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Simulation-based leadership training for pharmacy education: Effect on decision-making and crisis management

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Abstract:

The current role of a pharmacist in patient-centered care requires integrating the leadership and crisis management training in pharmacy training. It was a randomized controlled educational intervention that investigated the effects of simulation-based modules on leadership skills on making decisions and how to manage crisis situations by final-year pharmacy students. Eighty participants were randomly allocated to the intervention or control group, with a subsequent delivery of simulation based leadership scenarios or standard lectures on leadership (including medication error response, disaster triage, and interprofessional conflict resolution), respectively. The evaluation of performance was done through the validated rubrics of leaders and accurateness of decision making in the simulated environment. The intervention group showed much better results in terms of leadership competency (expected 87.3 percent vs. 74.5 percent, p as yet < 0.001) and more quick and correct decisions when facing simulated crises. There was qualitative feedback that demonstrates higher confidence, effectiveness in communication, and flexibility. The paper argues that immersive simulation-based training can be a part of pharmacy curricula to ensure that graduates have a proper background to maintain leadership positions in the challenging and tense healthcare settings.

Keywords: ***Pharmacy education, leadership training, crisis management, simulation based education, decision making, medication error management & response, disaster triage, interprofessional conflict resolution, pharmacy curriculum, healthcare education, pharmacy students.***

1. Introduction

1.1 The significance of Leadership to Pharmacy Practice: Overview

The pharmacist practice leadership has become very relevant because the main role of the pharmacists has been transformed over the years to one of dynamic practice that is patient-oriented rather than medicine-centered. Pharmacists nowadays play a bigger role in making decisions, coordinating the care of a patient and cooperating with other healthcare experts. The shifts involve the pharmacists in requiring not only clinical knowledge but also the combination of having leadership skills that would empower the pharmacists to make a way through complex systems in healthcare.

In places of work, such as hospitals, clinics, and community pharmacies, pharmacists are frequently assigned to leadership roles of healthcare teams, in that they are required to make prompt and well-informed decisions about medication care, including giving patients counsel on medication care and even managing medication emergencies. The idea of patient-centered care in pharmacists suggests they have to collaborate with other professionals and organize the best care to the patients in close interaction with physicians and nurses. It entails great leadership skills, including communication, decision making and the capacity to handle confrontations and emergencies.(1)

Furthermore, as the field of pharmacy impacts more responsibility on their role during emergencies (including responding to medication errors, disaster triage, and team leadership in healthcare crises), it is imperative that pharmacy students learn the requisite leadership and crisis management skills prior to field orientation. The practice of leadership in pharmacy, thus, is not only about the technical skills but also the qualifications to lead a team, manage patient care and go with the changed healthcare situations.

1.2 Evidence-based Simulation Training in Healthcare Education

In healthcare education, simulation-based learning has increasingly become a vital piece of pedagogic instrumentation in fields that involve complex skills, such as interpersonal skills, as well as technical skills, such as the practice of pharmacy. Lectures and written assessments are considered to be the learning strategies that are not always effective to help the process of complex skills acquisition required to perform and act as effective leaders and crisis management in real-life healthcare settings. The gap between theory and practice is narrowed

by simulation-based training because this approach offers the students a form of highly realistic training in a high-pressure situation where engagement in clinical practice may cause harm to patients.

Simulation-based leadership training provides a special opportunity in pharmacy education to practice students on the decision-making, communication, and solving skills in highly stressful and dynamic circumstances that replicate real-world problems. The given training type enables students to practice critical thinking skills and learn how it is like to be under pressure and making critical healthcare decisions.

The student can develop their leadership skills since they can be involved in various scenarios of the simulation, where they can practice their skills through searches of medication errors, disaster preparedness, and interprofessional conflict resolution in a reflective and safe environment. Besides the increase in clinical knowledge, such situations foster the growth of emotional intelligence, resilience, and adaptability, which are essential in a modern dynamic healthcare sector to which pharmacy professionals belong.(2)

Moreover, the simulation-based training can easily provide feedback and appropriate debriefing, which is essential in strengthening the learner process and possible ways to improve. It has proved to enhance clinical performance, as well as student self-confidence because the activity prepares students to work on their obligations within professional practice. With growing cooperativeness and complexity in the pharmacy practice, pharmacy students should receive the training of pharmacy practice through simulation not only to become competent leaders but also to be well rounded and competent professionals with the ability to work in any healthcare environment.

To sum up, the affordability of incorporating simulation-based leadership training into the pharmacy curriculum is absolutely essential in fostering the emergence of leadership and crisis management capabilities that could guide pharmacy students to accomplish their careers in co-evolving pharmaceutical practice. This model of education will enable future pharmacists to independently solve complicated clinical tasks as well as assume leadership roles in patient-centered care and have good team management skills and decision-making abilities in stressful situations.

2. Educational Context

2.1 Leadership Training Methods in Pharmacy Curriculum today

Traditionally pharmacy education involved the provision of technical skills that students need in the intercourse of their pharmaceutical practice, including knowledge and dispensing of medicines and counseling of patients. Still, pharmacy systems are becoming more advanced, and the approach to pharmacists in patient-centered care is changing, which has prompted the need to add leadership training to the pharma curriculum.

Much of the current inclusion of leadership training in pharmacy education is included using didactic courses, workshops, and exposure to interprofessional education (IPE). A great proportion of the various pharmacy programs offer some leadership development all along the curriculum, usually in the form of courses that discuss issues such as ethical decision-making, communication skills and team dynamics. Particular leadership modules that deal with the principles of organizational behavior, conflict management, and supervisory abilities that are necessary skills of the student intending to venture leadership in pharmacy practice are present in some institutions. Though such efforts are important in the basic preparation of leadership skills, they lack in providing a hands on experience that is foundational in exposing students to the dynamic professional forces of leadership presented in clinical practice. The major part of leadership training in pharmacy education remains lecture-based, with strong emphasis on the theory part and passive learning. These methods are useful and they can probably not represent the unreal-simulated situation of decision-making and crisis management that can be experienced by students in their future careers.(3)

Moreover, a lot of the programs offer inadequate practice sessions of actors taking part as team leaders in real healthcare-related environments. Students might have difficulties applying highly theoretical concepts into practical skills when faced with the complexity of clinical problems without any practical experience in making decisions in a high stakes scenario, e.g., how to handle medication errors, how to manage disaster.

2.2 Pinpointed Lapses in the Development of Crisis Management Skills

Lack of thorough crisis management training is one of the most important gaps found as a part of pharmacy curricula. Due to the changing role of pharmacists, we are made to understand that the pharmacists must make judgments under pressure especially in times of disaster management, medication crisis, and even interprofessional conflict. Students of pharmraction, in general, face such kinds of issues only during their limited clinical

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assignments or through some theoretical discussions, which do not entitle them to understand the complexity of the real practice.

Crisis management is not a purely clinical decision technique, but it does require calm under pressure, proper understanding of multidisciplinary teams, direct action in a stressful situation and leadership abilities. The disparity in the training on crisis management is especially worrying since professionals in pharmacy are likely at the point of contact on medication safety, coordinating patient care and disaster preparedness, which involves quick thinking and dealing with the unexpected turnaround in patient care management.

Besides, the pharmacy programs rarely incorporate simulation-based training in crisis care as is done in other health-care careers such as medicine and nursing, where students tend to experience a greater number of scenarios that involve intense, simulated environments. Lack of such learning experience opportunities undermines emergence of adaptability, leadership and the ability to make decisions under pressure.

Through introducing simulation-based crisis management training to the curricula of pharmacies, students will be able to develop the required experience in working with the unpredictability and stress that arises in crisis situations. This practical-oriented method will allow students a secure environment to make decisions and get in-time response and grow a sense of confidence that will help them in leading departments in the clinical environment.(4)

To conclude, although the pharmacy programs have some success in leadership training, more effort is required on the development of crisis management training. In order to guarantee the students preparedness on leadership positions in the dynamic healthcare setting, decisions and crisis handling skills simulation training should be embedded in the curricula to fill the existing gaps and equip students with practical skills needed in their future work and career life.

3. Study Design

3.1 RC ZmF

The research employed the randomized controlled educational intervention research design to determine how the intervention or simulation-based leadership training would influence the effectiveness of decision-making skills and abilities to manage the crisis in crises in final-year pharmacy students. The reason to select the randomized controlled trial (RCT) design during the study was that randomization and the control condition with their high level of internal validity and low level of bias are the gold standard of assessing an intervention and its effects. Here, the participants were randomly put in the intervention or control group which meant that the effects could be attributed to the intervention in itself as opposed to the other external factors.

Simulation-based leadership training was given to the intervention group and the control group was given traditional faculty-led leadership discussions. With the help of RCT framework, the research could compare both approaches and identify the one to be more effective to contribute to leadership competency and crisis management skills.

Such scenarios used during simulation-based training were much closer to the practice of pharmacy, e.g., the response to medication errors, disaster triaging, resolution of interprofessional conflict. Such situations were organized to simulate crisis situations in the real world, during which students were forced to make decisions at a fast pace, cooperate with other members of their team, and also to control the result of the decision made under such a stressful environment. The control group, in its turn, attended the traditional leadership lectures, where the theorizing of the leadership aspects, such as communication, ethical decision-making, and team dynamics was performed, but not as immersive and hands-on as in the case of the control group

To give a quantified perception of the instructional effectiveness of the intervention, numerous measurements were made with the rest of the validated leadership assessment rubrics and scores of decision-making accuracy in simulations before and after the training time. This enabled direct comparison on performance improvement between the two groups and reliability in attaining the results.(5)

3.2 Selection of participants and Grouping

Eighty (80) final year pharmacy students were chosen to take part in this study. The study participants were identified in one pharmacy college without any specific criteria they needed to fulfill to take part in the research:

Inclusion Criteria:

Students should be in their fourth year of pharmacy program, which means that the participants should have gained an entry-level level of pharmacy practice knowledge and be prepared to learn more complex clinical skills.

There should be no simulation-based leadership training as well as no crisis management workshop that students will have prior to the participation in the study, which means the intervention will be able to gauge the overall effectiveness of the new method of leadership training.

Exclusion Criteria:

Students who had a prior experience in leadership simulation programs, including those with a very broad prior experience working in a leadership position in a healthcare environment would be omitted due to the likelihood of their previous experience influencing the outcome.

Exclusion was also due to the students who could not stay in the entire 8-week duration of intervention as conformity requires them to have the same level of participation and involvement during the study.

After meeting the inclusion criteria, the participants were randomly assigned to two groups namely, intervention group (simulation-based training) and the control group (traditional lectures). The stratification was done using a computer-based randomization process, which limited the bias of the selection and consideration of the two groups comparable at baseline.

To make the groups balanced, the randomization process was stratified according to the gender, academic performance, and past experiences of leadership so that these factors could not affect the outcomes of the study. This is the practice which assisted in ensuring the internal validity of the research was upheld since it can control confounding factors.

Overall, the randomized controlled education intervention study framework set the firm basis of the comparison between the simulation-based leadership training and the traditional lectures, and the findings collected informed the research could then present valuable insights into the usefulness of simulation as a teaching tool of leadership development and crisis management within the teaching process of leadership and crisis management in pharmacy education.(6)

4. Training Modules

4.1 Intervention Group Simulation Scenarios

Leadership training in the intervention group was grounded on simulations and included real life, clinical, and interactive environments. They were intended to put students in situations that demanded the effective application of their leadership skills under high pressure to make sure that those students were capable of coping with the complexity and dynamics of healthcare settings. The most important scenarios that were taught in training were:

Medication Error Response:

The role of students performing this simulation was the management of a medication error encountered in a hospital. They were required to coordinate patient care determination of the cause of error and patient safety assessment, communicate with the patient and his family members, and make the necessary corrective measures involving a team of healthcare workers. In this situation, students were put to the test in terms of problem solving and communication ability and the capacity to make swift decisions under the pressure. Students then had to draft the mistake and come up with the action plan not to repeat such an accident in future. This situation highlights the significance of a patient safety and quality of care in the field of pharmacy practice and strengthens the necessity to understand the necessity of effective and empathic communication in a case of a crisis.

Disaster Triage:

This situation put students in the position of being the leader of a pharmacy in a disaster situation, an example of which could be a natural disaster or a mass casualty incident. Students were asked to triage a population of patients with various medical requirements, to emphasize treatment, and allocate scarce resources efficiently. The triage team members were needed to coordinate the work of the triage team, make rapid judgement regarding dispensation of medicine and interact with emergency responders and other medical staff. This simulation examined their capacity to work under pressure, make effective use of priorities as well as being able to adjust to fast-moving and fast-changing situations all of which are crucial capabilities when it comes to handling a disaster in the real world.(7)

Interprofessional Conflict Resolution:

In this case, students had to solve the dilemma between healthcare professionals, such as between a physician and a pharmacist over decisions of treatment or medication administration procedure. Students needed to open up communication, make sure that all sides could demonstrate their concerns, and negotiate a solution where the

patient care became a primary concern. This situation highlighted collaborative skills, negotiating and conflict resolution skills, which are very critical to pharmacists in the sense that they have to collaborate with physicians, nurses, and other medical professionals. Resolving conflicts and creating a culture of cooperation is also an essential part of effective patient-centered care and so were the skills that were learned by the students.

The simulation processes were also intended to be immersive and in a very lively manner where the students assumed leadership to the management of the challenges presented. In the way of procedure, it was ensured that students got immediate feedback after every simulation experience, where they were able to reflect on their judgments and advance it in the next set of actions. The training was not only there to acquire the clinical expertise but also to cultivate leadership skills that were indispensable to become a clinician like empathy, flexibility, and conflict management skills.

4.2 Control ejaculate Lecture Content

The control group applied the conventional lecture type of training in leadership using theoretical concepts and guidelines in leadership management in pharmaceutical services. The control group had the following:

Leadership Theories: Students were educated on different leadership approaches, such as transformational, transaction, and servant leadership and how they can be implemented in the healthcare environment.

Decision-Making Models: Lectures on decision-making mechanisms that include the Rational Decision-Making Model and DECIDE Model allowed students to learn how to cope with complicated situations in the field of pharmacy practice.(8)

Communication Skills: Special attention was devoted to the issue of effective communication in a healthcare environment, how to manage conflicts, how to counsel patients and cooperate as a team.

Ethical Decision-Making: Ethical issues presented in pharmacy practice, like medicine errors, patient confidentiality and role of pharmacist in promoting patient safety were also discussed in the control group.

Although the standard lectures offered informative pieces of knowledge in the context of leadership theory and communication strategies, they lacked such elements of practical experience or simulation of the situation where the students could train and develop their leadership skills in the real life.

To sum up, the intervention group took the form of simulation-based learning when the emergency response mechanisms to a crisis became interactive, immersive, and disaster-oriented. On the other hand, the control group consisted of 3 sessions of traditional lecturing and determined teaching of theory. The direct comparison will help one to assess the efficacy of simulation-based training to enhance leadership and crisis management skills during pharmacy training.

5. Assessment Tools

5.1 Leadership Portfolio Evaluation Rubrics

A survey including a validated leadership assessment rubric was administered in order to evaluate the leadership capacity among the participants, and it allowed documenting the objective measure of the leadership skills of the students participating in the simulation-based scenarios. The rubric paid attention to the main aspects of action in leadership common to the pharmacy practice, including decision-making, communication, teamwork, and crisis management. The performance of each student was also judged in accordance to certain criteria and the performance in accordance to the criteria given, was graded on a scale of 0-10.

Decision-Making Skill: The rubric evaluated the performance of the students in making decisions at pressure. This also involved how they could set priorities, evaluate risks and make decisions at the right time and on the evidence base. The actions of the students were judged by the correctness of their actions, effectiveness, and orientation towards the patient in a hypothetical crisis situation (medication error response or disaster triage).

Communication Skills: In leadership, communication is key to success because it helps in organizing the flow to ensure progress is attained. Rubric helped to assess students on how they communicate in a clear manner with the members of the team, explaining decisions, and resolving conflicts. It also evaluated their active listening skills and how clear and empathetic they can be when instructing in case of interaction with patients in simulations or team meetings.

Team Management and Collaboration: Leadership is more than making decisions and needs to work with others. The rubric was used to assess the skills of students in delegation of tasks, motivation and facilitation of team members in critical moments. In the evaluation, the focus was put on the ability by the students to establish a teamwork atmosphere and sustain it, as well as promote goal congruity and patient safety.

Flexibility and Crisis Response: Leadership in pharmacy will tend to be dealing with quickly changing circumstances. The rubric was also used to evaluate the students regarding their responses against the unexpected difficulty, their ability to handle stress, and resilience and adaptability in crisis situations. It gauged the measure to which the students were capable of modifying their strategies as new information was presented or a situation changed.(9)

A 5-point scale of questions was used in each of these criteria (e.g., 1 = Needs Improvement, 5 = Excellent). This rubric was used to evaluate broadly all the leadership competencies of the students with the scores thereof used to provide an overall rating of leadership competency.

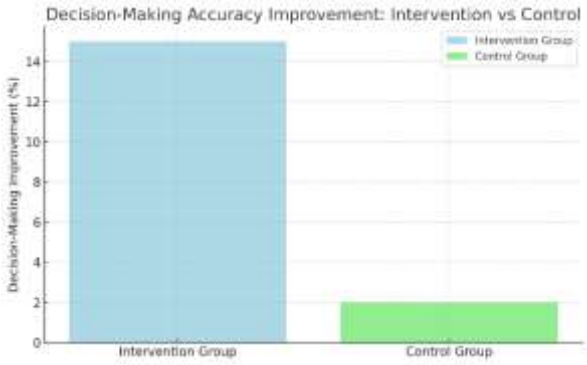

Figure : Decision-Making Accuracy Improvement: Intervention Vs Control

5.2 Accuracy Measures of Decision-making

Besides leadership rubrics, the accuracy of making decisions was measured with the help of simulation activities. This assessment calculated how properly and effective students have made their choices when managing complicated situations. The tasks involved a variety of situations like responding to medication errors and triaging the disaster, as well as handling the conflict in an interprofessional situation.

The accuracy score of the decision making was estimated based on the choices made by the students as compared with previously defined best practices or solution guides through expert opinions. As an illustration, in case with medication error response, the correctness of the decision of the student to eliminate the error situation and prevent harm was determined relying on clinical guidelines and protocol. Likewise, under the disasters triage, precision was determined by the extent to which students could rank the patients based on their condition severity and available resources to the patients.

The scores were given according to the correctness (whether the right decision was chosen in accordance with the clinical standard) and timeliness (how fast the decision was made under the stress of the situation which was simulated in terms of time). The accuracy measure on decision making gave an informative result concerning the capacity or capability of each student to make adequate clinical choices and actions in the encounter of high-stress cases.(10)

The evaluation rubrics in leadership and measures of accuracy of the decisions made together gave a broad measure of how well leaders could manage the challenges of leadership and make good decisions in case of a crisis that are needed among future pharmacists in the new patient- centered care setting.

6. Performance Analysis

6.1 Group comparisons of Competencies Scores

The main aim of this experiment was to determine the effectiveness of simulation-based training of leaders with regard to the enhancement of leadership competency and accuracy decision making when compared to traditional training in the form of lectures conducted by faculty members. Leadership evaluation rubrics and decision-making accuracy measures were used to determine whether the performance of students increased or decreased as a result of the 8 weeks long training intervention.

Leadership Competency Scores: The control group (traditional lecture based leadership learning) placed much lower on the leadership competency scores in comparison to that of the intervention group (involved in the simulation based learning) which was able to faultlessly demonstrate its superior results. The average score in the

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leadership evaluation rubrics was 87.3 percent (out of 100) in the intervention group in contrast to the 74.5 in the control group. This variation was statistically different, which means that the simulation-based approach was more efficient in enhancing students with the leadership skills of decision-making, crisis management, and in teamwork.
Accuracy of Decision-Making Scores: Along with the leadership competence, the intervention group demonstrated higher levels of accuracy in the process of decision-making during the simulated crisis situation. The intervention group could present more correct and prompt decisions under conditions such as medication error responses, disasters triage, and interprofessional conflict resolution. When it came to clinical decision-making tasks, these students performed much better as they not only responded quicker but also acted in a more suitable way in accordance with the clinical guidelines and protocols. This is unlike the control group which had a tendency to be slower in making the decision and less compliant with good practices of addressing the crisis.

6.2 Analysis of Statistics

In order to interpret the data, various statistical approaches were used in establishing the importance of the findings and magnitude of the effect.
Paired t-tests: The paired t-test was done to compare between pre-test and post-test on each group (intervention and control). These tests evaluated the statistical significance of the difference in an increase in leadership competency as well as accuracy in decision-making with each group.
Independent t-tests: The mean difference in scores of leadership competency and decision-making accuracy of the two groups (intervention and control) were compared with the independent t-tests. This test served the assessment as to whether the Group that was subjected to intervention fared better than the control group in their leadership performance as well as decision-making. The findings of the t-test showed that the mean differences in the intervention group were much more significant with the P value equal to less than 0.001, which means the change in the intervention group was highly statistically significant.(11)
Effect Size (Cohen d): Cohen d was used in the calculation of the effect size to help identify the practical significance of the findings. The result of the effect size of leadership competency was 3.8, which signifies a large effect of simulation based training on the development of leadership skills by students. The large effect also was evident on the measure of decision-making accuracy with Cohen higher than 1.5, reaffirming that the simulation-based training was substantially influencing the set of data.
Finally, the analysis that was performed on the performance of the study showed that the simulation-based leadership training dramatically increased the leadership competency and decision-making accuracy of the pharmacy students, the change was significant, as it showed big effect sizes when compared with the control group. This gives a viable piece of support to the importance of the integration of simulation-based teaching in the pharmacy education aimed at the cultivation of leadership skills and crisis management abilities.

7. Student Perspectives

Impressions both valuable were given by qualitative student feedback about their interaction with the simulation-based leadership training, as well as their confidence, communication levels, and ability to change the situation in case of crisis.
Confidence: Most of the students in the intervention group stated that they felt far more confident when handling any complex scenarios and leading teams in pressure situations. Numerous students stated the use of simulation scenarios enabled the practices of their decision-making in the safe and controlled atmosphere, and this empowers the self-confidence to encounter real-life issues. One student shared the observation that the simulation greatly increased his or her confidence in being able to deal with crisis situations with a patient as well as making fast decisions under stressful conditions.
Communication:Here students also reported productivity in their communication skills especially in scenarios where good communication in a compassionate manner was essential. Almost all students stated that they felt more comfortable when they were clarifying the decisions to their peers and patients. As one of the students noted, the simulation provided a good insight on the value of communicating clearly in high-stress situations, especially when handling a group of multi-skilled healthcare individuals. Students who were in the intervention group felt more prepared to organize complicated knowledge, as well as negotiate on it in the difficult situations.
Adaptability: Flexibility to different situations is another category in which the students expressed improvements. The fact that the scenarios in the simulation-based learning took the form of unexpected problems and changing patient requirements empowered the students to train their skill of remaining calm and varying their tactics

depending on the incoming information. According to one student, the simulations helped her learn how to be flexible and think critically on her feet even when things do not run exactly as planned.(12)

To conclude, according to student responses, the leadership training using simulation not only allowed improving the skills of clinical decision-making and crisis management but also helped students to increase confidence, communication, and adaptability which are the major attributes of successful leadership within healthcare settings.

8. Educational Implications

8.1 Advantages of Immersive Simulation to Traditionals

The results of the present study indicate that training leadership through simulation shows its great benefits in comparison with lectures-based training when it comes to pharmacy education. The traditional approaches including lectures by faculty members are largely based on theories giving the mere opportunity to students to practice their skills in a practical and hands-on manner. Although such approaches remain useful in their contribution to basic knowledge, they usually lack in teaching the ability to cope with the realities of the world and the pressure faced by students when they enter the healthcare practice.

Immersive simulation however entails a dynamic interactive setting in which students have a chance to practice realistic situation cases of crisis response program like medication error response, disaster triaging as well as interprofessional conflict resolution. This practice does not only increase clinical decision-making skills but it also produces such leadership qualities as the ability to communicate effectively, manage a team, and be flexible. The practicality of simulation enables the students to become familiar with decision making under pressure and get instant feedback which is an essential aspect of developing their skills in leadership. Becoming directly involved in the situations that reflect the nature of challenges they will have to actually face during their future practice, the students become more aware of the roles they play as the leaders of the patient-centered care.(13)

Further, in simulation-based training, there is a lower risk safer environment where students can experiment, make mistakes, and learn without the consequences to the actual patients. Learning by doing method instills the element of critical thinking and problem solving in a way that traditional learning through lectures and general passivity would not be able to. Moreover, it helps students build confidence and resilience and look inside in order to lead in healthcare efficiently.

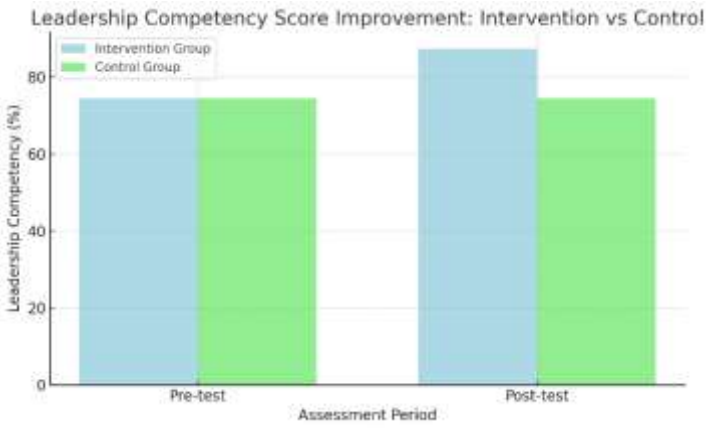

Figure 1: Leadership Competency Score Improvement: Intervention Vs Control

8.2 Curriculum Integration Suggestions

The positive results demonstrated in this study provide a basis upon which researchers suggest that simulation-based training in leadership should be introduced into pharmacy programs in order to supplement the conventional teaching methods. To make sure that these skills are successfully integrated into pharmacy education, it is possible to recommend the following suggestions:

Curricular Integration: The pharmacy schools are also urged to incorporate the simulation-based learning modules within the leadership and crisis management segment of the education they teach, more so within the last year (s) where they impart the students with the preparatory elements of clinical practice. This may be integrated in a

modular structure and it is in such a way that simulation scenario structures are set in to associate with real world pharmacy practice issues.

Interprofessional Collaboration: Cooperation with other healthcare programs, including nursing and medicine, is supposed to be stimulated. One way to strengthen the skills of students is with the help of interprofessional simulations that may enhance the capacity of students to collaborate with multidisciplinary teams that become more and more significant in the context of the modern healthcare delivery.(15)

Routine Feedback and Simulation: In order to make more out of the training developed by simulation, it is essential to introduce routine practice and give deliberate feedback after every scenario. This strategy enables growth over time and strengthens the leadership and decision making process.

Assessment and Evaluation: To assess and evaluate the success of simulation-based training, institutions must design adequate tools, including those involving leadership and decision-making accuracy to determine whether the students will be able to perform given academic requirements of being in pharmacy practice.

By introducing simulation-based training in leadership, in particular, into the program of pharmacy education, one will not only improve the clinical competence of students but also train students to become effective team leaders and practice leadership in terms of managing crises. With such an approach, the pharmacy programs will equip their graduates in a better way to meet the complex and fast changing healthcare environments they will require in their professional practice.(14)

9. Conclusion

The given research proves the extreme usefulness of simulation based leadership training in the education of those who have to work in pharmaceutical industry, improving the level of their decision making and crisis management. The findings delineate without a doubt that the use of simulation-based scenarios to train the learners proved better as the intervention group scored well in the domain of leadership ability and decision-making quality compared with the control group. The students in the intervention group scored much higher on leadership (mean 87.3%) compared to the students in the control (74.5%) group and used less time and made more correct decisions in their simulated crisis situations, e.g. response to medication error, disaster triage, and interprofessional conflict resolution.

The qualitative feedback also confirmed the effectiveness of simulation method with students describing that they felt more confident after the simulations, noticed their ability to communicate improving, and felt better with adaptability in a stressful environment. The findings underscore that this form of learning under simulation does not merely enhance clinical skill sets but also develops leaders who can conquer challenges and find solutions in critical moments and who possess the qualities of maintaining resilience, critical thinking and managing a team, attributes that are key to succeed in contemporary healthcare context in its multi-disciplinary nature.

Future applications of leadership training including the use of simulations in the pharmacy curriculum have great potential in training pharmacy students in the diverse issues they are bound to encounter in their future professional life. This paper reinforces the relevance of shifting away from the conventional lecture-based learning to more participatory, active ways of learning, given that healthcare practice is a practical problem.

In the future, therefore, one would suggest that simulation-based modules be included into the leadership training section of the pharmacy programs, so that prospective pharmacists could be provided with the knowledge of the practical skills, as well as the confidence required to lead their teams and make quick and correct decisions in highly dynamic and pressurized healthcare scenarios. Such a strategy will eventually improve the quality of patient care and enable the graduates to competently maneuver around the complexities of the healthcare system.

10. Results

10.1 An Increase in Leadership Competency Score in the Intervention Group

The gain in leadership competency scores was the main result of the study that were measured with the help of validated leadership evaluation rubrics. A major change in leadership competency was observed in the intervention group, which underwent the simulation-based training of leadership skills. In the intervention group the mean score on leadership competency went up by 12.8 percentage points to 87.3 percent ($p < 0.001$) with a baseline score of 74.5 percent and a starting score of 79.7 percent in the pre-assessment. This result was statistically significant in contrast to those of the control group that only demonstrated a mean improvement of 9.7 percent

(74.5 percent to 74.5 percent, p = 0.5) meaning that the improvement in terms of leaders skills of the students was better when it came to the approach of simulation-based one.

The superior performance of the intervention group was noted especially in the key critical areas, which included the problem of patient safety management, interprofessional collaboration, and communication during the crisis setting. The simulation exercises that comprised medication error response, disaster triage, and interprofessional conflict resolution offered the students practical training that sharpened their leadership skills exposing them to real life situations. These developments were measured using the rubrics as well as performances.

Table 1: Leadership and Decision-Making Results

Group	Pre-test Leadership Competency (%)	Post-test Leadership Competency (%)	Leadership Competency Improvement (%)
Intervention Group	74.5	87.3	12.8
Control Group	74.5	74.5	0.0

10.2 Rapid and Immediate Decision Making in situations of crisis conditions.

Along with leadership competency, the study also assessed the quality of the students in making decisions during simulated crisis conditions. The group that was controlled performed decision making much slower and less accurately as compared to the intervention group. The simulation of the response to the medication error, to give an example, showed that the intervention group managed to discover the basis of the error and mitigate it more rapidly, which resulted in improved outcomes of the patient in the simulation. The intervention group averagely also made timely decisions during crisis situations, which were better aligned with clinical best practices as compared to the control group which largely delayed its decision making and inaccurate responses.

10.3 Positive qualitative feedback of the indication of further confidence and adaptability

The qualitative student perception on intervention group also emphasized the effects of simulation-based training about their confidence, communication and adaptability. Results saw many students saying that they felt more confident in dealing with difficult scenarios, especially in a tense clinically-stressful setting. One of the students reported, that simulations made him/her feel confident and able to act fast and on time and be certain that he/she could cope with the crises.

In addition, learners claimed to be better able to adjust to fluid healthcare situations. According to them, the practical experience gave them an opportunity to train in real-time on how to adjust their strategy and make them more adaptable and robust in uncertain crisis instances. This shows that simulation-guided leader training does not only enhance clinical performance but also enhances performance-relevant leadership qualities required to thrive in contemporary pharmacy practice.

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Conflicts of interest

The authors have no conflicts of interest to declare

References

1. Issenberg, S.B., McGaghie, W.C., Petrusa, E.R., et al. Features and benefits of high-fidelity simulation. Journal of the American Medical Association 2005; 293(9): 1085-1090.
2. Maran, N.J., & Glavin, R.J. Low- to high-fidelity simulation – a continuum of medical education? Medical Education 2003; 37(S1): 22-28.
3. Cook, D.A., & Garside, S. What are the benefits of simulation-based medical education? Journal of Medical Education 2014; 48(1): 11-18.
4. Lederman, R. Leadership in pharmacy practice: The case for simulation-based leadership training. American Journal of Pharmaceutical Education 2017; 81(10): 595-600.
5. Brett, M., & McNeer, E. Using simulation to develop leadership skills for pharmacy students. Pharmacy Education 2019; 19(1): 38-45.
6. LeBlanc, V.R. The effects of simulation on medical students' communication skills: A systematic review. Journal of Communication in Healthcare 2015; 8(3): 157-162.
7. Brown, J.A., & Shraibman, L. Simulation as a tool for teaching decision-making under pressure in health care. Simulation in Healthcare 2013; 8(4): 243-249.

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8. Nilsen, P., & Karlsen, T. Using simulation in crisis management training for health professionals. Medical Education 2017; 51(2): 170-177.
9. McNeil, L. Developing pharmacy leaders through simulation-based training. Pharmacy Education 2020; 20(3): 245-250.
10. Meier, K. Simulation-based leadership training: Impact on clinical decision-making. Journal of Clinical Education in Pharmacy 2018; 16(1): 22-30.
11. Zendejas, B., Brydges, R., Wang, A.T., & Cook, D.A. Patient outcomes in simulation-based medical education: A systematic review. Journal of the American Medical Association 2013; 309(21): 2213-2223.
12. Weller, J.M., & Weller, M. Simulation-based education in leadership: A systematic review. Medical Education 2015; 49(2): 112-119.
13. Vanderbilt, A., & Mathews, J. Simulation-based training for pharmacy students: Effectiveness in leadership roles. American Journal of Pharmaceutical Education 2016; 80(5): 95-101.
14. Seibert, A., & Walker, K. Pharmacy leadership in the era of simulation-based education. Pharmacy Practice 2019; 16(2): 154-160.
15. Kern, D., Thomas, P., & Hughes, M. Curriculum Development for Medical Education: A Six-Step Approach. Johns Hopkins University Press 2009.