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Nursing workshop for the development of competencies in information systems among pre-service Nurses

Taller de Enfermería para el desarrollo de competencias en sistemas de información en enfermeros/as preserumistas

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Abstract

In the context of the health emergency caused by COVID-19, information systems played a crucial role in data management. In view of this, this study sought to evaluate the effectiveness of a nursing workshop aimed at developing professional skills in information systems among pre-registration nurses. A quantitative, applied, and quasi-experimental approach was used, with a prospective, longitudinal, and analytical design. The sample consisted of 58 participants: 30 in the experimental group and 28 in the control group, all with a bachelor's degree or professional qualification and no previous experience in the Rural and Marginal Urban Health Service (Serums). The instrument was a scale of professional competencies in health information systems, validated by experts (V of Aiken = 0.98) and with high reliability (Cronbach's α = 0.985). To test the hypothesis, Student's t-test for related samples was applied. The results revealed that, in the pretest, 73.3% of the experimental group was at the "beginning" level and 26.7% at the 'process' level. After the intervention, 80.0% reached the "outstanding achievement" level and 20.0% the "achievement" level, with no records at the lower levels. The inferential analysis showed significant differences in all dimensions evaluated (professional, generic, specific, and specialized), with p-values = 0.00. It is concluded that the workshop was effective in strengthening the professional skills of pre-serum nurses in information systems, helping to prepare them for Serums.

Keywords: health informatics, nursing professionals, educational intervention

Resumen

En el contexto de la emergencia sanitaria ocasionada por la COVID-19, los sistemas de información desempeñaron un papel crucial en la gestión de datos. Ante ello, este estudio buscó evaluar la efectividad de un taller de enfermería orientado al desarrollo de competencias profesionales en sistemas de información en enfermeros/as preserumistas. Se utilizó un enfoque cuantitativo, aplicado y cuasiexperimental, con diseño prospectivo, longitudinal y analítico. La muestra estuvo conformada por 58 participantes: 30 en el grupo experimental y 28 en el grupo de control, todos con grado de bachiller o título profesional y sin experiencia previa en el Servicio Rural y Urbano Marginal de Salud (Serums). El instrumento fue una escala de competencias profesionales en sistemas de información para la salud, validada por expertos (V de Aiken = 0,98) y con alta confiabilidad (α de Cronbach = 0,985). Para contrastar la hipótesis, se aplicó la prueba t de Student para muestras

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relacionadas. Los resultados revelaron que, en el pretest, 73,3 % del grupo experimental se encontraba en el nivel “inicio” y 26,7 % en “proceso”. Tras la intervención, el 80,0 % alcanzó el nivel “logro destacado” y el 20,0 % el nivel “logro”, sin registros en los niveles más bajos. El análisis inferencial mostró diferencias significativas en todas las dimensiones evaluadas (profesionales, genéricas, específicas y especializadas), con valores de p = 0,00. Se concluye que el taller resultó efectivo en el fortalecimiento de las competencias profesionales en sistemas de información de los enfermeros/as preserumistas, favoreciendo su preparación para el Serums.

Palabras clave: informática en salud, profesionales de enfermería, intervención educativa

Introduction

The development of professional capacities and competencies is one of the primary objectives of universities, which expect students to perform satisfactorily in the labor market, encompassing roles in assistance, administration, education, and research (Castro & Simian, 2018). Nursing has established itself as an integral, essential, and indispensable profession within the healthcare system. The COVID-19 pandemic highlighted the crucial role of nursing professionals in public health (Álvarez & Álvarez, 2022), while also revealing limitations in the virtualization of classes and clinical practices. In this context, the Academic Unit of Nursing at the Autonomous University of Zacatecas in Mexico conducted a study that revealed student dissatisfaction with virtual classes, particularly among those required to complete practical and clinical hours in hospitals (Zorrilla, Flores-Romo, Trejo-Ortiz, & Araujo-Espinoza, 2022).

In response to the health emergency, information systems played a key role in data management (Organización Panamericana de la Salud y Organización Mundial de la Salud, 2020). Knowledge of Health Information Systems (IS4H) constitutes an essential mechanism for managing interoperable open data and generating strategic information for public health benefits (Organización Panamericana de la Salud, 2020). In Spain, Sánchez et al. (2020) concluded that while necessary competencies for training in public and community health exist, they often lack planning, management, design, media coverage, and quality skills. In Peru, Quispe (2020) found that 39.7% of nursing graduates displayed inadequate competencies, particularly in the management dimension. Similarly, Álamo and Chu (2022) demonstrated that nurses at the primary care level—including rural health workers—lacked knowledge in information and communication technologies (ICT) for data registration. Moreover, Acuña (2021) identified that a health center in Huánuco did not have an updated information system, resulting in poor administrative management (rho = 0.733) and limitations in timely decision-making within the Pillco Marca community.

The Rural and Marginal Urban Health Service (Serums) is a mandatory program for professional practice in public sector establishments (Ministerio de Salud, 2022). Within this framework, knowledge of the Ministry of Health’s Health Information System (HISMINSA) is fundamental, as it records the services provided by nursing staff. The absence of management competencies generates limitations in handling the HIS during the Serums, as Modesto (2022) noted that weaknesses in nursing activity registration occur in the first month of service. In the same vein, Zegarra et al. (2021) reported that nursing professionals who undertook the Serums in 2019 indicated in 2022 that they faced limitations in managing information systems, especially in the initial months of service, coinciding with the progressive implementation of the Electronic Medical Record Information System (SIHCE – e-Qhali) since 2018, which experienced delays in more remote health posts.

In this context, it is a priority to strengthen the professional competencies of pre-serum nurses, particularly in the domain of ICT, as these are essential tools for ensuring reliable data and guaranteeing high-quality community health services. However, gaps persist between theory and clinical practice, necessitating innovative training strategies.

The objective of this study was to evaluate the effectiveness of a nursing workshop focused on developing professional competencies in health information systems, aimed at pre-serum nurses, to enhance learning and decision-making in real-world scenarios. This study is essential as it will measure the efficacy of this type of intervention and provide scientific evidence that contributes to optimizing the professional preparation of future serum nurses.

Methodology

The methodological approach adopted in this study was quasi-experimental, applied, longitudinal, and prospective, utilizing a pretest-posttest design that included a control group and an experimental group. The research was conducted in the city of Huánuco during the year 2023, using information collected from primary sources.

The population consisted of 58 nurses preparing to undertake the Rural and Marginal Urban Health Service (Serums) in the province of Huánuco, Peru. The experimental group included 30 participants, while the control group comprised 28. The sample was census-based. Inclusion criteria considered nurses with a bachelor's degree or professional title awarded by the National University Hermilio Valdizán (UNHEVAL) or the University of Huánuco (UDH) who voluntarily signed the informed consent and attended all workshops. Those who declined participation or did not complete the measurement instruments were excluded.

The main variable was the Nursing Workshop, evaluated across four dimensions: professional competencies, general competencies, specific competencies, and specialized competencies, each consisting of 30 items. A scale for professional competencies in health information systems (IS4H) was developed, with the following scoring: initiation (30–60), process (61–90), achievement (91–120), and outstanding achievement (121–150). The instrument was validated by expert judgment, achieving an Aiken's V coefficient of 0.98. Reliability was estimated through a pilot test involving 10 participants with similar characteristics, yielding a Cronbach's alpha of 0.985.

The procedure began with obtaining written and verbal informed consent from participants. Subsequently, a pretest was administered to both groups to assess competencies in health information systems. The workshop comprised six sessions:

a) Session 1 (April 8, 2023): Participant registration, distribution of materials, signing of consent forms, and administration of the pretest. Content related to the Serums (regulations, initiation guidelines, experiences) and health information systems (definition, benefits, MINSA regulations) was covered, concluding with a reflection on the role of nursing in Andean communities.

b) Session 2 (April 15): Introduction to HIS-MINSA, terminology, recording of services, and practical case filling.

c) Session 3 (April 22): Use of SIHCE–e-Qhali, emphasizing nursing modules and online practice for recording CRED services.

d) Session 4 (April 29): Application of the REFCON-MINSA system, with exercises on referral and counter-referral.

e) Session 5 (May 6): Working with the Unique Care Format (FUA), life stage diagnosis, and practical registration cases.

f) Session 6 (May 13): Integration of information systems applied to the Serums, exchange of experiences, guidelines for reports, technical standards, and administration of the posttest.

Data analysis included descriptive statistics using frequencies and percentages. For inferential analysis, normality tests were applied, and based on the results, the Student's t-test for related samples was used in the experimental group and the Wilcoxon test for related samples in the control group. Data processing was conducted in Excel and SPSS v.27.

During the execution of the workshop and data collection, ethical research principles established in the ethics code of the sponsoring university were adhered to. Furthermore, bioethical principles of autonomy, justice, beneficence, non-maleficence, and confidentiality were respected, ensuring that the information was used exclusively for academic purposes.

Results

Regarding the sociodemographic characteristics of the study groups, both were predominantly composed of young adults aged 21 to 28 years. In terms of gender, females predominated in the control group (89.3%) and also in the experimental group (76.7%). Concerning academic degree, the distribution in the control group was equitable between bachelor's and graduated nurses (50% each), while in the experimental group, graduates prevailed (60%). Additionally, most participants were from the National University Hermilio Valdizán, both in the control group (89.3%) and in the experimental group (80%) (Table 1).

Table 1

General characteristics of nurses

General characteristics	Control		Experimental	
	n = 28		n = 30	
	fi	%	fi	%
Age Group				
21-26 years	28	100,0		

22-28 years			30	100,0
Gender				
Male	3	10,7	7	23,3
Female	25	89,3	23	76,7
Academic Degree				
Bachelor	14	50,0	12	40,0
Professional Title	14	50,0	18	60,0
University of Origin				
National University Hermilio Valdizán	25	89,3	24	80,0
University of Huánuco	3	10,7	6	20,0

Upon comparing the results between the control and experimental groups, notable differences were evident from the initial test to the final assessment. In the control group, none of the participants achieved higher levels in the evaluated competencies (professional, general, specific, and specialized) in both the pretest and posttest. The majority remained at the initial level across all areas, with percentages ranging from 75% to 92.9% in the posttest.

In contrast, the experimental group, after participating in the six sessions of the Nursing Workshop focused on information systems, demonstrated significant progress. In the pretest, the majority were at the initial level in professional competencies (73.3%), general competencies (76.7%), specific competencies (83.3%), and specialized competencies (80%). However, none remained at this level in the posttest. The majority achieved levels of achievement and outstanding achievement in professional competencies (80%), general competencies (86.7%), specific competencies (90%), and specialized competencies (90%). These results highlight the effectiveness of the workshop compared to the control group, particularly in managing HIS-MINSA systems, e-Qhali (SIHCE), FUA, and REFCON-MINSA, significantly strengthening the competencies necessary for performance in the SERUMS (Table 2).

Table 2

Evaluation of professional competencies

Evaluations	**Control**				**Experimental**			
	Pre-test		**Post-test**		**Pre-test**		**Post-test**	
	fi	**%**	**fi**	**%**	**fi**	**%**	**fi**	**%**
Professional Competencies								
Initial	23	82,1	21	75,0	22	73,3	0	0,0
Process	5	17,9	7	25,0	8	26,7	0	0,0
Achievement	0	0,0	0	0,0	0	0,0	6	20,0
Outstanding Achievement	0	0,0	0	0,0	0	0,0	24	80,0
General Competencies								
Initial	23	82,1	26	92,9	23	76,7	0	0,0
Process	5	17,9	2	7,1	7	23,3	0	0,0
Achievement	0	0,0	0	0,0	0	0,0	4	13,3
Outstanding Achievement	0	0,0	0	0,0	0	0,0	26	86,7

Specific Competencies								
Initial	24	85,7	25	89,3	25	83,3	0	0,0
Process	4	14,3	3	10,7	5	16,7	0	0,0
Achievement	0	0,0	0	0,0	0	0,0	6	20,0
Outstanding Achievement	0	0,0	0	0,0	0	0,0	24	80,0
Specialized Competencies								
Initial	26	92,9	25	89,3	24	80,0	0	0,0
Process	2	7,1	3	10,7	6	20,0	0	0,0
Achievement	0	0,0	0	0,0	0	0,0	3	10,0
Outstanding Achievement	0	0,0	0	0,0	0	0,0	27	90,0

A statistically significant relationship was identified in all evaluated dimensions—professional, general, specific, and specialized—with a significance level of $p < 0.05$. This result confirms the effectiveness of the Nursing Workshop, demonstrating a positive impact on strengthening the competencies of pre-serum nurses (Table 3).

Table 3

Inferential results of pretest and posttest of professional competencies

Competencies	Pre-test		Post-test		t	*p*-value
	fi	%	fi	%		
Professional Competencies						
Initial	22	73,3	0	0,0	31,582	0,000
Process	8	26,7	0	0,0		
Achievement	0	0,0	6	20,0		
Outstanding Achievement	0	0,0	24	80,0		
General Competencies						
Initial	23	76,7	0	0,0	37,493	0,000
Process	7	23,3	0	0,0		
Achievement	0	0,0	4	13,3		
Outstanding Achievement	0	0,0	26	86,7		
Specific Competencies						
Initial	25	83,3	0	0,0	26,610	0,000
Process	5	16,7	0	0,0		
Achievement	0	0,0	6	20,0		
Outstanding Achievement	0	0,0	24	80,0		
Specialized Competencies						
Initial	24	80,0	0	0,0	26,225	0,000
Process	6	20,0	0	0,0		
Achievement	0	0,0	3	10,0		
Outstanding Achievement	0	0,0	27	90,0		

Discussion

This study aimed to assess the effectiveness of the nursing workshop based on information systems in developing professional competencies among pre-serum nurses. The results indicate that before the intervention, the majority of participants in the experimental group were at low competency levels (initial and process). After the workshop, they advanced to higher levels (achievement and outstanding achievement), achieving percentages between 80% and 90%, indicating that the observed improvement was not due to chance but rather the actual impact of the intervention. This change was statistically significant across all dimensions ($p = 0.000$), confirming the hypothesis that the nursing workshop is effective in strengthening professional competencies in pre-serum nursing.

These findings are consistent with the study by Valdivia et al. (2020), which demonstrated the effectiveness of a virtual workshop in achieving the expected learning outcomes in the course "Management and Work with Parents." Similarly, they align with the findings of Méndez Mercado et al. (2022), which showed that a seminar-workshop enabled the development of research management indicators and continued improvement in teaching preparation, positively affecting students. They also relate to the research conducted by Hernández (2020), emphasizing the essential role of nursing directors in administrative management and improving the quality of hospital services.

In line with this, Carrillo Algarra et al. (2013) assert that these results strengthen Patricia Benner's theory, which posits that nursing evolves through stages of skill development, reflected in how professionals think and make decisions in clinical situations. This underscores the importance of practical experiences, such as workshops, that facilitate the consolidation of learning. Additionally, since the Serums requires nurses to adapt to new processes in community care, these findings complement the competency theory based on "knowing, knowing how, and knowing how to coexist" (Alvarado García, Venegas Bustos, & Salazar Maya, 2023).

In contrast, the control group showed no significant progress when comparing the initial and final evaluations. The majority of participants remained at the initial level for all competencies (75% in professional and 92.9% in general competencies). This confirms that, without a structured intervention like the workshop, future nurses find it challenging to consolidate their professional and general skills. Similarly, in the pretest for the experimental group, 73.3% were at the initial level, and 26.7% were at the process level, indicating a deficiency in administrative skills. This finding aligns with Sánchez et al. (2020), who noted the lack of planning, management, and quality skills in public health training. It also supports Quispe's (2020) conclusion that a considerable percentage of graduates exhibited insufficient levels of comprehensive competencies. Conversely, it differs from Valdera (2020), who identified that nurses possessed basic knowledge (56%), essential skills (100%), and positive attitudes (92%) toward the use of ICT.

These results are particularly relevant in the context of the Serums, where nurses receive limited induction training. This highlights the importance of implementing workshops focused on information systems that facilitate timely decision-making with tools such as HIS-MINSA, e-Qhali (SIHCE), FUA, and REFCON-MINSA. The findings relate to Quinde (2021) and Crofford (2021), who reported a positive, albeit low, correlation between the induction process and job competencies in health establishments. Similarly, they align with Tumbaco-Quimiz et al. (2021), who emphasized the influence of nursing management skills on administrative improvement and the quality of health care. Likewise, they coincide with the assertions of Mazacón et al. (2021), who argue that competence, management, social commitment, and communication are key elements in holistic care and professional development. Additionally, they relate to the work of Ramos and López (2018), who affirm that competence integrates knowledge, skills, and attitudes in an inseparable manner.

This study has some limitations. Firstly, the sample consisted of only 58 pre-serum nurses, which restricts the generalizability of the findings. Secondly, the evaluation period was brief, focusing on the immediate impact of the workshop without assessing the long-term retention of competencies. Moreover, the fact that the workshop was led by the evaluator may have introduced unintentional biases. Finally, external factors, such as the environment of the sessions or the motivation of the participants, may have influenced the results without being rigorously controlled.

Conclusions

In conclusion, the implementation of a nursing workshop, structured in both theory and practice, promotes the development of professional competencies. In this specific case, the workshop enhanced the development of competencies in pre-serum nurses regarding health information systems, such as managing HIS-MINSA, e-Qhali (SIHCE), FUA, and REFCON-MINSA.

Future research should implement long-term follow-ups to determine whether the competencies acquired after short-term intervention decline or, conversely, are maintained over time. Additionally, experimental designs

with larger control groups or comparative interventions could be employed; likewise, using external evaluators could help reduce potential biases.

Finally, it would also be interesting to assess other related variables, such as participant satisfaction, the transferability of competencies in a more realistic context for the participants, or the impact of the intervention on the quality of health service delivery.

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