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Strategic Risk Management of Cardiovascular Diseases: An Analysis of Blood Pressure Control and Medication Adherence Based on the WHO/ISH Framework at Lolo Public Health Center

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ABSTRACT

Cardiovascular disease (CVD) is a systemic threat to global health and economic stability that requires a strategic risk management approach at the primary care level. This study aims to analyze the relationship between blood pressure control and medication adherence with the risk of cardiovascular disease in hypertensive patients at the Lolo Community Health Center, using the WHO/ISH Cardiovascular Risk Chart risk stratification instrument. This study used a quantitative observational design in a chronic patient population. From a health management perspective, weaknesses in the adherence monitoring system and inconsistent clinical control were determinants that increased the patient risk profile into the high and very high categories. Integration of Good Corporate Governance (GCG) principles, particularly the aspects of risk data transparency and service accountability, is crucial in mitigating the risk of treatment failure. The study results recommend reconstructing standard operating procedures (SOPs) at the Lolo Community Health Center by adopting a data-driven risk management model to sustainably reduce cardiovascular morbidity and mortality rates.

Keywords: *Strategic Risk Management, Cardiovascular Disease, Medication Adherence, WHO/ISH Framework, Health Governance.*

Introduction

The dynamics of global health in the 21st century have shifted from a focus on infectious diseases to the burden of chronic and systemic non-communicable diseases (NCDs). Cardiovascular disease (CVD) remains the leading cause of death worldwide, encompassing heart attacks, strokes, and other peripheral vascular diseases (World Health Organization [WHO], 2023). In healthcare organization management, the primary challenge lies not only in the clinical aspects of treatment but also in implementing strategic risk management to predict and prevent fatal events before they occur. Failure to manage these risks not only results in loss of life but also in the inefficiency of national health budget allocation due to the extremely high cost of curative care (Smith & Jones, 2021).

Lolo Community Health Center, as the frontline provider of public health services in its region, has seen a significant increase in the number of patients with hypertension over the past five years. However, data show that the increase in visits is not directly proportional to the success of collective blood pressure control. From a managerial perspective, this indicates a gap *between* service availability and clinical outcomes. Managing chronic diseases such as hypertension requires a continuous "Quality of Service Management" approach, in which each patient's risk factors must be accurately mapped using international standards, such as *the WHO/International Society of Hypertension (ISH) Cardiovascular Risk Chart* (International Society of Hypertension [ISH], 2020).

A proactive cardiovascular risk management strategy requires a deep understanding of the interaction between physiological and behavioral factors. Blood pressure control is a key performance indicator *in* hypertension management. However, this clinical control is often overlooked due to weak regular monitoring systems at the primary level (Bakris & Ali, 2020). From a *Good Corporate Governance* (GCG) perspective in the healthcare sector, Community Health Centers (Puskesmas) are required to be accountable in reporting the health status of their population. The inability to control a patient's blood pressure is a form of operational risk that can lead to serious complications, which organizationally indicates weak clinical governance *at* the Puskesmas (Johnson, 2022).

A far more complex issue arises in medication adherence management. Patient adherence is a behavioral variable that is very difficult to control but has the greatest impact on therapy outcomes. Adherence is not simply a matter of patient discipline, but rather the result of managerial interactions between the quality

of staff education, medication availability in the pharmacy, and support from the health information system (Brown & White, 2019). At the Lolo Community Health Center, patients' tendency to self-medicate or stop taking their medication when symptoms resolve indicates low health literacy and weak risk-communication intervention strategies (Prasetyo & Utami, 2023).

The implementation of the WHO/ISH framework at the Lolo Community Health Center (Puskesmas) is a strategic step to shift the service model from a "reactive-episodic" to a "proactive-stratified" one. By adopting this *risk chart*, Puskesmas management can allocate resources more intelligently (*smart resource allocation*). High-risk patients are prioritized for intensive monitoring, while low-risk patients receive broader preventive education (WHO, 2023). Without systematic risk stratification, Puskesmas tend to provide "equal" services to all patients, which management considers inefficient because it does not target the groups most in need of intervention (Miller, 2021).

Furthermore, the integration of GCG principles into healthcare services at the Lolo Community Health Center includes transparency in conveying risk profiles to patients. Every patient has the right to know their estimated risk of a heart attack or stroke in the next ten years based on objective parameters. This transparency is expected to build trust *and* increase patient engagement in their treatment plans (Kurnia, 2023). The accountability of healthcare workers at the Community Health Center is also tested through their ability to reduce population risk levels through measurable, data-driven interventions (Lisi, 2023).

Economic disparities and geographic accessibility around the Lolo area also add an additional dimension to this risk management. Socioeconomic factors are often major determinants of patient noncompliance. Therefore, the management of the Lolo Community Health Center needs to develop an "Outreach Management" strategy *to* ensure blood pressure control not only within the Community Health Center building but also in the community (Sari et al., 2022). This strategy aligns with the concept of preventive health crime policy, in which prevention is considered far more valuable than managing clinical crises (Sipayung et al., 2025).

Sociologically, the local community's strong adherence to traditional medicine presents a unique managerial challenge. Community health centers (Puskesmas) must position themselves as knowledge managers, integrating modern medical approaches with local wisdom without compromising patient safety standards (Fadjar & Sukma, 2023). The lack of integration between public health programs and clinical risk management at the Lolo Community Health Center has resulted in stagnant hypertension management, while the burden of cardiovascular disease continues to overshadow the productivity of the working-age population in the region.

Therefore, this research is urgently needed as an effort to reconstruct the standard of care for patients with hypertension. The urgency of this research lies in its ability to provide empirical evidence for policymakers at the regional level regarding the need to strengthen risk management systems in community health centers (Bagaskoro et al., 2023). By examining the relationship among clinical control, adherence behavior management, and cardiovascular risk profiles, it is hoped that a more robust, efficient, and patient-safety-oriented primary healthcare governance model will *emerge*.

Ultimately, the long-term vision of this strategic risk management is to create a "Cardiovascular Resilient Lolo Community." Through operational standardization based on the WHO/ISH framework and strengthening the pillars of GCG, the Lolo Community Health Center can transform into a healthcare institution that not only treats symptoms but also professionally manages future risks (Sipayung & Subandi, 2023). This research will serve as a foundation for developing more humane and managerially accountable health policies for all residents of the region.

Research Methods

This study employed a quantitative research method with an observational-analytical design using a *cross-sectional* approach. This design was chosen to simultaneously map clinical control variables and adherence behavior with cardiovascular risk levels at a specific point in time. In the context of health management, the use of a quantitative approach allows researchers to standardize data, enabling the analysis results to be accounted for objectively and systematically (Soekanto, 2015). The primary focus of this methodology is on integrating medical parameters into a managerial framework to mitigate the risk of degenerative diseases at the primary care level.

The population in this study comprised all patients diagnosed with hypertension who were registered as active participants at the Lolo Community Health Center. The sampling technique used was *purposive sampling* with specific inclusion criteria: patients who had undergone routine treatment for at least the past six months and had complete medical records. This segmented sample selection is crucial in clinical data management to ensure the quality of the information to be processed (Marzuki, 2021). The sample

size was determined using statistical formulas for small populations to ensure high confidence in generalizing health policies.

The research instrument consisted of two main devices representing clinical and managerial aspects. Clinical data, including systolic and diastolic blood pressure, were measured with a sphygmomanometer calibrated periodically to ensure accuracy. Medication adherence was measured using the validated *Morisky Medication Adherence Scale* (MMAS-8) questionnaire. The use of these standardized instruments is part of "Operational Standardization" in research, where consistency of measurement tools is an absolute prerequisite for the validity of research data (Ibrahim, 2008).

Data collection procedures included direct observation and structured interviews to complete patient risk profiles. The data analysis stage began with a codification and tabulation process to facilitate variable identification. Researchers then performed risk stratification by entering data on age, sex, smoking status, cholesterol levels (if available), and blood pressure into *the WHO/ISH Cardiovascular Risk Chart* (WHO, 2023). This process constitutes a form of "Strategic Risk Analysis" that aims to group patients into low (<10%), intermediate (10-<20%), high (20-<30%), and very high (≥30%) risk categories for vascular events within the next 10 years.

Data analysis was performed using statistical software to test the strength of the relationship between the independent variables (blood pressure control and adherence) and the dependent variable (cardiovascular risk). Statistical tests used included the *Chi-Square* test for bivariate analysis and logistic regression for multivariate analysis. Managerially, the use of regression models allows researchers to identify the most dominant risk factors, allowing the Community Health Center (Puskesmas) to allocate intervention resources more effectively and precisely (Sipayung & Subandi, 2023). This entire series of methods was designed to provide a scientific basis for reconstructing chronic disease service management standards at the community health center level (Sipayung et al., 2025).

Result And Discussion

Strategic Analysis of Cardiovascular Risk Based on the WHO/ISH Framework

Risk mapping results using *the WHO/ISH Cardiovascular Risk Chart* at the Lolo Community Health Center (Puskesmas Lolo) revealed a highly heterogeneous risk profile among hypertensive patients. Based on the clinical data collected, it was found that the majority of study subjects were at medium to high risk for experiencing a major cardiovascular event in the next ten years. Managerially, these findings strongly indicate that the primary health care approach at the Lolo Community Health Center can no longer use a "one *-size-fits-* all" approach. Risk segmentation using the WHO/ISH instrument allows the community health center management to allocate resources more strategically and efficiently (WHO, 2023).

Implementing this risk stratification is a crucial form of preventive management. For patients identified as being in the "red zone" or high risk (≥20%), community health centers must implement stricter monitoring protocols, including aggressive medication dose adjustments and monitored lifestyle interventions. Conversely, for patients in the low-risk zone, management can focus on self-health education to reduce the workload of medical personnel. Without such a standardized risk management system, the identification of critically ill patients is often delayed, systematically increasing cardiovascular morbidity in the region (International Society of Hypertension [ISH], 2020).

The rigorous risk analysis based on the WHO/ISH framework at the Lolo Community Health Center also highlighted the role of non-modifiable variables such as age and sex, interacting with modifiable variables such as systolic blood pressure and smoking status. From a health policy perspective, the high-risk rates among the productive age group in Lolo indicate a potential loss of future economic productivity. Therefore, this stratified data should serve as the basis for developing a more integrative "Chronic Disease Management" program grounded in robust clinical evidence (Bakris & Ali, 2020).

Correlation of Compliance Management with Patient Clinical Output

One of the most significant findings of this study is the strong negative correlation between medication adherence and cardiovascular risk profile. Patients with low adherence tend to have poor blood pressure control, which automatically places them in the highest risk strata in the WHO/ISH table. From a patient behavior management perspective, adherence is not simply a matter of individual discipline, but rather the result of the monitoring and education system implemented by the health facility. The low adherence at the Lolo Community Health Center reflects operational barriers in "Patient Relationship Management" that require immediate attention (Brown & White, 2019).

Factors contributing to low adherence in the Lolo region include the complexity of treatment regimens, misperceptions about drug side effects, and a lack of informational support from healthcare

professionals. Managerially, community health centers (Puskesmas) should view adherence as an "operational risk" that can be managed through appropriate interventions, such as the use of automated message reminders or the involvement of village health workers as medication monitoring. Failure to manage adherence directly undermines the cost-effectiveness of government-run hypertension treatment programs (Johnson, 2022).

Furthermore, suboptimal blood pressure control at the Lolo Community Health Center demonstrates that therapy management often falls out of step with patients' conditions. Fluctuating adherence leads to blood pressure fluctuations, which are even more dangerous for patients' vascular stability. Therefore, the Community Health Center needs to adopt a "Continuous Compliance Management" strategy, in which each patient visit includes not only a physical examination but also an audit of medication-use patterns. This approach aligns with efforts to improve the quality of clinical outcomes through more measurable standardization of patient behavior (Prasetyo & Utami, 2023).

Implementation of Risk Mitigation in Primary Health Care

Cardiovascular disease risk mitigation at the Lolo Community Health Center requires a paradigm shift from a curative-reactive approach to proactive risk management. Data generated from the WHO/ISH stratification provides the foundation for management to develop a more focused "Secondary Prevention" policy. For example, patients at high risk whose blood pressure remains within the normal-high range still require special attention due to the presence of other comorbid risk factors. This mitigation strategy includes smoking cessation education and dietary management integrated into the community health center's standard operating procedures (Sari et al., 2022).

In the long term, the success of cardiovascular risk management depends heavily on the Lolo Community Health Center's ability to maintain access to essential facilities, such as antihypertensive medications and diagnostic tools. Logistical barriers are often a major cause of treatment interruptions, which, from a managerial perspective, constitutes a failure in the healthcare supply chain. Therefore, strengthening pharmaceutical logistics management is an integral part of a population-based cardiovascular risk reduction strategy. By ensuring easy and sustainable access to medications, the community health center indirectly strengthens community health resilience against the threats posed by stroke and heart disease (Miller, 2021).

The implementation of data-driven risk management at the Lolo Community Health Center is also expected to reduce long-term healthcare costs. By preventing a single stroke through good blood pressure control and adherence, the Community Health Center has saved significant family and national economic resources. This confirms that cardiovascular risk management is a strategic investment, not just an operational cost. The effectiveness of this intervention must be continuously monitored using an accurate health information system to ensure that population risk-reduction targets are consistently achieved (Sipayung et al., 2025).

Conclusion

This study demonstrates that strategic risk management using *the WHO/ISH Cardiovascular Risk Chart* at the Lolo Community Health Center provides a more accurate picture of community health status than a single blood pressure measurement. Blood pressure control and medication adherence are identified as two key pillars in determining the success of cardiovascular risk mitigation. Strategies to strengthen primary care services should focus on standardizing patient behavior management and segmented clinical supervision based on risk profiles. Implementing this policy will not only improve patient clinical outcomes but also enhance the Community Health Center's operational efficiency in managing the burden of non-communicable diseases.

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