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# Effectiveness of My Dispense Post-Internship Simulation (MDPIS) Program through Case-Based Approach among Hospital Pharmacy Interns in Selected Pharmacy School in Davao City

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#### **ABSTRACT :**

Internships are a vital component of pharmacy education, serving as a crucial bridge between theoretical knowledge and practical application in a clinical environment. However, navigating the complexities of real-life scenarios during this transition can present challenges, and interns may exhibit varying levels of initial preparedness. To address this, innovative tools like the MyDispense® Post-Internship Simulation (MDPIS) Program are being adopted to enhance the proficiency of pharmacy interns. MyDispense® is a web-based virtual simulation tool developed by Monash University that allows students to safely practice and improve their dispensing skills in a digital setting, enabling remote learning while upholding patient safety standards and pharmacy law principles. This study aimed to measure the effectiveness of the MyDispense Post-Internship Simulation (MDPIS) Program, delivered through a case-based approach, among hospital pharmacy interns in Davao City. Employing a quasi-experimental design with pretest and posttest measures, the study involved fourth-year pharmacy students at San Pedro College who had completed their hospital pharmacy internships. The MDPIS Program was implemented for four weeks, utilising validated questionnaires and case analysis within the MyDispense platform to assess critical thinking skills, problem-solving abilities, and confidence levels before and after the intervention. Data analysis involved descriptive and inferential statistics, including one-way analysis of variance (ANOVA). Before the program, interns demonstrated varying levels of competency, with mean scores of 79.74 for critical thinking skills, 78.60 for problem-solving skills, and a confidence level mean of 3.86. Following participation in the MDPIS Program, significant improvements were observed across all indicators. Mean scores increased to 89.47 for critical thinking skills and 86.49 for problem-solving skills, while the confidence level mean rose to 4.33. Statistical analysis confirmed significant improvements (p-values indicating substantial changes), and effect size calculations revealed a high impact of the program on critical thinking (Cohen's d = 0.77), problem-solving skills (Cohen's d = 0.69), and confidence levels (Cohen's d = 0.75). The study concludes that the MDPIS Program effectively enhances pharmacy interns' competencies and prepares them for the challenges of modern healthcare practice.

Keywords : MyDispense, Simulation, Pharmacy Education, Hospital Pharmacy, Interns, Critical Thinking, Problem Solving, Confidence Level, Casebased Learning, Davao City

## 1. Introduction

Internship programs are integral to pharmacy education, playing a crucial role in the development of skills and readiness among aspiring pharmacists. These internships serve as a vital bridge, transferring theoretical knowledge and classroom skills into practical applications in a clinical environment, providing the foundation for applying knowledge, honing skills, and undergoing professional socialization. Key competency areas include effective communication, the production process, legal and ethical considerations, and ensuring patient care and safety.

Globally, there is a growing adoption of virtual simulations in pharmacy education, with reports indicating significant use in various countries like the United States. Virtual patient simulation in pharmacy education utilises digital technologies to foster professional competence, encompassing skills in problem-solving, critical thinking, and process understanding. Online simulation methods effectively mimic patient encounters within an educational clinical environment, establishing a learning environment that closely resembles real-life experiences with a primary emphasis on patient safety. MyDispense® is a notable web-based virtual simulation tool developed by Monash University, enabling students to practice dispensing skills in a safe, simulated setting.

In the Philippines, pharmacy education is increasingly integrating innovative educational methods to reflect the evolving, patient-centered, and outcomesdriven role of pharmacists. While traditional "see one, do one" methods carry inherent risks, online platforms like MyDispense® empower educators to monitor student progress, deliver timely feedback, and evaluate performance. MyDispense® allows the tailoring of dispensing, over-the-counter, and validation tasks, facilitating the acquisition of fundamental skills for prescription management and counselling.

In Davao City, there is an increasing demand for proficient pharmacy interns, which innovative tools like the MyDispense® Post-Internship Simulation (MDPIS) Program aim to address. The integration of MDPIS into internship programs has the potential to produce better-prepared pharmacy graduates.

This research specifically aimed to measure the effectiveness of the MyDispense® Post-Internship Simulation (MDPIS) Program through a case-based approach among hospital pharmacy interns in Davao City. The study sought to determine the interns' levels of critical thinking skills, problem-solving skills, and confidence before and after the program, assess if significant differences existed, and determine the program's effect size on these indicators.

# 2. Method

This chapter details the methodology employed to investigate the impact of the MyDispense Post-Internship Simulation (MDPIS) Program on the competency development of hospital pharmacy interns.

**2.1 Research Design** This study employed a quasi-experimental research design, specifically a pretest-posttest design. This framework was utilized to collect data before and after the implementation of the MDPIS program intervention to examine the relationship between the program (independent variable) and changes in intern competencies (dependent variables). The MDPIS program was implemented over four weeks.

2.2 Research Locale The study was conducted in Davao City, Philippines, particularly at San Pedro College, where the participating pharmacy interns were enrolled. Davao City was selected for its diverse hospital settings and healthcare practices, offering a realistic context for simulation-based training.
2.3 Participants The study participants were fourth-year pharmacy interns enrolled at San Pedro College during the second semester of the 2023-2024 school year. These interns had completed their hospital pharmacy internship course. Participants were selected based on the research objectives, ensuring they had prior internship experience. The actual number of participants analysed in the study was 114, although the methodology initially stated a plan to randomly select 108 out of 149 eligible interns.

# 2.4 Eligibility Criteria

Inclusion criteria

- 1. Fourth-year pharmacy student enrolled at San Pedro College during the 2nd semester of the school year 2023-2024.
- 2. Must be 20 years old and above.
- 3. Completed hospital pharmacy internship course.
- 4. Currently in the internship period.

Exclusion criteria

- 1. Not currently enrolled as a pharmacy student at San Pedro College during the specified semester and school year.
- 2. Having less than a year of experience as a community pharmacist (though the study focused on hospital interns, this criterion is listed).

#### **2.5 Research Instruments**

The primary research instrument utilised in this study was a questionnaire-based survey, specifically developed by the researchers for the purpose of conducting pre- and post-intervention competency assessments among hospital pharmacy interns participating in the MyDispense Post-Internship Simulation (MDPIS) Program. This instrument was rigorously validated by experts, with detailed documentation of the validation process. The overarching aim of the instrument was to evaluate changes in interns' proficiency and self-assurance across three key indicators: Critical Thinking Skills, Problem-Solving Skills, and Confidence Level. The administration of both the pre-test questionnaire (before the program) and the post-test questionnaire (after completion) was facilitated via Google Forms to streamline data collection. The assessment of Critical Thinking Skills and Problem-Solving Skills was interwoven with the MyDispense platform, requiring interns to analyse case scenarios embedded within the simulation. The raw data indicates that scores for these skills were captured on a scale out of a maximum of 10. Specifically, Problem-Solving assessment involved evaluating abilities, methods, and outcomes in addressing cases. Confidence Level was quantified using a 5-point Likert scale, ranging from 1 (Not Confident at all) to 5 (Very Confident), with scores based on a potential maximum of 5. Beyond the core competency measurement, the instrument's initial component collected basic personal information from participants, including name (if preferred), age, gender, and year level. Furthermore, a dedicated third section in the postintervention phase was designed to solicit input and feedback from participants concerning their experiences with the integration of MyDispense into their internship training, prompting them to identify straightforward and challenging aspects and propose suggestions for enhancements. Complementing the questionnaire, a three-section standardised rubric was also employed to gauge interns' pharmaceutical knowledge and proficiency. The raw data detailing the scores collected through this instrument for all participants, before and after the program. The structured use of this instrument aligns with the study's quasi-experimental pretest-posttest design, enabling the measurement of the MDPIS Program's impact on the targeted competencies.

2.6 Data Collection Procedure Data collection commenced upon the conclusion of the interns' training period. The procedure involved several key steps:

- Participant contact information and demographic details were initially gathered via Google Forms. Approval was sought from clinical
  instructors and intern advisors for the dissemination of this initial survey.
- Upon the conclusion of their internship training, approval was sought from clinical instructors, the intern advisor, and the school to integrate MyDispense® into the internship program for research purposes.
- Insights were gathered from licensed hospital pharmacists regarding the operational aspects of hospital pharmacies and pharmacies in general. This information was crucial for the virtual recreation of a hospital pharmacy setting in MyDispense® that aligns with Philippine hospital settings, particularly concerning components of the Electronic Health Record (EHR), Medication Review systems, and SOAP notes. No patient information was revealed or used.
- Collaboration occurred with MyDispense® to replicate the pharmacy environment virtually. Working with a MyDispense® programmer, the
  research team recreated the setting, integrating Filipino characters and commonly used medications. MyDispense® was configured to include
  a point system for monitoring and tutorials. The new EHR feature in MyDispense® version 7 was specifically leveraged.
- A researcher-designed pretest via Google Forms was distributed before the MyDispense® program launch. This pretest focused on cases related to critical thinking skills, problem-solving skills, and confidence levels to evaluate interns' baseline knowledge.
- The MyDispense® Program was launched, with interns receiving weekly cases (three case scenarios) to complete at their own pace.

- After the four-week MyDispense® training, a post-test via Google Forms was administered. This post-test reviewed cases and inquiries
  encountered during the training to assess overall learning outcomes and the program's effectiveness.
- Data confidentiality was maintained throughout the process.

2.7 Data Analysis Descriptive and inferential statistics were employed to analyze the collected data.

- Data processing involved entry, maintenance, error checking, and coding responses for statistical analysis, ensuring accuracy, dependability, and readiness for analysis.
- The study compared results from the pre-test and post-test.
- Standard mean deviation (presented as mean and standard deviation) was used to describe the levels of competencies before and after the
  intervention.
- Paired sample t-tests were used to evaluate the statistical significance of changes in competencies between the pre- and post-tests.
- Effect size (Cohen's d) was calculated to quantify the magnitude of the program's impact.

#### 2.8 Ethical Considerations.

Due to the nature of the quasi-experimental research design used in the study, ethical challenges could potentially arise for both the researchers and the participants. Therefore, it was considered imperative to adhere to specific ethical criteria, with a particular emphasis placed on maintaining confidentiality, ensuring anonymity, and upholding trustworthiness and credibility.

The research paper was submitted to the institutional ethics committee to ensure that all ethical considerations were thoroughly addressed, and approval from the SPC-RCC Research Coordination Center was necessary to obtain ethical clearance. Researchers were required to adhere to any rules or regulations set forth by the institution's ethics committee.

The principle of Social Values was recognised, with researchers acknowledging the potential for the study results to improve pharmacy internship programs in Davao City, benefiting both interns and the healthcare system. This involved enhancing the skills of pharmacy interns while adhering to the principles of the pharmacy profession and the broader healthcare community. The process of developing the questionnaire was approached with consideration for gender, location, and experience, including consulting experts and professionals involved in tool development. Ethical standards were prioritised with the goal of improving pharmacy internship training and healthcare services for the benefit of the Davao City healthcare community.

Regarding Informed Consent, all participants, specifically hospital pharmacy interns, provided informed consent through an ongoing and transparent dialogue. Clear justifications for the study were provided, and any questions or concerns were addressed before participants were presented with a comprehensive informed consent form. The researcher thoroughly explained the entire procedure, ensuring participants had all necessary information to make an independent decision about their involvement. The completion of this process was facilitated through a Google Form, sent via email addresses and instant messaging services. It was explicitly stated that participants maintained the autonomy to decline the invitation to participate, adhering to the ethical principle of informed consent, meaning individuals could decide their level of involvement without facing coercion or pressure. Participants were informed that their participation was entirely optional and would not be forced, and deciding not to participate would not require a reason and would have no impact on their future attention and care from the investigator. Participants also had the option to withdraw at any moment. While no monetary payment was provided for participation, a reward was offered for their time and effort.

Transparency was a key consideration. The study openly disclosed any aspects of the research that might affect the rights, well-being, or safety of participants, while safeguarding the security of their personal information. Participants received a clear and easily understandable explanation of the entire research process, including objectives, methodologies, and anticipated conclusions, before the study began. Following the study, the findings were to be communicated to participants after presentation within the department, and the researcher intended to share outcomes in conferences or forums and pursue international publication, with an additional copy presented to the dean's office.

The principle of Beneficence guided the research, with the aim to ensure that the integration of MDPIS into pharmacy internship training was formulated to enhance the competence and skills of hospital pharmacy interns. The study's goal was to optimise the benefits for both participants and the broader society.

Confidentiality and Anonymity of participant data and personal details were strictly safeguarded. Various procedures were employed to ensure anonymity unless participants explicitly requested identification. Any personally identifiable information collected was kept private. The use of special identifiers or code names was implemented to further protect anonymity, offering participants the choice to select their own code name to enhance identity protection while preserving data integrity. Information shared during data collection that could potentially identify a specific person, intentionally or unintentionally, would not be disclosed. Participant data was securely stored in a private folder on Google Drive, accessible only to individuals with the necessary permissions. Exclusive access to this password-protected folder and flash drive was limited to the researchers. Any data gathered online or offline and saved on Google Drive was to be expeditiously erased once the study concluded, specifically after presenting the final report to the panel, with recycle bins emptied and online datasets wiped to maintain participants' ongoing privacy. Throughout the study, identities were consistently coded to protect anonymity.

To establish Trustworthiness, the researchers aimed for credibility, transferability, dependability, and confirmability. Credibility was ensured through the meticulous design of the quasi-experimental method and systematic data collection and analysis procedures, allowing participants to scrutinise and authenticate findings. Transferability pertains to the study's applicability in diverse situations; the clear presentation of context, methodology, and participant characteristics enabled readers to evaluate potential applicability to other settings. For Dependability, researchers ensured gathered literature was consistent with study outcomes and committed to ensuring other researchers scrutinising the data would arrive at coherent interpretations, conclusions, and findings, designed to avoid overlooking any inconsistencies.

# 3. Results

This chapter presents the analysis of the study data assessing the level of competency indicators among hospital pharmacy interns before and after the

#### MyDispense Post-Internship Simulation (MDPIS) Program.

## 3.1 Level of Competency Before the MDPIS Program

Table 1 - Level of the following indicators of hospital pharmacy interns before the MyDispense Post-Internship Simulation (MDPIS) Program

Criteria	Mean Scores	SD	Min Scores	Max Scores	Significance
Critical Thinking Skills	79.74	15.02	20	100	Indicates varying levels of ability to analyze and integrate complex information.
Problem-Solving Skills	78.60	11.66	30	100	Reflects a solid foundation in addressing clinical problems, but with some variability.
Confidence Level (5-point scale)	3.86	0.69	3	5	Shows moderate self-assurance among interns, with room for improvement.

Before the initiation of the MDPIS Program, Table 1 served as a snapshot of interns' competencies. Critical thinking skills, depicted by a mean score of 79.74, exhibited notable variance among participants, suggesting diverse levels of analytical prowess. Conversely, problem-solving skills displayed a marginally more uniform performance, with a mean score of 78.60, indicating a relatively consistent baseline proficiency. Confidence levels, with a mean score of 3.86, denoted a moderate level of self-assurance among interns in their abilities prior to program intervention.

# 3.2 Level of Competency After the MDPIS Program

Table 2 - Level of the following indicators of hospital pharmacy interns after the MyDispense Post-Internship Simulation (MDPIS) Program

Criteria	Mean Scores	SD	Min Scores	Max Scores	Significance
Critical Thinking Skills	89.47	9.85	70	100	Indicates improved ability to analyze and integrate complex information.
Problem-Solving Skills	86.49	11.13	50	100	Reflects enhanced proficiency in addressing clinical problems.
Confidence Level (5-point scale)	4.33	0.56	3	5	Shows increased self-assurance in clinical decision-making.

Upon completion of the MDPIS Program, Table 2 illuminated substantial advancements in critical thinking, problem-solving skills, and confidence levels among pharmacy interns. Notably, mean scores for critical thinking surged to 89.47, indicative of a significant enhancement in interns' capacity to analyze and integrate complex clinical information [13]. Similarly, interns demonstrated marked improvement in problem-solving skills, with mean scores elevating to 86.49, reflecting a heightened ability to navigate intricate clinical scenarios with efficacy [98]. Moreover, confidence levels experienced a notable boost, with mean scores ascending to 4.33, underscoring interns' increased assurance in their clinical decision-making capabilities following program participation [97].

## 3.3 Testing for Significant Difference

**Table 3** - Testing the significant difference in the level of the following indicators of hospital pharmacy interns before and after the MyDispense Post-Internship Simulation (MDPIS) Program

Criteria	Mean Scores		T value	P value	Remarks*
	Before	After			
Critical Thinking Skills	79.74	89.47	7.50	.000	Significant
Problem-Solving Skills	75.60	86.49	6.32	.000	Significant
Confidence Level (5-point scale)	3.86	4.33	7.16	.000	Significant

\*Calculation was performed at .05 level of significance

Providing empirical validation of the program's efficacy, Table 3 furnished statistical evidence of significant improvements in critical thinking, problem-

solving skills, and confidence levels among interns. The observed changes, substantiated by p-values indicating substantial alterations, underscored the tangible impact of the MDPIS Program on interns' competencies.

 Table 4 - Effect size in the level of the following indicators of hospital pharmacy interns before and after the MyDispense Post-Internship Simulation (MDPIS) Program

Criteria	Mean Scores		Cohen's d	Remarks*
	Before	After		
Critical Thinking Skills	79.74	89.47	0.77	High
Problem-Solving Skills	75.60	86.49	0.69	High
Confidence Level (5-point scale)	3.86	4.33	0.75	High

\*Calculation was performed at .05 level of significance

The MyDispense Post-Internship Simulation (MDPIS) program had a substantial impact on the critical thinking skills, problem-solving skills, and confidence levels of hospital pharmacy interns, as demonstrated in Table 4. Prior to the program, interns exhibited a mean score of 79.74 in critical thinking skills, which increased significantly to 89.47 after participation. This improvement, indicated by a Cohen's d effect size of 0.77, underscores the program's efficacy in enhancing critical thinking abilities. Similarly, interns' problem-solving skills saw a notable enhancement through the MDPIS program. Initially scoring a mean of 75.60, interns' scores rose to 86.49 post-program, with a Cohen's d effect size of 0.69, further emphasizing the program's effectiveness. Additionally, interns' confidence levels experienced a significant boost from a mean score of 3.86 before the program to 4.33 after, with a Cohen's d effect size of 0.75. These results collectively highlight the program's success in fostering critical thinking, problem-solving abilities, and confidence among interns. The remarks provided in the table confirm the statistical significance of these improvements at a 0.05 level of significance, affirming the program's efficacy.

Overall, Table 4 underscores the MyDispense Post-Internship Simulation program's effectiveness in enhancing key skills and confidence levels among hospital pharmacy interns.

# 4. Discussion

The results of this study demonstrate a significant improvement in critical thinking skills, problem-solving abilities, and confidence levels among hospital pharmacy interns following participation in the MyDispense Post-Internship Simulation (MDPIS) Program. These findings align with the increasing recognition of simulation-based learning as a powerful pedagogical tool in pharmacy education.

The statistically significant enhancement in critical thinking skills (mean 81.59 to 89.47, p < .001) suggests that the MDPIS Program effectively strengthens interns' ability to analyze and integrate complex clinical information. This skill is fundamental for pharmacists, particularly when reviewing prescriptions to identify potential drug interactions, contraindications, and medication errors. MyDispense®'s design, which emphasizes prescription review and error detection, likely contributed to this improvement by encouraging interns to actively engage with real-world clinical problems in a controlled, low-risk environment.

Problem-solving skills also showed a meaningful increase (mean 82.54 to 89.42, p < .001), indicating that the program successfully prepares interns to tackle complex clinical scenarios. The MyDispense® platform's virtual environment allows interns to practice clinical decision-making without the fear of causing harm, enabling them to learn from mistakes and receive instant feedback. This iterative learning process is crucial for developing proficiency in handling challenging cases such as drug interactions—for example, understanding the impact of Ciprofloxacin on blood glucose regulation in patients taking Metformin—and making appropriate clinical recommendations. Such enhanced problem-solving ability is essential for pharmacists working in dynamic healthcare settings, where rapid, accurate decisions are required.

The significant increase in confidence levels (mean 3.86 to 4.33, p < .001) further underscores the value of the MDPIS Program. Confidence is a critical attribute for interns transitioning into professional roles, influencing their willingness to engage with patients and healthcare teams effectively. By allowing interns to practice dispensing and counselling skills within a safe simulated environment, MyDispense® fosters a sense of preparedness and self-efficacy. Previous reports from MyDispense® users have similarly highlighted increased confidence in managing prescription-related tasks and patient interactions, reinforcing the validity of these findings.

Collectively, these improvements in cognitive skills and confidence reflect the comprehensive educational impact of the MDPIS Program. Simulationbased learning addresses the gap between theoretical knowledge and real-world practice by providing experiential learning opportunities that are often limited during traditional internships due to workload, patient safety concerns, and resource constraints.

However, while the results are promising, certain limitations must be acknowledged. The study's reliance on self-reported confidence measures may introduce response bias, and the short-term nature of the assessment limits insight into long-term retention and application of skills in clinical practice.

Future studies should explore longitudinal outcomes and assess direct impacts on patient care and pharmacy practice.

In summary, the MDPIS Program appears to be an effective adjunct to hospital pharmacy internships, enhancing critical thinking, problem-solving, and confidence. Its integration into pharmacy education could better prepare interns for the complex challenges they will face in clinical environments, ultimately contributing to improve healthcare outcomes.

# 5. Conclusion

The study successfully demonstrated the transformative influence of the MyDispense Post-Internship Simulation (MDPIS) Program on enhancing pharmacy interns' aptitude and adaptability. The program was found to be effective in significantly improving hospital pharmacy interns' critical thinking skills, problem-solving skills, and confidence levels in Davao City. These findings suggest that **simulation-based training initiatives, such as the MDPIS Program, hold promise in strengthening the capabilities of future pharmacy professionals**, ultimately fostering enhanced patient care outcomes.

Morover, the MDPIS Program exemplifies the potential of simulation-based learning to elevate the preparedness of pharmacy students, fostering not only technical proficiency but also clinical decision-making and professional assurance. The integration of innovative tools such as MyDispense® can play a significant role in cultivating practice-ready students capable of delivering patient-centered care. The findings of this study support the broader adoption of such digital learning platforms as a sustainable and impactful component of pharmacy internship training programs.

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