety culture, 24% showed High knowledge and Acceptable safety culture; while 21% presented a Low level of knowledge and Regular safety culture.

Conclusions: a significant correlation was established between knowledge about injury prevention and safety culture in athletes; the majority presented a medium or low level of knowledge, linked to a regular or acceptable safety culture.

MeSH: rehabilitation; rehabilitation services; movement; range of motion, articular; athletic injuries; education, medical

RESUMEN

Fundamento: el conocimiento sobre prevención de lesiones es importante para la salud y su óptimo bienestar. Tener conciencia de los riesgos genera una reducción de los accidentes o lesiones físicas músculo-esqueléticas, por lo que es necesario fomentar una cultura de seguridad permanente.

Objetivo: establecer la correlación entre el conocimiento sobre prevención de lesiones y la cultura de seguridad en deportistas que acuden al centro de fisioterapia, Lima 2024.

Métodos: estudio descriptivo observacional de corte transversal en un centro de terapia física y rehabilitación en Lima, período enero-abril 2025. Se utilizaron métodos teóricos: histórico-lógico, análisis-síntesis e inducción-deducción para la fundamentación teórica de la investigación; empírico: cuestionario; y matemático-estadísticos: para el análisis de los datos y su presentación en tablas y figuras.

Resultados: predominó en sexo masculino; en las dimensiones valoradas en la prevención de lesiones se observó el mayor porcentaje en el conocimiento sobre Factores nutricionales implícitos, seguido de Movimiento corporal humano; el menor porcentaje estuvo en Autoconocimiento del concepto de cuerpo. Respecto a la equivalencia, la mayoría (40 %) exhibieron nivel de conocimiento Medio y cultura de seguridad Regular, el 24 % mostró conocimiento Alto y cultura de seguridad Aceptable; mientras el 21 % presentó un nivel de conocimiento Bajo y cultura de seguridad Regular.

Conclusiones: se estableció una correlación significativa entre el conocimiento sobre prevención de lesiones y la cultura de seguridad en los deportistas; la mayoría presentó un nivel de conocimiento medio o bajo, en vínculo con una cultura de seguridad regular o aceptable.

DeCS: rehabilitación; servicios de rehabilitación; movimiento; rango del movimiento articular; traumatismos en atletas; educación médica

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INTRODUCTION

Currently, sports have acquired growing relevance in Peruvian society and are in constant development and expansion. This boom represents a positive indicator as it is closely related to the promotion of physical and mental health. Most notably, physical activity is presented in an inclusive manner, aimed at the entire population without distinction of age, gender, or condition.

As defined by the World Health Organization (WHO),⁽¹⁾ physical activity indicates any bodily movement produced by skeletal muscles; it is considered any movement to move to and from certain places, or as part of a person's work; consequently, it involves energy expenditure.

It is known that moderate or intense physical activity improves health. According to the Pan American Health Organization (PAHO),⁽²⁾ its insufficiency has been identified as one of the main factors for global mortality; a situation that has been increasing in many countries.

Carrera⁽³⁾ warns that physical activity should be done from moderate to intense according to the International Physical Activity Questionnaire (IPAQ). Some training plans sometimes do not respond to the type of sport or do not correspond to the needs of individual performance, which can lead to future injuries.

Nuñez Samaniego⁽⁴⁾ confirms the need to focus efforts on patient safety, with the aim of preventing injuries derived from inadequate care. The quality of care, which is becoming increasingly relevant in healthcare practice, seeks to reduce the probability of errors, whether systemic or human, in order to mitigate them and improve health outcomes and quality of life. This author⁽⁴⁾ calls on professionals in charge of physical activity:

"It is also important to know the level of knowledge that exists on these topics from a preventive perspective, not only among the general population or athletes, but also among professionals who have the role of providing support as experts. In this way, everyone can be more aware of the risks and necessary adaptations. Although we start from the concept that sport and physical activity are for everyone, it is essential to consider the impact and the appropriate level of activity for each person, which can be evaluated, for example, through the IPAQ questionnaire."

Desiderio *et al.*⁽⁵⁾ focus their analysis on sport as a more organized type of physical activity, in some cases competitive and high-performance, which greatly influences physical, psychological, and spiritual condition. They state: "People who practice sports report less anxiety, are more independent and extroverted compared to those who do not."

According to Law No. 26842,⁽⁶⁾ every person has the right to receive emergency medical-surgical care in any healthcare facility when needed, and as long as the state of serious risk to their life or health persists; while Law 28036⁽⁷⁾ promotes the development of sports to enhance athletic talent and ensure the integration of people with disabilities into the national sports system.

Injury prevention is a complex process that requires prior knowledge about exercise practice, as well as self-knowledge of one's own body schema. It involves various factors:

proper use of attire, a balanced diet that favors performance and prevents musculoskeletal risks, and of course, the knowledge and guidance of the professional in charge. Therefore, timely intervention and an adequate safety culture can significantly contribute to avoiding this problem.

In this context, the objective of this research was to establish the correlation between knowledge about injury prevention and safety culture in athletes attending a physiotherapy center, Lima 2024.

METHODS

A descriptive, observational, cross-sectional study was conducted at a physical therapy and rehabilitation center, during the period January–April 2025. The study population consisted of athlete patients attending the center (n=101); all met the inclusion criteria and accepted the informed consent to participate in the study.

Ethical considerations corresponding to the type of research were taken into account, as established in the Declaration of Helsinki, amended by the 52nd General Assembly in Edinburgh, Scotland, in October 2000. Participants were explained the importance of the study, as well as the confidential nature of the information provided.

Regarding methodology, theoretical methods were used: historical-logical, analysis-synthesis, and induction-deduction. These allowed supporting the research, analyzing relevant bibliographic background, and understanding the evolution of the treatment of the subject in the reviewed literature. Likewise, they allowed structuring the logical foundations of the theoretical framework, with the aim of approaching the behavior of the problem and determining its current state based on the analysis of the consulted sources.

Empirical methods:

- Questionnaire on knowledge about injury prevention, to evaluate aspects of human body movement, phases of physical exercise (range of motion and muscle performance) and adequate postural hygiene in sports practice.
- Questionnaire on patient safety culture to analyze competencies and patterns of individual and group behavior that determine commitment and capacity for patient management and safety. It was assessed through the categories Acceptable, Regular, and Not acceptable.

Mathematical-statistical: the SPSS statistical program was used to analyze the data found and present it in tables and figures.

RESULTS AND DISCUSSION

Of the total number of athletes surveyed, the highest percentage is male (57 %) and the lowest percentage is female (43 %), as shown in Figure 1.

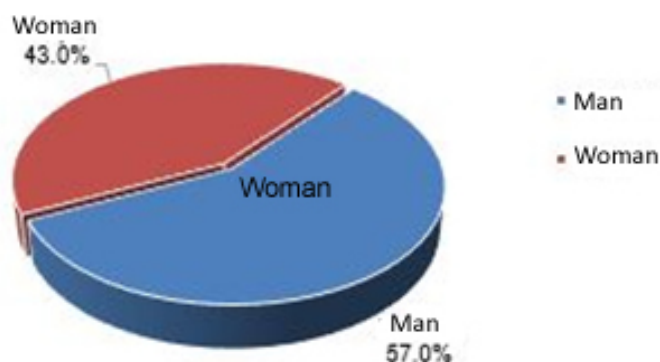


Fig. 1. Percentage distribution of athletes by sex. Physical therapy and rehabilitation center.

JR Fisioterapeutas. Lima. January–April 2025

Source: questionnaire.

Regarding knowledge related to injury prevention, the highest percentage of athletes presented medium knowledge (41 %), followed by low level (35 %), and the lowest percentage was at the high level (24 %), as illustrated in Figure 2.

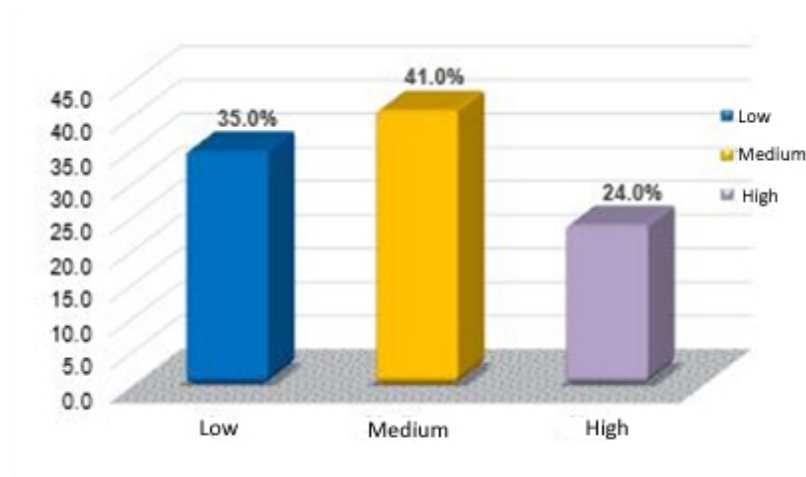


Fig. 2. Percentage distribution according to knowledge about injury prevention. Physical therapy and rehabilitation center. JR Fisioterapeutas. Lima. January-April 2025

Source: questionnaire.

In Table 1, according to knowledge about injury prevention in athletes, it is observed that the majority had a medium level of knowledge in Implicit Nutritional Factors (73 %), followed by Human Body Movement (69 %), Phases of Physical Exercise (55 %), Sports Attire (47 %), Sports Footwear (43 %), and Self-Knowledge of the Body Concept (41 %); while the highest percentage of knowledge about Postural Hygiene in Sports Practice was at a low level (37 %).

Table 1. Dimension of knowledge about injury prevention. Physical therapy and rehabilitation center. JR Fisioterapeutas. Lima. January-April 2025

Dimension	Low		Medium		High		Total	
	n ₁	%	n ₂	%	n ₃	%	n	%
Human body movement	13	13.0	69	69.0	18	18.0	100	100
Phases of physical exercise	29	29.0	55	55.0	16	16.0	100	100
Postural hygiene in sports practice	37	37.0	36	36.0	27	27.0	100	100
Factores nutricionales implícitos	10	10.0	73	73.0	17	17.0	100	100
Sports attire	32	32.0	47	47.0	21	21.0	100	100
Sports footwear	29	29.0	43	43.0	28	28.0	100	100
Self-knowledge of the body concept	35	35.0	41	41.0	24	24.0	100	100

Source: questionnaire.

Regarding the questionnaire on safety culture, it is observed that of the total respondents, the highest percentage obtained a Regular category (61 %), followed by Acceptable (29 %) and a lower percentage of Not Acceptable (10 %), as shown in Figure 3.

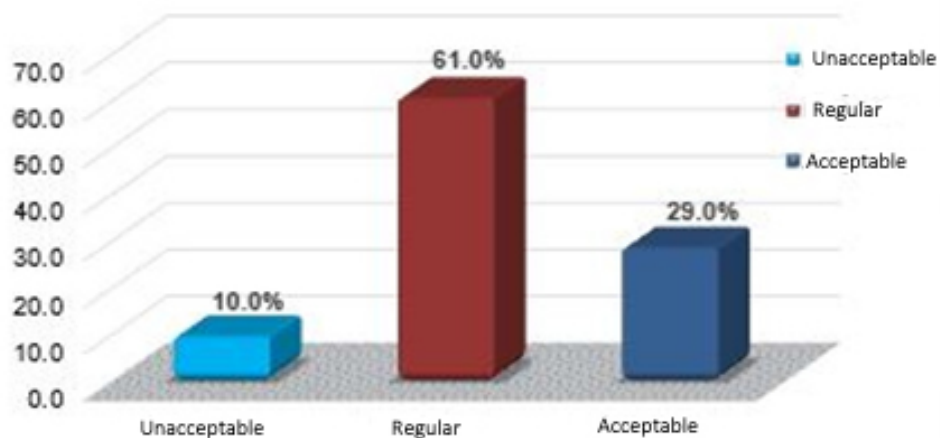


Fig. 3. Percentage distribution of safety culture in athletes. Physical therapy and rehabilitation center. JR Fisioterapeutas. Lima. January-April 2025

Fuente: questionnaire.

The analysis of Table 2 on knowledge about injury prevention and safety culture in athletes highlights that the highest percentage of respondents (40%) had a Medium knowledge level and Regular safety culture, followed by 24% with a High knowledge level and Acceptable safety culture. Likewise, 21% presented a Low knowledge level and Regular safety culture.

Table 2. Knowledge about injury prevention and safety culture in athletes. Physical therapy and rehabilitation center. JR Fisioterapeutas. Lima. January-April 2025

Knowledge about injury prevention	Safety culture							
	Unacceptable		Regular		Acceptable		Total	
	n ₁	%	n ₂	%	n ₃	%	n	%
Low	10	10.0	21	21.0	4	4.0	35	35.0
Medium	0	0.0	40	40.0	1	1.0	41	41.0
High	0	0.0	0	0.0	24	24.0	24	24.0
Total	10	10.0	61.	61.0	29	29.0	100	100

Source: questionnaire.

Normality Test:

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follows a normal distribution.

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H•: The distribution of the variables knowledge about injury prevention and safety culture differs from a normal distribution.

Decision rule:

If p-value > 0.05, the Null Hypothesis (H₀) is accepted.

If p-value < 0.05, the Null Hypothesis (H₀) is rejected, and H₁ is accepted.

The normality test of the variables shows a p -value = 0.000 < 0.05 and p -value = 0.000 < 0.05 (Kolmogorov-Smirnov, $n > 50$); in all cases, the p -value is < 0.05.

Given the evidence presented, H_0 is rejected, and it variables do not come from a normal distribution, which justifies the use of the non-parametric statistic Spearman's Rho (ordinal qualitative variables).

General Hypothesis

Knowledge about injury prevention is significantly related to safety culture in athletes attending the physical therapy center, Lima 2024.

Null Hypothesis

Knowledge about injury prevention is not significantly related to safety culture in athletes attending the physical therapy center, Lima 2024.

Decision rule:

If p -value > 0.05, the Null Hypothesis (H_0) is accepted.

If p -value < 0.05, the Null Hypothesis (H_0) is rejected, and H_1 is accepted.

The Spearman's Rho correlation coefficient result of 0.697 indicates that there is a positive correlation between the variables. Furthermore, it falls within the high correlation level. Given the bilateral significance level of $p = 0.000 < 0.05$ (highly significant), the Null Hypothesis is rejected, and the General Hypothesis is accepted; concluding: knowledge about injury prevention is significantly related to safety culture in athletes attending the aforementioned physical therapy center.

Based on the findings and analysis of the results, it is maintained that there is a highly significant correlation between the variables knowledge of injury prevention and safety

culture. The questionnaire on knowledge of injury prevention is divided into 7 dimensions; according to the statistical analysis using Spearman's Rho correlation coefficient:

Dimension 1) Knowledge about human body movement: the Spearman's Rho correlation coefficient result of 0.783 indicates that there is a positive relationship between the variables, and it falls within the high correlation level.

Dimension 2) Knowledge about the phases of physical exercise: range of motion and muscle performance: the Spearman's Rho correlation coefficient result of 0.663 indicates that there is a positive relationship between the variables, and it falls within the high correlation level.

Dimension 3) Knowledge about postural hygiene in sports practice: the Spearman's Rho correlation coefficient result of 0.691 indicates that there is a positive relationship between the variables, and it falls within the high correlation level.

Dimension 4) Knowledge about nutritional factors implicit in sports: the Spearman's Rho correlation coefficient result of 0.571 indicates that there is a positive relationship between the variables, and it falls within the moderate correlation level.

Dimension 5) Knowledge about sportswear: the Spearman's Rho correlation coefficient result of 0.645 indicates that there is a positive relationship between the variables, and it falls within the high correlation level.

Dimension 6) Knowledge about sports footwear: the Spearman's Rho correlation coefficient result of 0.623 indicates that there is a positive relationship between the variables, and it falls within the high correlation level.

Dimension 7) Knowledge about self-awareness of the body concept in sports practice: the Spearman's Rho correlation coefficient result of 0.748 indicates that there is a positive relationship between the variables, and it falls within the high correlation level.

In summary, regarding the general objective, the Spearman's Rho correlation coefficient result of 0.697 indicates that there is a positive correlation between the variables.

Furthermore, it falls within the high correlation level, and the bilateral significance level of $p = 0.000 < 0.05$ is highly significant. This indicates that the highest percentage of surveyed athletes (40 %) have a Medium knowledge level and a Regular safety culture, reinforced by the 24% with a High knowledge level and Acceptable safety culture; while 21 % presented a Low knowledge level and Regular safety culture.

A predominance of the male sex (57 %) is also observed, with a lower percentage being female (43 %). The highest percentage (44 %) are aged between 25 and 30 years, followed by 22 % in the 31 to 40-year range, 14 % aged 50 years or older, 9 % in the 41 to 50-year range; and among the youngest: 6 % in the 18 to 24-year range and 5 % under 18 years.

The level of knowledge about injury prevention is fundamental for health, individual well-being, and for the benefit of society. Understanding how to prevent injuries allows for a significant reduction in the risk of suffering physical or musculoskeletal damage, decreases the need for physical therapy treatments, and improves quality of life. This knowledge is closely linked to a solid safety culture, which promotes an attitude of protection and responsibility, both among professionals and patients themselves.

Fostering a safety culture implies that professionals are concerned not only for themselves but also for their colleagues and patients. This favors greater awareness of risks, safer behavior, and consequently, a reduction in accidents and injuries.

This aligns with Paitan Collazos et al.,⁽⁸⁾ who in their research determined that there is a significant relationship between the variable safety culture and patient biosafety, evidenced by a Spearman's Rho correlation coefficient = .705** and a significance level of $p = .000$. It is concluded that as the patient safety culture is strengthened, adherence to and compliance with biosafety practices among healthcare personnel increase. Continuous training in educational and awareness programs on safety culture topics is very important, because if

healthcare personnel consciously prioritize patient safety, there is a higher probability that they will comply with biosafety measures.

Maestre Cabrales⁽⁹⁾ in their diagnostic study, showed that most coaches knew little about the most common injuries in fencers and the risk factors; they did not manage information on the subject, and only a minority had minimal preparation to avoid them. The educational intervention succeeded in modifying this result. Among their topics, they explained the characteristics of injuries and their predisposing and triggering factors, thus helping to improve preventive work during training sessions.

Larsen⁽¹⁰⁾ found that the most frequent injuries were muscle contractures (30.6 %) and tendinitis (13.2 %); the most prominent risk factors were overweight (20 %), high blood pressure (16.3 %), and thyroid issues (14 %). Regarding the risk factor-injury relationship, in the population that indicated being overweight, the prevalent injuries were tendinitis and muscle contractures.

Acosta Vargas⁽¹¹⁾ in their evaluation study on knowledge in dentistry among contact sport athletes, determined that 51.79% presented a Regular knowledge level; they highlighted the importance of directing attention towards promoting comprehensive health within the sports environment through talks not only medical, but also nutritional, physiotherapeutic, and dental.

Álvarez⁽¹²⁾ studied the level of knowledge of karate coaches regarding fundamentals in the field of physical training, exercise physiology, functional anatomy, sports nutrition, injuries and first aid, and disability in the sports field. Their results were moderate, with a 3.09% accuracy rate. Among the mentioned fields, physical training coincides with the research presented here. It is necessary to raise awareness among coaches so that they also prevent sports injuries and achieve notable performances in their students or accomplished athletes.

Tello García *et al.*⁽¹³⁾ in a sample of nurses, evaluated various criteria regarding patient safety culture; results showed they lacked strengths and opportunities for improvement, expectations, and actions; organizational learning, feedback, and communication about

errors, although they reported strengths in teamwork. Other indicators scored lower: openness in communication, management support, staffing, and non-punitive response to errors. This diagnosis demands the development of strategies to provide safe hospital care.

Dos Santos Bezerril *et al.*⁽¹⁴⁾ regarding dimensions of culture, highlighted as positive: teamwork and follow-up of patient care; as negative responses: work pressure and rate, and team formation; and as neutral responses: patient safety and quality problems, and information exchange with other institutions.

It is estimated that for professionals to demonstrate good potential, they should achieve a minimum percentage of 75 % to be considered a strength. In this study, several weaknesses are perceived that must be addressed to achieve an efficient safety culture in the health service.

Suffler⁽¹⁵⁾ in their reviews on this topic, suggests the existence of a direct relationship between the quality of healthcare personnel training and patient safety, reinforcing the idea that training practices must be rigorous, continuous, and adaptive to new medical realities to ensure a safe environment for both patients and healthcare professionals.

These findings support the objectives of reviewing critical aspects of patient safety, recognizing the main factors influencing it from training, and identifying health quality indicators, charting a clear path for future interventions and policies. It is a substantial concern that impacts not only the physical but also the psychological integrity of healthcare professionals.

Scientific contribution

A diagnosis is provided with scientific evidence based on the application of statistical methods that expresses the correlation between knowledge about injury prevention and safety culture in athletes.

CONCLUSIONS

A significant correlation was established between knowledge about injury prevention and safety culture in athletes attending the physical therapy center in Lima, 2024. The results showed that the majority of participants have a medium or low level of knowledge, linked to a safety culture classified as regular or acceptable.

BIBLIOGRAPHICAL REFERENCES

1. Organización Mundial de la Salud. Actividad física [Internet]. Ginebra: OMS; 2024 [cited 14/01/2026]. Available at: <https://www.who.int/es/news-room/fact-sheets/detail/physical-activity>
2. Organización Panamericana de la Salud. Directrices sobre la actividad física, el comportamiento sedentario y el sueño para menores de 5 años. [Internet]. Washington: OPS; 2019 [cited 14/01/2026]. Available at: <https://iris.paho.org/server/api/core/bitstreams/9932db28-906e-4be4-aa40-94a3faaced1b/content>
3. Carrera Y. Cuestionario Internacional de actividad física (IPAQ). Enfermería del Trabajo [Internet]. 2017 [cited 14/01/2026];7(2):[aprox. 6 p.]. Available at: <https://dialnet.unirioja.es/servlet/articulo?codigo=5920688>
4. Nuñez Samaniego I. Cultura de seguridad del paciente en enfermeras del Hospital regional Docente las Mercedes-Chiclayo, Perú-2028 [Tesis de Licenciatura en Enfermería]. Universidad Católica Santo Toribio de Mogrovejo; 2020. [cited 14/01/2026]. Available at: <https://repositorio.usat.edu.pe/server/api/core/bitstreams/16bdd1ee-4226-4ded-a429-00b34008c048/content>
5. Desiderio WA, Losardo R, Bortolazzo C, Van Tooren JA, Hurtado Hoyo E. Deporte, educación y salud. Rev Asoc Méd Argent [Internet]. 2021 [cited 14/01/2026];134(3):[aprox. 7 p.]. Available at: <https://eliashurtadohoyo.org/wp-content/uploads/2021/09/Deporte-educación-y-saludpdf.pdf>
6. Perú. Plataforma del Estado peruano. Ley General de Salud. Ley No. 26842, 15 de julio de 1997. Available at: https://essalud.gob.pe/transparencia/pdf/informacion/ley_general_salud_26842.pdf
7. Perú. Archivo digital de la legislación del Perú. Ley de promoción y desarrollo del deporte. Ley 28036 /2003, 24 de julio de 2003. Available at:

https://appweb.ipd.gob.pe/observatorio/web/assets/pdf/ley_promocion_%20y_desarrollo_d_el_deporte_ipd.pdf

8. Paitan Collazos A, Santivañez Luis LV, Izquierdo Muñoz ZM. Cultura de seguridad del paciente y bioseguridad en los profesionales de salud del Centro de Salud de Chilca I-4 Huancayo-2023 Perú [Tesis de Licenciatura en Enfermería]. Universidad Continental; 2024 [cited 14/01/2026]. Available at:

<https://repositorio.continental.edu.pe/backend/api/core/bitstreams/394f86b7-5cbe-4d32-9135-5a6f29f093da/content>

9. Maestre Cabrales D. Intervención educativa para la prevención de lesiones deportivas. Rev Cubana Ortop Traumatol [Internet]. 2023 [cited 14/01/2026]; 37(4): [aprox. 9 p.]. Available at: <http://scielo.sld.cu/pdf/ort/v37n4/1561-3100-ort-37-04-e657.pdf>

10. Larsen YM. Factores de riesgo asociados a la aparición de lesiones deportivas en grupos de corredores de la ciudad de Viedma [Tesis de Licenciatura en Kinesiología y Fisiatría]. Universidad Nacional de Río Negro; 2023 [cited 14/01/2026]. Available at:

<http://rid.unrn.edu.ar:8080/bitstream/20.500.12049/10797/1/Larsen%20Yolanda%20Magali-2023.pdf>

11. Acosta Vargas SF. Evaluación del nivel de conocimiento sobre Odontología aplicada al deporte en atletas de deportes de contacto [Tesis de Cirujano dentista]. Universidad Peruana de Ciencias aplicadas; 2022 [cited 14/01/2026]. Available at:

https://repositorioacademico.upc.edu.pe/bitstream/handle/10757/660010/Acosta_VS.pdf?sequence=3&isAllowed=y

12. Álvarez E [tesis] El nivel de conocimiento de los entrenadores de karate sobre diferentes ámbitos del entrenamiento. España: Universidad Pontificia Comillas; 2024. Available at:

<https://repositorio.comillas.edu>

13. Tello García M, Pérez Briones NG, Torres Fuentes B, Nuncio Domínguez JL, Pérez Aguirre DM, Covarrubias Solís IF. Percepción del personal de enfermería sobre la cultura y seguridad del paciente. Enferm glob [Internet]. 2023 [cited 14/01/2026]; 22(70): [aprox. 14 p.]. Available at: <https://scielo.isciii.es/pdf/eg/v22n70/1695-6141-eg-22-70-111.pdf>

14. Dos Santos Bezerril M, Gonçalves Da Costa ME, De Araujo Lima Freire V, Belmiro Andrade F, Barreto Tavares Chiavone F, Pereira Santos VE. Evaluación de la cultura de seguridad del paciente en la Atención Primaria de Salud. Enferm glob [Internet]. 2022 [cited

14/01/2026];21(67):[aprox. 11 p.]. Available at:

<https://scielo.isciii.es/pdf/eg/v21n67/1695-6141-eg-21-67-376.pdf>

15. Suffler M. Seguridad del paciente como clave para atención de calidad en los servicios de salud. Las enfermeras de hoy [Internet]. 2025 [cited 14/01/2026];4(2):[aprox. 15 p.].

Available at: <https://revistas.anep.org.pa/index.php/edh/article/view/92/67>

Declaration of interests

The authors declare no conflict of interest.

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