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Original Article

Suicide prevention in a virtual environment: a roadmap for simulation-based education*

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Highlights: (1) Innovative study on suicide prevention, simulated teaching, and the virtual environment. **(2)** Script validated by experts and available in full for simulated teaching. **(3)** Introduction of a prototype of a fictional virtual social network for simulated practice. **(4)** Results indicated the appropriateness of the construction, with good agreement in the analyses. **(5)** The script enhances professional training and development in the mental health context.

Objective: to build and validate a simulation-based education roadmap on suicide prevention in the virtual environment. **Method:** methodological research subdivided into a development and validation stage. The roadmap was built using a previously drafted template based on international guidelines on good clinical simulation practices and scientific literature on suicide prevention in the virtual environment. For validation, the roadmap was validated by experts through self-application of an assessment form with answers based on "adequate, fair, and inadequate", with a field for suggestions. Descriptive statistics and the Content Validity Index (CVI≥0.8) were used. **Results:** nine experts took part in the study, the majority of whom were nurses (66.7%), female (55.6%), with an average age of 42.22 years. All the items in the roadmap met the acceptance criteria (CVI≥0.8). **Conclusion:** this study provides a useful roadmap for teaching suicide prevention in the virtual environment.

Descriptors: Suicide; Suicide Prevention; Mental Health; High Fidelity Simulation Training; Online Social Networking; Social Media.

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Introduction

The impacts related to suicide are extensive and significantly affect society. Considered a multifactorial phenomenon with repercussions on public health worldwide, suicide is preventable, however, some challenges are observed in the development of strategies that address the *continuum* of behavior (suicidal ideation, suicidal plan, suicidal attempt, and death by suicide)[1-2].

Suicide prevention requires professional training to act in a way that takes into account the specificities of suicide, in order to break down the barriers, stigmas, and taboos that permeate it[3]. In recent years, prevention actions and strategies have expanded to virtual environments, especially virtual social networks[4-6]. Some studies have investigated the relationship between suicide prevention and the use of networks, which are sources for understanding how content about suicide has been published and shared on these media[7-11]. The risks related to the dissemination of content about suicide in the virtual environment can be wide-ranging, especially when it comes to potentially harmful publications, which directly affect users who use virtual social networks in their daily lives[5,12]. Currently, there are gaps in the provision of care that considers suicide prevention in the virtual environment, especially by health professionals[7-11].

Health training for suicide prevention using simulated teaching is a promising practice[12-13], as it enables participants to build a variety of knowledge, skills, and attitudes through training activities that are close to the reality of the care to be provided[14-15]. Achieving the expected learning objectives in a clinical simulation is linked to the use of a roadmap. Therefore, the construction of a roadmap for simulation-based education involves the systematic and organized planning of a scenario, which is used as a guiding instrument and guide for the activity to be developed, especially for the facilitators involved in the proposal[12].

In this way, simulation-based education has been recommended and expanded in the health area because it favors clinical practice in a safe and participatory way[16], as well as providing the basis for future interactions that can be experienced in mental health care[13,17-19]. Considering the potential of this practice, the aim of this study was to build and validate a roadmap for simulation-based education on suicide prevention in a virtual environment.

Method

Study design

This is a methodological study[20] presented in accordance with the recommendations of the Methodological Study Reporting Checklist (MISTIC)[21].

Roadmap

The roadmap for simulation-based education was built between July and December 2020, based on a template available in the scientific literature, previously validated by experts[12,22-24]. A simple survey was also carried out, i.e. without involving literature review techniques, on aspects of suicidal behavior in a virtual environment and good professional care practices[7,25]. The materials and topics were identified and worked on according to the scientific team's expertise.

Participants

In the validation stage, the experts were selected from the Lattes Platform using two different searches for the terms: "suicidal behavior" and "high fidelity simulation". The experts were selected using a non-probabilistic technique, according to the adapted priority criteria (Master's or Doctoral degree, supervision of academic work, and teaching experience in the area of interest)[26]. Experts who did not return the validation invitation within 30 days were considered to have withdrawn.

Instruments used to collect information

The experts were asked to answer a questionnaire to characterize the participant, with questions about gender, age, education (degree), geographical location, and area of expertise (suicidal behavior and/or clinical simulation). They also answered a questionnaire with the simulated teaching roadmap, in which each item was evaluated based on the answers: adequate, fair, and inadequate.

The roadmap was drawn up with 13 items: title, general objective, target audience, human, physical and material resources, previous study, duration (briefing, simulation and debriefing), pre-briefing (information about the contracts and conducting the simulation), briefing (basic guidelines about the simulated case), instructions for the simulated patient, objective structured clinical examination - OSCE (items expected and assessed during the simulation), debriefing structured in three phases (descriptive, analytical and applicative), according to The Diamond model[12,27].

Data collection, processing and analysis

Data collection took place between January and November 2021 in virtual format, via email, with an explanatory message and a hyperlink redirecting to the virtual form. The collection form included the Free and Informed Consent Term (FICT), a characterization

questionnaire, further reading on the topics (optional reading), and a simulated roadmap with each topic assessed on a scale of adequate, fair, inadequate, and spaces for suggestions.

All the data was arranged and processed in Microsoft Excel 10 and then processed and analyzed using STATA® statistical software. Simple descriptive statistics were used to analyze the characterization data and the Content Validity Index (CVI) was used to evaluate the simulated roadmap, with an acceptance level of 80%[28]. The CVI was calculated by adding the answers agree and neutral.

Ethical aspects

This study was appraised and approved under opinion number 4.608.709 and CAAE 19918019.8.0000.5393 by the Research Ethics Committee of the Ribeirão Preto Nursing School - University of São Paulo (CEP/EERP-USP).

Results

Development

The simulated roadmap "Welcoming suicidal communication in the virtual environment" was designed for students and health professionals taking a mental health class. Its general aim was to welcome suicidal communication in the virtual environment, encouraging initial supportive behavior. For the roadmap, a fictitious virtual social network prototype was developed for simulated practice. It is important to note that the social network prototype was inserted as a tool to enable the learning objectives validated in the simulation roadmap. The virtual social network provides visual information about the simulated patient (name, age, followers, status), posts with indications of emotional distress and risk factors, as well as an initial chat to encourage dialog between the health professional and the simulated patient (Figure 1).

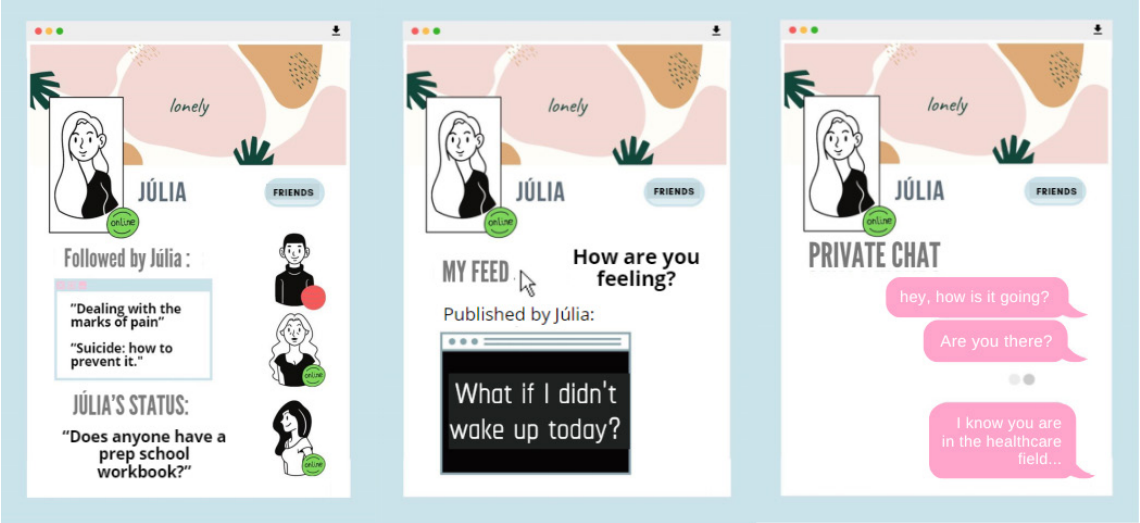

Figure 1 - Prototype of a virtual social network developed to support a high-fidelity clinical simulation on the treatment of suicidal behavior in a virtual environment. Ribeirão Preto, SP, Brazil, 2021

Instructions were specified to help build the simulated patient as a 24-year-old pre-university student who lives with her friends in a different city from her family. Information was inserted containing examples of how the role-player could express her feelings, risk factors for suicidal behavior, relationship with the virtual environment, and support network during the clinical simulation. The actions expected of the participants were covered in the content indicated for a previous study and dealt with welcoming, recognizing feelings and needs, communicating safely in the virtual environment, encouraging well-being, promoting safety, and the search for a support network and specialized assistance (Figure 2).

ROADMAP TITLE
Welcoming Suicidal Communication in the Virtual Environment
GENERAL OBJECTIVE
- Welcoming suicidal communication in the virtual environment, encouraging initial support behaviors.
TARGET AUDIENCE OF THE ROADMAP (ROADMAP PARTICIPANTS)
Undergraduate health students (who have taken subjects related to mental health/psychiatry) and health professionals.

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NUMBER OF PEOPLE NEEDED TO DEVELOP THE ROADMAP

- Two simulation coordinators (responsible for developing the simulation);
- One participant (target audience) who will take part in the simulated activity;
- A role-player (who will simulate the person behind the Virtual Social Network);
- Observers (other participants who exceed the number of participants provided for in the roadmap).

PHYSICAL RESOURCES AND MATERIALS

- Teaching Laboratory or Classroom that simulates an environment/space for using a computer or visual resource: This roadmap takes place through an interactive simulation in the online environment, with the use of any virtual tool that performs audio, video, and text sharing (adaptive). It therefore requires the use of a device (cell phone or computer) that can be transmitted or projected onto (television or projector). Materials built for the Virtual Social Network (Supplementary Material 1).

MATERIALS FOR PRE-READING BY PARTICIPANTS AND OBSERVERS (PROVIDED BY THE ROADMAP COORDINATORS VIA E-MAIL FOR PRE-READING BY PARTICIPANTS AND OBSERVERS)

- These materials will be made available by the roadmap coordinators, via e-mail, for prior reading/viewing by all the participants involved:
- Educational video on: “Safe Communication about Suicidal Behavior in Virtual Environments”, available at: https://www.youtube.com/watch?v=XfYW1d5q3K4&t=4s
- Booklet “How to help someone at risk of suicide?” https://inspiracao-leps.com.br/cartilhas-e-e-books/como-ajudar-alguem-em-risco-de-suicidio/
- Educational video: “Safety and Mental Health Tips on the Internet” - https://inspiracao-leps.com.br/videos/dicas-de-seguranca-e-saude-mental-na-internet/
- Booklet “Mental Health in Times of Pandemic”. https://inspiracao-leps.com.br/cartilhas-e-e-books/dicas-de-uso-seguro-na-internet/

ESTIMATED DURATION FOR EACH STAGE OF THE ROADMAP

1. Prebriefing (15 minutes);
2. Simulation (20 minutes);
3. Debriefing (40 minutes).

PREBRIEFING (INFORMATION ABOUT THE CONTRACTS AND THE CONDUCT OF THE SIMULATION)

1. Present the environment with the computer (or digital resource) to the participants in the roadmap before the activity begins (Supplementary Material).
2. Present the teaching and learning method, emphasizing the collaborative and non-evaluation nature of the process. Explain that it involves an external member (simulated patient) who will be attended to virtually by a student or health professional, while the rest of the group (observers) watch the scene attentively. During the simulation, it is not recommended that the person carrying out the care be directed toward the observers, and the facilitators will not intervene in the scene. The observers play an active role in the observation, as they collaborate in the discussion during the debriefing. Hence the importance of participating in the discussion after the simulation.
3. Discuss the contracts on emotional and ethical safety with the participants: confidentiality, anonymity, respect, and the possibility of suspending the activity in the event of emotional discomfort. In this case, it’s recommended that the student chooses whether to be welcomed individually or to share their feelings in a group. If the option is individual, it is also recommended that the group of students and/or professionals receive emotional support and ask questions.
4. This simulated roadmap includes the presentation of Julia’s fictitious profile (Supplementary Material). This roadmap takes place through an interactive simulation in the online environment, using a virtual tool that shares audio, video, and text (adaptable).

PREBRIEFING (BASIC GUIDELINES FOR THE SIMULATED CASE - CAN BE READ OUT AND NO INFORMATION SHOULD BE OMITTED)

This will be a simulation with a director, carried out using multimedia resources in a virtual tool, which shares audio, video, and text (the virtual tool can be adapted).

You’re online in your virtual social network. For some time you have noticed that a “follower” (acquaintance) on the social network has been following and posting content with a depressive, self-deprecating characteristic, expressing the feeling of loss of meaning, lack of reasons to live, feeling left out, lonely, and empty. In the items liked on this individual’s social network, there is content about non-suicidal self-injury and suicide. In the stories of the virtual social network, this “follower” has posted videos of risky behavior, such as drinking and driving at high speed.

This person starts a conversation with you on their social network, privately (because they know you’re in the health field), in order to talk to someone who is in this field.

In this first moment, you will have approximately 30 minutes to talk.
The simulation lab will not be interfered with by people outside the activity and will be terminated by the simulation coordinators when one of the users goes offline or when the time allotted for the simulation has elapsed.
Question for participants and observers: Do you have any questions about the guidelines and preparation presented?

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INSTRUCTIONS FOR THE SIMULATED PATIENT (PREPARATION SHOULD BE CARRIED OUT IN THE DAYS LEADING UP TO THE SIMULATION)

You will be Júlia, 24 years old, single, living in a sorority with three other girls. Júlia has been studying for the university entrance exams for three years to try to get into medical school. Júlia's family lives in another state and, due to the distance, they are only able to visit her twice a year. During the simulation, you will have to address some of the feelings, sensations, and difficulties you have experienced, presented in the form of clues, such as:

Clues that you will necessarily address in the case:

- **Unbearable pain and sadness;**
- **Loneliness and misunderstanding:** "If loneliness could kill, I wouldn't be here anymore"; "I'm surrounded by people, and at the same time, I feel very alone".
- **Discouragement:** "I get home and go straight to bed, if I could I'd stay in bed all day, I don't feel like going to the course".
- **Feeling of pressure:** "My mother said that this is my last year here. That if I don't pass this year, I'll go back home because she feels she's "throwing money away".
- **Guilt:** "I don't know what's going on because, as my mother says, I have everything and I still feel like this. So many people are worse off [...]", "People comment on my photos saying 'so beautiful, you shouldn't be posting these things', I feel worse".
- **Feeling devalued:** "Nobody sees how much I studied, they just demand it from me [...]. Little do they know that I struggle through my days [...] I can't make myself feel better"
- **Questions related to death:** "Maybe it would be better for everyone if I weren't around. One less burden for my parents"; "everything would be different if I ceased to exist [...]".
- **Virtual social networking and ambiguity:** "I've started participating in some groups here on the Internet, but there are days when I feel worse when I see the posts"; "I've also made friends who understand what I'm going through, who I feel I can open up to [...]".
- **Substance use and abuse**: "Sometimes I think I'll only be able to turn my head off if I'm drinking", "some days I'm drinking, I get in the car and drive around aimlessly, trying to feel something".
- **Previous suicide attempt:** "I've tried to kill myself, but I'm no good at it, I didn't succeed".

Clues that you will address if you have the chance/opportunity

- **Shame:** "Everyone's life is moving forward and mine is always in the same state [...]".
- **Sense of loss of meaning:** "I've always loved reading and drawing, but lately I don't want to do anything".
- **Impaired self-care:** "Some days I don't even get out of bed to eat", "I don't see the point in eating anymore".

Note: the simulated patient needs to be familiar with the "Structured Objective Clinical Examination" (item below) before the role-play, so that they can program their clues according to what is expected in the roadmap.

OBJECTIVE STRUCTURED CLINICAL EXAMINATION (OSCE*)
FOR EACH ITEM BELOW, ASSESS WHETHER THE ACTION TAKEN WAS CARRIED OUT PROPERLY, USING THE ANSWER OPTIONS YES, PARTIALLY OR NO.

Items assessed	*Assessment*
OSCE* 1: Enabling people to speak and listen, recognizing that they can express their feelings, experiences, and needs at their own pace and time.	( ) yes ( ) in part ( ) no
OSCE* 2: Develop safe communication in the virtual environment, promoting recommended communication (Examples: seeking help, social and professional support, among others).	( ) yes ( ) in part ( ) no
OSCE* 3: Promote non-judgmental communication, avoiding telling the person what they need to do, say, or how they should feel.	( ) yes ( ) in part ( ) no
OSCE * 4: Encourage the person to express their need for help and how they want to be helped, encouraging communication.	( ) yes ( ) in part ( ) no
OSCE* 5: Identify the "Stages of Change" for healthy online behavior, guiding preventive online content.	( ) yes ( ) in part ( ) no
OSCE* 6: Guide the person to seek out places and people who make them feel safe and protected, strengthening these supportive relationships in order to avoid isolation (e.g. family, friends, groups, support groups, professional help, among others).	( ) yes ( ) in part ( ) no
OSCE* 7: Identify warning signs by analyzing posts on social networks or conversations with Júlia.	( ) yes ( ) in part ( ) no
OSCE * 8: Encourage the person to practice self-care, stimulating their well-being with satisfying relationships, positive emotions, and a sense of hope.	( ) yes ( ) in part ( ) no

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(continuation...)

Items assessed	*Assessment*
OSCE* 9: Valuing the individual's potential, selecting positive aspects and stimulating protective factors.	( ) yes ( ) in part ( ) no
OSCE* 10: Promote safety by guiding the person to avoid making impactful or drastic decisions while they are feeling this way.	( ) yes ( ) in part ( ) no
DEBRIEFING BASED ON "THE DIAMOND" MODEL (STAGE DEVELOPED AFTER THE ROADMAP THROUGH THREE CONSECUTIVE PHASES)	
Descriptive phase (to show how the case turned out, without judging the participants' performance during the simulation). How did you feel during the initial welcoming of Júlia?	
Analytical Phase (Evidence of non-technical skills involved in the simulation that were important to the participants) What positive actions were taken during the initial welcome for Júlia? What would you do differently during the initial welcome for Júlia? (Question addressed to the participants in the roadmap). How do you consider your performance in group work during the initial welcome for Júlia? (Question posed to the participants in the roadmap).	
Applicative phase (Evidence of how the participants will be able to apply the knowledge in their clinical practice). What will they be able to take from this experience in the simulation of receiving Suicidal Communication in the Virtual Environment into their professional practice?	

*OSCE = Objective Structured Clinical Examination

Figure 2 - Roadmap for simulated teaching on accepting suicidal communication in the virtual environment, validated by experts (n=9). Ribeirão Preto, SP, Brazil, 2021

Expert validation

The participation invitation for validation was sent to 36 experts; however, only nine experts participated in the validation stage of the simulated script. The majority were female (55.6%), with an average age of 42.22 years (minimum=34; maximum=62; standard deviation=8.41), residing in the southeast region (77.8%). Regarding academic background, six were nurses (66.7%), and three were psychologists (33.3%). The average professional experience was 18.56 years (minimum=10; maximum=38; standard deviation=9.11), with experience in clinical simulation (66.7%) and suicidal behavior (33.3%).

In terms of acceptance and agreement, all the items in the simulated roadmap met the minimum approval criteria (CVI≥80%) (calculated by adding up the adequate and regular responses). Most of the items achieved maximum agreement (100.0%) among the experts. Only the title, objectives, and items of the objective structured clinical examination (OSCE) on speaking space and recognizing feelings and needs (OSCE 1), promoting safe communication in the virtual environment (OSCE 2) and without judgment (OSCE 3), seeking support according to needs (OSCE 4), and identifying warning signs (OSCE 7) reached approximately 89% agreement in the experts' overall assessment (Table 1).

Table 1 - Acceptance and agreement of the validation by experts (n=9) of a simulated roadmap on the prevention of suicidal behavior in the virtual environment. Ribeirão Preto, SP, Brazil, 2021

Item	Agreement					
	N* (%)			IVC†		
	Yes	Regular	No	SBE‡	Suic.B.§	Total
Title	6 (66,7)	2 (22,2)	1 (11,1)	0,8333	1,0000	0,8889
Objectives	6 (66,7)	2 (22,2)	1 (11,1)	0,8333	1,0000	0,8889
Target audience	8 (88,9)	1 (11,1)	-	1,0000	1,0000	1,0000
Number of people	8 (88,9)	1 (11,1)	-	1,0000	1,0000	1,0000
Physical resources	8 (88,9)	1 (11,1)	-	1,0000	1,0000	1,0000

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Item	Agreement					
	N* (%)			IVC†		
	Yes	Regular	No	SBE‡	Suic.B.§	Total
Duration	7 (77,8)	2 (22,8)	-	1,0000	1,0000	1,0000
Pre-briefing	7 (77,8)	2 (22,8)	-	1,0000	1,0000	1,0000
Briefing	8 (88,9)	1 (11,1)	-	1,0000	1,0000	1,0000
Instructions to directors	6 (66,7)	3 (33,3)	-	1,0000	1,0000	1,0000
OSCE‖ 1	6 (66,7)	2 (22,8)	1 (11,1)	0,8333	1,0000	0,8889
OSCE‖ 2	7 (77,8)	1 (1,11)	1 (11,1)	0,8333	1,0000	0,8889
OSCE‖ 3	8 (88,9)	1 (11,1)	-	0,8333	1,0000	0,8889
OSCE‖ 4	8 (88,9)	1 (11,1)	-	0,8333	1,0000	0,8889
OSCE‖ 5	8 (88,9)	1 (11,1)	-	1,0000	1,0000	1,0000
OSCE‖ 6	9 (100)	-	-	1,0000	1,0000	1,0000
OSCE‖ 7	8 (88,9)	1 (11,1)	-	1,0000	1,0000	0,8889
OSCE‖ 8	9 (100)	-	-	1,0000	1,0000	1,0000
OSCE‖ 9	9 (100)	-	-	1,0000	1,0000	1,0000
OSCE‖ 10	7 (77,8)	2 (22,2)	-	1,0000	1,0000	1,0000
Debriefing - Descriptive Phase	8 (88,9)	1 (11,1)	-	1,0000	1,0000	1,0000
Debriefing - Analytical Phase	8 (88,9)	1 (11,1)	-	1,0000	1,0000	1,0000
Debriefing - Application Phase	6 (66,7)	3 (33,3)	-	1,0000	1,0000	1,0000
References	7 (77,8)	2 (22,2)	-	1,0000	1,0000	1,0000

*n = Number of participants; †CVI = Content Validity Index; ‡SBE= Simulation-Based Education; §Suic.B. = Suicidal Behavior; ‖OSCE = Objective Structured Clinical Examination

Among the experts' suggestions was the use of the term "welcoming": *I believe that welcoming is not the term to designate the broad form of what is going to be done, which is not just welcoming* (P9). With regard to the virtual feature, the experts suggested that the description of the physical resources should be more in-depth. *I suggest detailing the Internet capacity needed, as well as the technological resources (characteristics of the computer, TV, etc.)* (P03), as well as more versions of the virtual social network prototype. *Variations with WhatsApp, Instagram, Twitter* (P09).

As well as suggestions related to the briefing, such as the importance of highlighting the role of facilitators, scene participants, and observers. *It is important to highlight the role of each individual. For example: the participant will not be able to interact with the observers or anyone else who has a technical role in the roadmap. It should be made clear what resources are available for the participant to seek/collect data. It is also important to make it clear to the observers that they will not be able to communicate with the participant when the roadmap is taking place* (P05) and during the insertion of guidance on emotional support. *This should include guidance on the need to stop the procedure if there is emotional discomfort/ suffering and the support to be received* (P09). Although all the items met the acceptance criteria, the suggestions relating to the specification of technological resources and the inclusion of more guidance on roles and safety in the briefing were accepted.

Discussion

The use of clinical simulation in health training processes has been growing, although it is more widely explored in physical health care[29-30]. In mental health, studies address the benefits of simulation for teaching, since students can experience the reality of clinical practice in the safety of an educational environment[31], in order to reduce anxiety about mental health care and also to discuss and clarify stigmatizing attitudes[32].

Despite the efforts to adopt clinical simulation in the field of mental health, the use of this strategy to prevent suicidal behavior still has gaps in the literature[17-19,31-34]. Due to the complexity of the phenomenon, it is necessary to examine it in multiple audiences, environments, and contexts, including those related to the virtual world[35-37], which has an as-yet-uninvestigated relationship of ambiguity between risk factors, protective factors, and preventive and pro-suicidal content[38].

In this way, the roadmap presents possibilities for working on a topic with a major social and health impact, suicide prevention, based on an original proposal to build a strategy validated by specialists, to collaborate in professional health training and for the prevention of suicidal behavior in a virtual environment. The virtual environment, its functioning, and the transformation of social functions based on these roadmaps need to be considered in health care[39]. This environment, and the different virtual social networks present in its domain, are spaces for expressing feelings and interactions, which can identify tendencies and risk factors, suicidal communication, as well as offering opportunities for reception, support and information about help channels[11,40].

To draw up the simulation-based education roadmap, the objectives, and expected results were taken into account, as well as an appropriate pre-briefing, the simulation itself, and a reflection on learning in the debriefing. Each stage of the process is interconnected during the creation of the roadmaps, allowing them to be reproduced and implemented in the daily practice of students and professionals[41]. For training purposes, clinical simulation, as well as involving didactic-pedagogical aspects, requires an understanding of the social, cultural, and historical meanings for professionals, built up in experiences throughout the life cycle[15].

The context of the roadmap was designed to allow the participants to act in situations that are close to the daily lives of society and health professionals on the subject, an aspect that justifies the development of the proposal through simulation-based education, based on the international guidelines that guide these processes[24]. In this sense, the experiences of a 24-year-old girl preparing for the university entrance exam, living in a municipality separated from her family network, and expressing herself through posts on her virtual social network, with indications of emotional distress, were worked on. Some studies have highlighted the high suicide mortality rate among young people aged between 15 and 29 and the complex mediation of factors at this stage of life, especially the diversity of experiences in the digital age[42-43]. The study is therefore in line with proposals to prevent suicidal behavior in the virtual environment[44].

The simulated roadmap was designed to enable learning about early identification, safe communication in a virtual environment, bonding, and the expansion of professional network support beyond virtual spaces. These recommendations are widely corroborated by national and international scientific literature. A number of studies have been carried out looking at the relationship between suicidal behavior, the virtual environment, and the possibilities of prevention through safe strategies, technologies and virtual resources based on scientific knowledge[5-6,45-46].

Among the main actions is the dissemination of supportive information, safe use of the Internet, reduction of mental health stigma and strengthening of protective factors[44], and safe communication about suicidal behavior, considering the virtual environment, its characteristics, potential, limitations, and possibilities[7,42,45], y understanding the barriers, facilitators, and recommendations for safe communication, the beneficial use of networks is encouraged, as well as the potential for prevention on the subject and the prevention of the contagion effect or Werther effect[7-8,45].

The quality of the teaching experience based on the roadmap presented in this study will depend on the quality of the facilitators' preparation, as well as the proper functioning of the technological resources. Information and Communication Technologies (ICTs) have been widely used to disseminate content, and this roadmap has contributed to recognizing the importance of developing creative and innovative methodologies that can help promote communication, health, and well-being in the community at large[47].

Validating the simulated roadmap with specialists is essential for assessing its quality, and cultural and pedagogical suitability. Clinical roadmaps validated for simulation can be widely used in teaching and replicated in different locations and institutions. This roadmap does not require a very sophisticated structure or technological resources that are expensive or not very accessible, making simulation a flexible teaching strategy that can be adapted to the needs of different institutions and audiences[48].

In this study, the validation results were within the criteria determined for the CVI, with values above 80% for simulation-based education, suicidal behavior, and also in the general evaluation. It should be noted that the choice of this evaluation criterion is in line with other validation studies of simulated roadmaps[12,49]. The results related to suicidal behavior also show the complexity of addressing this issue, even concerning the consensus of experts on the actions expected for care and prevention[50].

The simulation that uses a fictitious (non-existent) virtual social network, but with similar characteristics to existing platforms, presents the need for a prior explanation of the types of interactions, reactions, content posted, and tools created by the existing platforms themselves, which can be used in the simulated practice. There is also the possibility of adapting the roadmap presented for the context of telesimulation (a practice widely used after the coronavirus pandemic), as a

possibility of modernizing teaching, fostering inclusion and adaptability of students, while enabling remote and universal access to content[51].

Even though the simulation can be designed based on available data and information, it is impossible to predict every possible situation that could occur in the simulated virtual environment and to provide the same level of interactivity as a real social network. These issues can impact realism, an important characteristic for good practice in simulation, so it is important to pay attention to the information that will be offered to participants and to pay attention to their feedback for adaptations in the implementation of the roadmap. In addition, it is recommended that the roadmap be reformulated and evaluated periodically to keep up with rising technologies.

Virtual platforms have a global reach and their use and adaptation may vary according to the jurisdictions of different countries[52]. In this context, discussions on public policies for the prevention of suicidal behavior in the virtual environment should be considered. Public policies must address the specificities of suicidal behavior in the virtual environment, including the early identification of signs of risk, the development and evaluation of effective prevention and intervention strategies, the training of health professionals, and the involvement of the offline world in the online prevention process.

This study contributes to the advancement of scientific knowledge, since it uses strategies that provide training that is more in line with the demands of society, diversifying the formats and sequences of teaching and learning in the field of Nursing, integrating scientific knowledge with advances in technology in an ethical approach, and actively involving students in their educational process, bringing them closer to reality beyond the academic environment[53-54]. It also brings innovations to the field of mental health training, nursing protagonism and the use of technologies.

Regarding the limitations of the research, we have difficult for participants, which may be related to the period of the COVID-19 pandemic and the expansion of virtual surveys and the moderate participation of experts in suicidal behavior in the virtual environment may be related to fair reliability in this area. Finally, there is a need for future studies to validate the social network prototype proposed for the roadmap, as well as investigations into the possibility of using artificial intelligence or other tools to help improve the reality of simulation-based education, considering the advancement of new technologies in everyday life and, consequently, the new challenges that can arise from new technologies.

Despite its limitations, it should be noted that this study offers the health field a product with training potential that could favor professional training processes on suicide prevention in the virtual environment. With its originality and the possibility of being accessed and used in its entirety, the roadmap also stands out for having been validated by specialist judges, making it a resource that can be used in a variety of contexts and by different health professionals, especially in the field of mental health.

Conclusion

This study resulted in the construction and validation of a clinical simulation roadmap that can be used free of charge to train health professionals to work in the prevention of suicidal behavior in a virtual environment. The validation carried out by experts in the fields of suicidal behavior and clinical simulation showed the suitability of the construction with good agreement in the analyses concerning the results obtained.

To date, the national or international scientific literature has not identified a clinical simulation roadmap that uses the virtual environment and virtual social networks to prevent suicidal behavior in the training of health professionals. Therefore, the results of this study are considered innovative, unprecedented, and represent an accessible alternative for training professionals, contributing to the adoption of safe, scientifically-based practices in mental health care and suicide prevention in the digital age.

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