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Recommended Citation

Davis SP, Stover CF, and Willhaus JK. Simulation Use in Entry-Into-Practice Respiratory Care Programs. Respir Care 2022.

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RESPIRATORY CARE Paper in Press. Published on February 15, 2022 as DOI: 10.4187/respcare.08673

Simulation Use in Entry-Into-Practice Respiratory Care Programs

Samantha P Davis, Camille F Stover, and Janet K Willhaus

BACKGROUND: Teaching and learning using simulation-based methods is increasing in health professions education; however, the prevalence of simulation use in respiratory care programs to date has not been explored. METHODS: All 412 Commission on Accreditation for Respiratory Care (CoARC)-accredited entry-into-practice respiratory care programs were e-mailed a survey inquiring about simulation use as an educational tool in their programs. RESULTS: Of the initial 412 programs contacted, 124 returned the survey, for a 30% response rate. More than three-quarters of programs reported using simulation including 87% of associate degree programs, 75% of bachelor's degree programs, and 100% of master's degree programs. Simulation modalities differed by course and program as did length of simulation activities and debriefings. Simulation hours may not be substituted for learner's clinical time under CoARC guidelines, and 69% of respondents agreed with this stance; however, 66% of responding programs have mandatory simulation learning activities, and 68% believe the amount of simulation should be increased. The survey also revealed respiratory care faculty have limited training in the use of simulation. CONCLUSIONS: Simulation-based teaching and learning is widespread and varied, but there is a lack of faculty development in its use among respiratory care programs. *Key words: simulation; entry into practice; debriefing; respiratory care education; simulation in respiratory care; health care simulation; undergraduate; faculty development*. [Respir Care 0;0(0):1–●. © 0 Daedalus Enterprises]

Introduction

Simulation-based learning is an immersive instructional method used throughout the health professions to prepare trainees for clinical practice using targeted, real-time instruction and feedback.[1] Simulation-based learning may improve knowledge, confidence, competence, and self-efficacy in prelicensure students.[2] Simulated environments afford educators the ability to monitor learner's proficiency from novice to competent in a controlled and safe learning environment. Accrediting bodies and educators alike are shifting toward competency-based assessment models that engage learners in hands-on training and allow them to receive formative feedback that can be immediately implemented.[3] As health professions programs continue to grow throughout the nation, academic programs are challenged to secure clinical experiences for all students, and simulation may be a valuable supplement.[2]

The need for innovation and exploration of alternate clinical placements became strikingly clear during the COVID-19 pandemic when in-person training was canceled for many. Simulation-based learning is deemed a valid substitution for traditional clinical hours for some health profession disciplines, such as paramedicine and nursing.[2,4,5] The Commission on Accreditation for Respiratory Care (CoARC) 2020 Entry Into Practice Standards encourage use of simulation-based learning when adjunctive to traditional clinical experiences but do not consider simulation to be a valid substitute for traditional clinical hours or competency assessment.[6] Faculty and student experiences with different simulation methods are reported in health professions research, but information specific to entry-into-practice respiratory care programs is lacking.[7] The purpose of this study was to determine simulation utilization and challenges in

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The authors have disclosed no conflicts of interest.

This study was supported by a faculty research grant from the Department of Respiratory Care, Boise State University.

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DOI: 10.4187/respcare.08673

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CoARC-accredited entry-into-practice respiratory care programs across the United States.

Methods

In January 2019, a Qualtrics survey was e-mailed to the program director of each CoARC-accredited entry-into-practice respiratory care program (N = 412). E-mail contacts were retrieved from the CoARC web site where they are publicly available. After receiving approval from the executive leadership team of the American Association for Respiratory Care (AARC), the survey was also posted to the AARC's Education Section listserv. CoARC program numbers were requested to eliminate any duplicate responses. Only surveys with valid CoARC program numbers were considered. The responses were de-identified by a respiratory care faculty member not involved in the initial survey before they were tabulated by question. A total of 124 nonduplicated surveys were received, for a response rate of 30%. This inquiry project received an exempt designation by the Boise State University Institutional Review Board. Respondents were eligible to receive a $10 Amazon gift card after survey completion.

Survey Instrument

The 23-item survey was consolidated and adapted from an initial survey of nursing education program use of simulation prevalence and practices conducted by the National Council of State Boards of Nursing (NCSBN).[4,8] The survey included multiple-choice, select-all-that-apply, and free-text responses that inquired about demographics, training, debriefing, simulation modality, accreditation, and recommendations for equivalent clinical time. Simulation-based learning activities may include a variety of methods such as, but not limited to, screen-based computer simulation, high-fidelity simulation with a manikin or standardized patient, and procedure simulations with task trainers. Examples of these methods could be branching logic modules for credentialing examination preparation, neonatal resuscitation training with a manikin that exhibits chest rise and breath sounds, or a head-chest manikin for tracheal intubation training, respectively. Definitions of high-fidelity simulation, computer-based simulation, and task trainer were adapted from the Healthcare Simulation Dictionary and embedded within the survey.[9] See Table 1 for definitions.

Results

One-hundred and twenty-four programs responded to the survey, for a 30% response rate; more than three-quarters reported using simulation education. Of the programs that responded, 87% of associate degree programs (83), 75% of bachelor's degree programs (30), and 100% of master's degree entry-into-practice programs (5) use simulation. Many respondents indicated they offer more than one kind of degree program. These demographics are consistent with the proportion of CoARC-accredited associate, bachelor's, and master's degree programs in the United States. See Table 2 for a demographic summary of responding programs, institution types, locations, and numbers of graduates annually.

Responding programs incorporated high-fidelity simulation activities involving manikins or standardized patients most commonly into foundations of adult therapeutics,

QUICK LOOK

Current knowledge

The use of simulation-based teaching and learning is increasing in health professions education; however, accreditation standards vary widely among disciplines. The Commission on Accreditation for Respiratory Care does not allow simulation to substitute for traditional clinical hours. Simulation-based learning is encouraged as an adjunct to traditional clinical experiences.

What this paper contributes to our knowledge

Many accredited entry-into-practice respiratory care programs use simulation-based learning. Simulation modalities and length of time for scenarios and debriefing vary between, and sometimes within, programs. Although time spent in simulation cannot be substituted for clinical hours, many programs have mandatory simulation-based learning activities and believe that simulation use should increase. Training for faculty who conduct simulation is limited, and few respondents were aware of best-practice standards for simulation.

Table 1. Simulation Definitions

High-Fidelity Simulation	Patient care scenario that uses a standardized patient or a full-body manikin that has the ability to mimic, at a very high level, human body functions. High-fidelity simulation experiences are highly realistic and provide a high level of interactivity and realism for the learner.
Computer-Based Simulation	The modeling of real-life processes with inputs and outputs exclusively confined to a computer. Subsets of computer-based simulation include virtual patients, virtual-reality task trainers, and immersive virtual-reality simulation.
Task Trainer	A device designed to train in just the key elements of the procedure or skill being learned (such as insertion, injection) or just in part of a total system.

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Table 2. Demographic Information

	No.
Type of Program	
Associate	95
Baccalaureate	40
Graduate	17
Other	1
Type of Institution	
Academic/teaching medical center	11
University/college	24
Community college/technical school	77
Geographic Setting	
Urban/metro area	60
Suburban	38
Rural	24
Programs by Graduate Numbers	
≤ 10	16
10–50	99
51–100	3
≥ 100	1

Table 3. Type and Amount of Simulation Use in Courses

Course	High Fidelity no. (%)	Computer no. (%)	Task Trainer no. (%)
Foundations of adult therapeutics	58 (47)	45 (36)	72 (58)
Neonatal/pediatrics	59 (48)	41 (33)	6 (5)
Adult critical care	96 (77)	64 (52)	53 (43)
Patient assessment	90 (73)	54 (44)	65 (52)

neonatal/pediatrics, adult critical care, and patient assessment courses. The number of programs offering these courses and corresponding simulation use is listed in Table 3.

In addition to simulation with manikins, 50% of respondents reported using live actors or standardized patients in their simulation programs. Approximately 30% used advanced lung simulators, such as commercially available products from Gaumard, IngMar Medical, Laerdal, or Michigan Instruments. Internet virtual hospital programs (21%) and computer screen-based simulations (22%), such as those independently developed or commercially available from Body Interact, were also widely used. A small number of programs (2%) reported using immersive or virtual reality simulation, such as those independently developed or commercially available from Oxford Medical Simulation.

The length of time allocated for a simulation scenario and debriefing differed among schools, and some programs reported length of scenarios varied within the program. Approximately 81% (100) of responding programs indicated that they used simulation scenarios lasting 15–30 min; however, some programs (56%, 69) reported scenarios that lasted 31–60 min, and others (44%, 55) used scenarios that lasted more than an hour. Respondents selected more than one time allocation when their program offered more than one simulation scenario length. Debriefing duration also varied from no debriefing to debriefing sessions that lasted as long or longer than the actual simulation scenario (See Table 4). Only 33% (41) of respondents reported using a structured debriefing method, whereas 60% (74) did not use a structured method, and 2% (3) did not debrief at all. The 3 most reported structured debriefing methods used were Promoting Excellence and Reflective Learning in Simulation (PEARLS),[10] advocacy/inquiry,[11] and Plus/Delta.[12]

Most programs indicated limited faculty development training in simulation. Whereas 45% (55) reported faculty were trained on how to run a simulation scenario, only 40% (49) said faculty were trained in debriefing. Approximately one-third of programs reported faculty training in scenario development and manikin programming. Only 28% (35) of respondents indicated familiarity with the International Nursing Association for Clinical Simulation and Learning (INACSL) Standards of Best Practice: Simulation.[13] The standards were renamed the Healthcare Simulation Standards in 2021; however, the former name is used here as it was current at the time of the study.[14] Even fewer (15%, 18) reported working in a simulation program accredited by the Society for Simulation in Healthcare.

CoARC does not allow simulation hours to be substituted for learner's clinical time, and most respondents (69%, 85) agreed with that stance. Despite these findings, 66% (82) of responding programs have mandatory simulation learning activities, and 68% (84) believe that the amount of simulation being used should increase.

Discussion

Compared to colleagues in nursing and medicine, the respiratory care profession lags behind in the adoption and utilization of simulation-based education. These findings are expected as the respiratory care profession is much newer in comparison, and the authors are encouraged by the current widespread use of simulation in entry-into-practice programs. Themes that emerged from this study that warrant further discussion are faculty development, debriefing, and standards of best practice.

Results of this survey indicate that faculty development in simulation for respiratory care educators is fragmented and sparse. Fewer than half of all respondents indicated receiving any faculty development in simulation design, debriefing, or technology-based instruction. Lack of faculty development may be related to limited financial resources, insufficient time or space, or a general scarcity of simulation research in respiratory care education demonstrating the need for such training. Without facilitators who are trained in simulation pedagogy and able to deliver consistent experiences that are formally evaluated, the outcomes

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Table 4. Debriefing Time by Simulation Scenario Duration

Simulation Scenario Duration	no. (%)	No Debriefing no. (%)	Debriefing Time Less Than Scenario no. (%)	Debriefing Time Equal to or Longer Than Scenario no. (%)
15–30 min	100 (81)	3 (3)	47 (38)	50 (40)
31–60 min	69 (56)	1 (1)	46 (37)	22 (18)
> 60 min	55 (44)	2 (2)	43 (35)	10 (8)

of simulation-based learning are difficult to measure.[10] Variable learner experiences and the inability to articulate return on investment to administrators may create a snowball effect leading to lack of buy-in and inadequate resource allocation, making it even more difficult to launch or maintain a simulation program. Simulation is an instructional technique informed by learning theories, intended to enhance and supplement real experiences with guided experiences.[15] To get distracted by the bells and whistles of cutting-edge technology without investing time and effort to learn simulation pedagogy is a common pitfall but is short-sighted and may have lasting negative effects.

Faculty development in simulation spans all phases of the process from design and facilitation to debriefing and operations. Through membership in professional societies, attendance at international conferences, and participation in stand-alone workshops, aspiring simulationists can gain the knowledge and skill needed to deliver high-quality simulation experiences. Debriefing is an important aspect of faculty development in simulation that has its own dedicated courses and standards of best practice. The simulation facilitator's role is to ensure an environment where lessons learned in the didactic and simulation environments can be translated and applied to clinical practice. In debriefing, learners will recount their experiences, celebrate successes, and debate shortcomings, but the facilitator is needed to guide the discussion from description to analysis to application.[10]

Whereas most survey respondents indicated that they engage in debriefing as part of their simulation practice, nearly two-thirds indicated that they do not use a structured approach. Among those who engage in structured debriefing, PEARLS,[10] advocacy/inquiry,[11] and Plus/Delta[12] were most used. PEARLS is a conceptual debriefing framework focused on learner's self-assessment, facilitating focused discussion, and providing information in the form of direct feedback.[10] Advocacy/inquiry is a conversational tool embedded within the Debriefing with Good Judgment model that involves pairing one's stated perspective with an open-ended inquiry to learn more about others' perspectives.[11] Plus/Delta is a debriefing technique where learner's actions are placed into columns labeled plus (+) and delta (Δ), indicating which actions should be continued or changed, respectively.[12] Structured debriefing methods exist beyond those described here and are largely selected by facilitator preference.[15] Novice simulation educators may use scripted and structured debriefing to improve learner's knowledge acquisition while standardizing the debriefing process.[16] Expert simulation educators often do not ascribe to any specific debriefing method but rather use the method most relevant to the learning objectives, scenario, location, and overall situation.[17] With only 40% of survey respondents indicating that faculty receive professional development in simulation debriefing, it is not surprising that 60% do not use any structured debriefing method. Without training or mentorship, faculty may be unaware of structured debriefing methods, their proper use, or lack confidence in their debriefing facilitation skills. Professional development opportunities and funding are needed to better prepare respiratory care educators for simulation practice.

Respondents' unfamiliarity with INACSL Standards of Best Practice: Simulation offers an excellent opportunity to learn from our colleagues in other disciplines regarding best practices in simulation. Instead of starting from scratch, respiratory care educators and simulationists should seek guidance from those who have done this work for decades. Our colleagues have put energy into developing and vetting standards of best practice that can inform our simulation practice and its integration into our academic programs and accreditation standards. Other professional organizations, such as the Association of Standardized Patient Educators and The Gathering of Healthcare Simulation Technology Specialists, have created standards of best practice specific to standardized patients and simulation operations.[18,19] Examples of these standards are outlined in Table 5. Beyond the knowledge gained through learning and integrating these standards into our practice, they provide a foundation for those interested in seeking simulation accreditation. Adapting the various standards of best practice may better prepare respiratory care educators to articulate return on investment, secure funding for equipment or professional development, engage in scholarship to advance the profession, or obtain simulation leadership roles.

Limitations

There are a few limitations to this study. First, the data represent a snapshot in time. Recent global changes in medicine, education, and simulation may have impacted the use of simulation in respiratory care programs. Second, the response

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Table 5. Examples of Best-Practice Standards in Simulation

Standard	Author	Brief Description
Simulation Design	INACSL Standards of Best Practice: Simulation	Recommends criteria for achieving optimal simulation design, such as performing a needs assessment, participant evaluation, and debriefing
Debriefing	INACSL Standards of Best Practice: Simulation	Recommends criteria for achieving optimal debriefing, such as facilitator competency and learning environment
Training Standardized Patients	Association of Standardized Patient Educators Standards of Best Practice	Describes principles of SP training methodology, including preparation for training, training for role portrayal, training for feedback, training for completion of assessment instruments, and reflection on the training process
Professional Development	Association of Standardized Patient Educators Standards of Best Practice	Describes principles of SP professional development, including career development, scholarship, and leadership
Domains of Practice	The Gathering of Healthcare Simulation Technology Specialists	Describes practice domains such as information technology, theatrics and staging, and management and operations
Core Competencies	The Gathering of Healthcare Simulation Technology Specialists	Describes core competencies such as audiovisual technology, research and evaluation, and education

INACSL = International Nursing Association for Clinical Simulation and Learning
SP = standardized patient

rate of 30% is less than desired despite following best practices in electronic survey distribution. Recent literature suggests that low response rates may have little correlation to nonresponse bias; however, we recognize this limitation.[20-21] Survey responses were representative of entry-into-practice undergraduate and graduate programs in rural and urban areas throughout the United States. In addition to e-mail distribution, the survey was shared via the AARC's Education Section listserv to capture more responses; however, this method only reaches those who are members of both the AARC and the Education Section. This study may underrepresent entry-into-practice respiratory care programs not using simulation because those program faculty may have declined to participate in the survey.

Conclusions

The use of simulation in entry-into-practice respiratory care programs is widespread, though highly varied. Challenges of the clinical environment include limited availability of high-quality clinical experiences, matching student learning objectives to the available patient population, and ensuring equitable training opportunities for all learners. Simulation-based learning is an instructional technique that can be used to address these challenges; however, it requires training, ongoing faculty development, and resources to be most effective. The desire for simulation-based learning in respiratory care is clear, but the lack of standardization may be our most significant hurdle to overcome. Future research should focus on faculty development in respiratory care simulation and the use of simulation in respiratory care education given the challenges of COVID-19.

ACKNOWLEDGMENTS

We would like to acknowledge Dr Joe Coyle and Lonny Ashworth for their assistance with survey development and data de-identification.

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RESPIRATORY CARE Paper in Press. Published on February 15, 2022 as DOI: 10.4187/respcare.08673

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