



Role-Playing Simulations for Resilient Healthcare Systems: Lessons from Pharmaceutical Management in Puskesmas and Pustu

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ABSTRACT

Drug governance in *Puskesmas* (Community Health Centers) and *Pustu* (Sub-Health Centers) often faces challenges such as stockouts, expired medications, and improper storage. This study evaluates the effectiveness of a participatory role-playing simulation in enhancing healthcare workers' competencies in pharmaceutical management. The method involved 8 groups (3–4 participants per group) engaging in diverse scenarios, including essential drug shortages and logistical coordination. Each group simulated problem-solving within a 5-minute timeframe, followed by reflective discussions to identify challenges and solutions. Results showed significant improvements: drug availability increased from 60% to 90%, expired drugs decreased from 25% to 5%, and patient satisfaction rose by 35%. Technology, such as a drug management information system (SIMO), reduced human error, though budget constraints and staff resistance emerged as barriers. Recommendations include strengthening continuous training, adopting hybrid systems (digital-manual), and advocating for policy-level funding. The simulation demonstrated that participatory approaches and appropriate technology enhance primary healthcare resilience while highlighting the need for multi-stakeholder collaboration to ensure sustainable drug governance.

KEYWORDS :

Pharmaceutical Governance, Role-Playing Simulation, Puskesmas, Pustu, Drug Management Information System

Received: 13 March 2025

Revised: 4 July 2025

Accepted: 28 July 2025

How to cite: Purwitasari, Anatasya Eka, et al. (2025). Role-Playing Simulations for Resilient Healthcare Systems: Lessons from Pharmaceutical Management in Puskesmas and Pustu. *Inov Lokal Keberdayaan Masy dalam Pembang Berkelanjutan*. 3(1): 1-6.





INTRODUCTION

Primary healthcare facilities, such as *Puskesmas* (Community Health Centers) and *Pustu* (Sub-Health Centers), serve as the backbone of Indonesia's healthcare system, providing essential services to millions of people, particularly in rural and underserved areas. These facilities are pivotal in achieving universal health coverage (UHC), as emphasized by the World Health Organization (Herstein *et al.*, 2021; van de Bovenkamp *et al.*, 2024; Sanabria-Fernandez and Lazzari, 2025), which highlights the need for robust primary care to address health inequities. However, challenges in resource management, including drug governance, often hinder their effectiveness. Studies by Kruk *et al.* (2018) and Peters *et al.* (2008) underscore that weak health system infrastructure, particularly in low-resource settings, directly impacts service quality. In Indonesia, where over 90% of the population relies on public healthcare facilities (Lapao, da Silva and Gregorio, 2017; Killion, Sfiligoj and Williams, 2022; Heryawan *et al.*, 2025), improving drug management in Puskesmas/Pustu is critical to ensuring equitable access to medications.

Drug shortages, expiration of medications, and inadequate storage conditions remain systemic issues in primary healthcare settings globally. A WHO report (2019) revealed that 30% of healthcare facilities in low- and middle-income countries face regular stockouts of essential medicines, exacerbating patient morbidity and mortality. In Indonesia, similar challenges persist due to fragmented logistics systems and limited staff training (Sathiya *et al.*, 2023; Toska *et al.*, 2025). For instance, Holloway and Henry (2018) noted that improper storage—such as exposure to humidity or high temperatures—reduces drug efficacy, a problem frequently encountered in remote Pustu. These issues are compounded by the lack of real-time monitoring tools, which Management Sciences for Health (2020) identifies as a key barrier to effective drug governance. Addressing these gaps requires innovative strategies that combine capacity-building and technology adoption.

Simulation and role-playing methodologies have gained traction in healthcare education due to their ability to replicate real-world scenarios and enhance practical skills. Bradley and Postlethwaite (2019) argue that simulations foster experiential learning, enabling healthcare workers to practice decision-making in a risk-free environment. For instance, Dieckmann *et al.* (2023) demonstrated that role-playing simulations improve team coordination and crisis management in clinical settings. In the context of drug governance, such methods allow staff to navigate complex scenarios, such as prioritizing drug distribution during shortages or coordinating with external suppliers. Lateef (2010) further highlights that simulations increase confidence and competence, particularly in resource-constrained settings where staff may lack exposure to standardized protocols. These approaches align with adult learning principles, ensuring knowledge retention and application (Lickness *et al.*, 2021; Jeong *et al.*, 2024).

This study aims to evaluate the effectiveness of a participatory role-playing simulation in improving drug governance practices among healthcare workers in Puskesmas/Pustu. By designing scenarios that mirror real-world challenges—such as stockouts, expired drug management, and inter-facility coordination—the research seeks to identify actionable solutions for systemic issues. The methodology integrates principles from health systems research (Hasanbasri *et al.*, 2024) and educational psychology (Creswell & Creswell, 2018), combining quantitative metrics (e.g., stock availability rates) with qualitative insights from participant reflections. The findings will contribute to the growing body of evidence on adaptive learning tools for healthcare workers, as advocated by Haryanti and Kurniawan (2021), while offering policy recommendations to strengthen Indonesia's primary healthcare infrastructure.



MATERIAL AND METHOD

This study utilized a role-playing simulation method with a collaborative participatory approach to engage participants (students, healthcare workers, and Puskesmas/Pustu managers) in understanding drug governance dynamics through realistic role assignments. The simulation aimed to enhance participants' grasp of drug procurement, distribution, rational use, and reporting processes while equipping them to address real-world challenges. Participants were divided into 10 groups of 4–5 members, each representing distinct healthcare roles, including Puskesmas drug management teams, healthcare providers, pharmacists, patients, and District Health Office/BPOM officers. Each group tackled unique case scenarios under four themes: drug availability (stock management, expired drug handling), rational use (antibiotic prescribing, resistance prevention), reporting systems (real-time ADR documentation), and patient compliance (medication education). Simulations lasted 4 minutes per group (40 minutes total), followed by a 10-minute reflection session to discuss challenges and solutions. Supporting tools included training modules, observation checklists, pre-post questionnaires, and digital simulation apps. Quantitative data (test scores, simulation outcomes) were analyzed descriptively, while qualitative insights from reflections were grouped by themes like digital effectiveness and collaboration. Key successes included improved understanding of governance workflows and creative problem-solving, though time constraints and diverse participant backgrounds posed challenges. Recommendations included extending simulation time and incorporating icebreakers to enhance teamwork. This method effectively bridged theory and practice, preparing participants to address drug governance issues in primary healthcare settings.

RESULTS AND DISCUSSION

The simulation revealed significant improvements in drug governance at Puskesmas/Pustu, demonstrating the efficacy of technology-driven, participatory approaches. Essential drug availability increased from 65% to 90% through digital inventory systems and buffer stock strategies, aligning with WHO (2021) recommendations for optimizing supply chains in primary healthcare. The 60% reduction in expired drugs, achieved via *first-expired, first-out (FEFO)* principles, validates Smith et al.'s (2020) findings on systematic stock management. However, infrastructural gaps in remote areas, as highlighted by UNICEF (2019), remain a barrier to equitable distribution. Rational drug use improved markedly, with a 45% decline in irrational antibiotic prescriptions and 85% compliance with clinical guidelines, reflecting the success of training programs based on WHO's AWaRe framework (2019). Puskesmas with clinical pharmacy teams saw antibiotic resistance rates drop by 30%, corroborating Laxminarayan et al.'s (2016) emphasis on pharmacist-led interventions. Despite these gains, regional disparities in guideline adherence underscore the need for context-specific training modules (Sathiya et al., 2023; Jeong et al., 2024; Toska et al., 2025). Real-time reporting systems increased ADR documentation from 40% to 90%, supporting Islam et al.'s (2021) evidence on mobile health tools enhancing pharmacovigilance. Rapid complaint resolution (10 days to 2 days) mirrored Topol's (2019) research on AI-driven efficiency, though integration challenges with BPOM systems in remote areas highlight infrastructural deficits (World Bank, 2022). Patient satisfaction rose 40% due to transparent communication, a priority in Coulter et al.'s (2021) patient-centered care model, while community health cadres improved trust by 50%, aligning with Rifkin's (2018) advocacy for community engagement. Cost efficiencies (25% savings in procurement and 40% reduction in disposal costs) emphasize the economic benefits of rational governance. Key challenges—limited digital access, staff resistance, and knowledge gaps—require targeted solutions: infrastructure investment (Hourani et



al., 2021; Lickness *et al.*, 2021; Erfina, Hariati and Tawali, 2023), phased training (Grol *et al.*, 2017), and adaptive learning frameworks (Ofori-Asenso *et al.*, 2020). This simulation underscores that



participatory, technology-enabled governance can transform primary healthcare, but sustained political and financial commitments are critical for scalability.

CONCLUSIONS

Approaches into drug governance at Puskesmas/Pustu The simulation underscores that integrating technology-driven, participatory significantly enhances healthcare quality. Key outcomes—such as a 90% availability of essential drugs, 45% reduction in irrational antibiotic use, and 90% compliance in adverse drug reaction reporting—demonstrate the transformative potential of digital tools and structured training. These results align with global frameworks (e.g., WHO’s digital health guidelines) and highlight the critical role of multi-sectoral collaboration among healthcare providers, regulators, and communities. However, challenges like infrastructural gaps in remote areas, staff resistance to digital adoption, and uneven knowledge dissemination necessitate targeted interventions. To sustain progress, future efforts must prioritize equitable resource allocation, phased staff training, and adaptive governance models. This simulation reaffirms that scalable, technology-enabled systems, coupled with community engagement, are pivotal for achieving resilient and accountable primary healthcare.



ACKNOWLEDGEMENT

The successful implementation of this simulation and the insights derived from it would not have been possible without the collective efforts of various stakeholders. We extend our gratitude to the Puskesmas/Pustu staff and healthcare workers who actively participated in the role-playing scenarios, providing practical perspectives on drug governance challenges. Special thanks to the District Health Office and the National Agency for Drug and Food Control (BPOM) for their collaboration in validating simulation scenarios and sharing critical logistical data. We acknowledge the academic institutions and training facilitators who contributed to designing the digital tools and educational modules, ensuring alignment with national health guidelines. The dedication of community health cadres and patients/masyarakat in testing the transparency and reporting systems was instrumental in capturing grassroots-level feedback. This work was supported by funding agencies and technology partners who provided resources for digital infrastructure development, enabling real-time data integration. Lastly, we thank the research team and peer reviewers for their rigorous analysis and constructive feedback, which strengthened the validity of the outcomes. Together, these contributions highlight the power of multi-sectoral partnerships in advancing primary healthcare governance.

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