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HIGHLIGHTS

1. Reducing Cervical Cancer Incidence in Rwanda by Increased Screening and Treating
2. Enhancing Malaria Prevention Strategies for Under-Fives in Rwanda
3. Maintaining Good Immunization Coverage To Prevent Potential Outbreaks
4. Hemodialysis Service Quality Assessment in Rwanda

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Public Health Bulletin

General Information

Rwanda Public Health Bulletin (RPHB) is an open-access and peer-reviewed bulletin published by Rwanda Health Communication Centre (RHCC).

Its mission is to serve as a knowledge sharing platform for national and international public health scientific information. Content published under RPHB will be used to control and address potential public health outbreak threats and strengthen health systems through real time availability of information.

This will allow more and effective communication between policy makers, researchers and health practitioners.

A new issue is published quarterly with supplements and special reports. Publication materials are submitted online at https://www.rbc.gov.rw/publichealthbulletin/manuscripts/submission and should fulfil the RPHB's instructions.

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CONTENT

Dear readers,

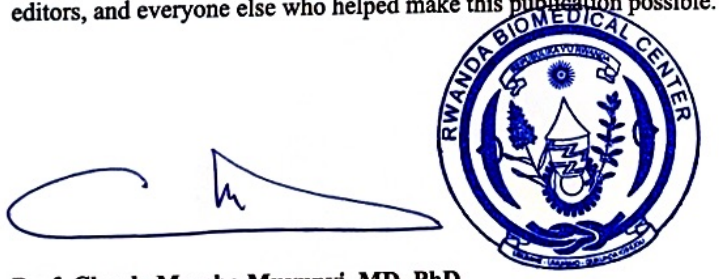
It is with pleasure to welcome you to the latest issue of the Rwanda Public Health Bulletin, a platform that has been at the forefront of disseminating important insights and knowledge to the healthcare and research community in Rwanda and internationally. In this issue, we focus on the use of data in public health policymaking, mainly tackling maternal and child health problems.

In a world of plentiful information, leveraging the power of data is important for making informed health decisions. This issue features health policy briefs as the outcomes of the Data to Policy (D2P) Program, a collaborative effort between Rwanda Biomedical Centre (RBC), CDC Foundation, and Vital Strategies to improve the use of data health policymaking in Rwanda. This initiative is more than just a collection of facts; it is a revolutionary approach to developing data-driven policies tackling some of the problems of health priories with a positive impact on the health and well-being of the Rwandan population on the health and well-being of Rwandan population. The D2P Program demonstrates Rwanda's commitment to evidence-based decision-making. This program aims to close the gap between data collection and policy formation by encouraging collaboration among researchers and policymakers.

As you read through the pages of this bulletin's issue, you will come across policy brief articles about cervical cancer screening, preventing malaria in children under 5, and immunization coverage to prevent outcomes. Apart from policy briefs, you will also get insights on the quality of hemodialysis service assessment using key indicators.

I applaud the devotion of everyone who participated in the implementation of D2P, and the production of policy briefs in particular, for their hard work gathering, analyzing, and interpreting the data that influences our health policies and policy brief writing. I encourage health professionals and leaders to implement health policy options recommended by policy briefs in order to Rwanda's disease burden through health promotion and disease prevention.

May this issue of the Rwanda Public Health Bulletin inspire and inform, developing a better awareness of the critical role data plays in shaping policies that benefit our communities. I am grateful to the contributors, editors, and everyone else who helped make this publication possible.



Prof. Claude Mambo Muvunyi, MD, PhD
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Protecting Rwanda's Children: Enhancing Malaria Prevention Strategies for Under-Fives

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KEY MESSAGES

Despite a decreasing malaria burden in children under 5, it remains a notable health concern in Rwanda due to their vulnerability, emphasizing the necessity for strengthened prevention measures.
To lessen the malaria burden, it is crucial to expand the coverage and effectiveness of prevention strategies, address root causes contributing to the rise in cases, and prioritize vulnerable populations, particularly children under 5.

PROBLEM STATEMENT

Across Africa, malaria cases increased from 232 million in 2020 to 234 million in 2021, with children under five accounting for 78.9% of all malaria-related deaths in the region [1]. In Rwanda, *Plasmodium falciparum* is the primary cause of malaria, and *Anopheles gambiae* serves as the dominant vector [2]. Children under five years old and pregnant women are particularly vulnerable to the disease's worst outcomes [3,4]. This susceptibility derives from their higher risk of severe illness and complications as a result of their low immunity [5]. Rwanda has made remarkable strides in reducing the malaria burden through interventions such as prompt diagnosis and treatment, the distribution of Long-Lasting Insecticidal Nets (LLINs), and the implementation of Indoor Residual Spraying (IRS) [6]. Despite these endeavors, malaria cases in children under 5 are still rising, and their vulnerability could lead to a resurgence of malaria cases unless preventive measures are reinforced and sustained (Figure 1).

In Rwanda, the distribution of Insecticide-Treated Nets (ITNs) is primarily limited to pregnant women and children under one year. Children one year and above don't get ITNs [7]. This, coupled with a lack of an early warning system, lack of awareness, inadequate mobilization, restricted coverage of IRS (only 13 districts), low community compliance with ITNs and IRS, a lack of evaluation of community adoption of preventive measures, and disruption of malaria services due to the COVID-19 pandemic have contributed to a rise in malaria cases among children under five in Rwanda.
To tackle this pressing health challenge requires

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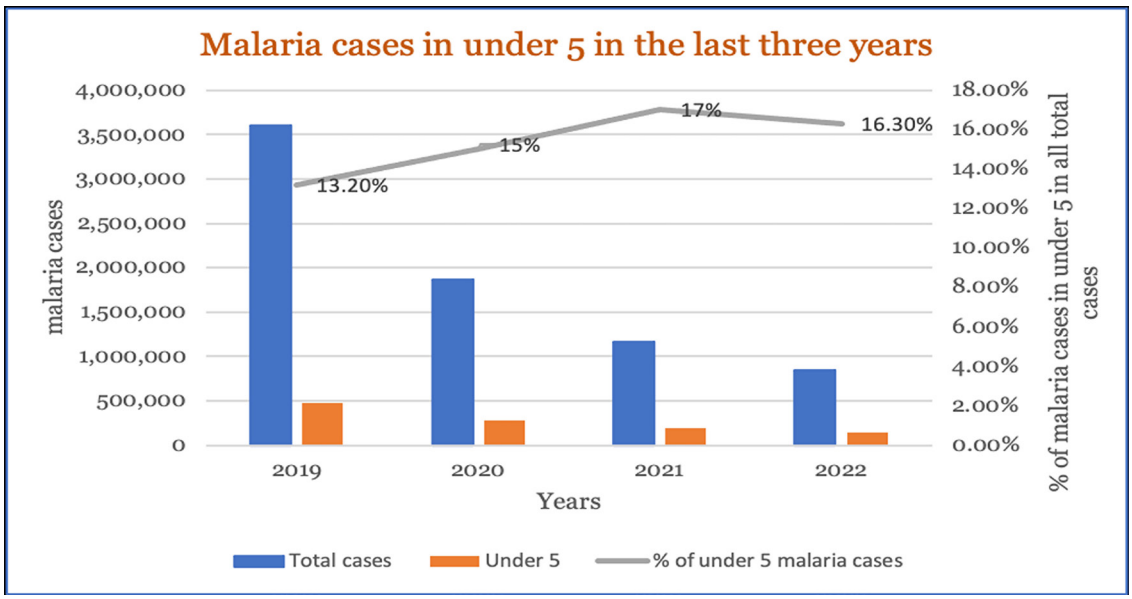

Figure 1: *Malaria prevalence in under five children in the last three years*

improving the effectiveness of existing prevention strategies, broadening their coverage, and addressing the underlying causes contributing to the rise in malaria cases among vulnerable populations, specifically children under five years in Rwanda.

POLICY OPTIONS

Status Quo: *Limited ITN Distribution and IRS Coverage*

What: Continue with the existing policy of prompt diagnosis and treatment, distributing ITNs to pregnant women, children under one-year-old and others through mass campaigns maintaining IRS coverage in the current 13 districts.
Why: Maintaining the status quo will continue to provide some level of protection to pregnant women and very young children while avoiding additional resource allocation and logistical challenges associated with expanding preventive measures.
Feasibility: High. The status quo is feasible since it requires no changes to existing programs or resource allocation. However, it is unlikely to sufficiently address the increasing malaria burden among children under 5 years in Rwanda.

Policy Option 1: *Expand ITN Distribution*

What: Broaden the distribution of ITNs to include all children under 5 years and all pregnant women in Rwanda, prioritizing high-risk regions.
Why: Expanding ITN distribution will provide better protection against malaria for vulnerable populations, especially children under 5 years, and reduce the malaria burden.
Feasibility: Medium. This option would require additional resources and funding for ITN procurement, but it builds on existing infrastructure and programs, making it a scalable approach.

Policy Option 2: *Enhancing early detection system*

What: Strengthening early detection systems by utilizing malaria surveillance data to promptly identify malaria outbreaks in children under 5 before their escalation [8]. Engaging the community health workers (CHWs) in detection systems in order to raise community awareness of the outbreak, enabling timely and adherence to implementation of preventive measures.
Why: Using malaria surveillance data and engaging the CHWs in detection systems will facilitate monitoring community-based reporting systems, consistent evaluation of community uptake of preventive measures and assessing interventions efficacy. This will enable use of targeted interventions in a timely manner, consequently alleviating the malaria burden in children under 5.
Feasibility: High. This option leverages pre-existing reporting systems rendering it a cost

Table 1: *Cost-effectiveness of the proposed policy options*

Policy Options	Expand ITNs Distribution	Early Warning System
Expected number of QALYs	285,000	334,000
Estimated QALYs annually	121,000	170,000
Estimated cost to the government	$51,000	$32,000
Cost of QALYs gained	$42,000	$23,000

ITN: Insecticide-Treated Nets; QALY: Quality-adjusted life year

Table 2: *Feasibility of both policy options*

Policy option	Early detection system	Expand ITNs
Political Feasibility	Highly Feasible	Highly Feasible
Operational Feasibility	Highly Feasible	Somewhat Feasible

ITN: Insecticide-Treated Nets

effective and sustainable approach; nonetheless, it will require investment in community awareness campaigns, the establishment of communication channels to notify the CHWs about the outbreak and provision of training for them.

Economic evaluation of policy options showed that early detection systems will have the highest public health impact per dollar invested (Tables 1 and 2), making it the most cost-effective option. A supported implementation plan and agreed-upon budget will be essential for success.

NEXT STEPS AND RECOMMENDATIONS

Enhancing the early Detection System is both cost-effective and feasible.

For the successful implementation of this strategy, firstly, it is imperative to collaborate with the government, local and international organizations, and other stakeholders to leverage resources and expertise. Secondly, it is crucial to strengthen reporting systems to ensure timely detection of malaria outbreaks and establish efficient communication channels to notify the CHWs. Moreover, engaging CHWs in community awareness campaigns can play a pivotal role in educating communities about malaria symptoms and prevention measures. By involving CHWs in these initiatives, we can foster a deeper understanding of the disease and empower communities to take proactive steps in combating malaria.

REFERENCES

[1] WHO, "World malaria report 2022." https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2022

[2] C. Karema et al., "History of malaria control in Rwanda: implications for future elimination in Rwanda and other malaria-endemic countries," Malar. J. 2020 191, vol. 19, no. 1, pp. 1–12, Oct. 2020, doi: 10.1186/S12936-020-03407-1.

[3] R. K. Imboumy-Limoukou et al., "Malaria in children and women of childbearing age: infection prevalence, knowledge and use of malaria prevention tools in the province of Nyanga, Gabon," Malar. J., vol. 19, no. 1, p. 387, Dec. 2020, doi: 10.1186/s12936-020-03411-5.

[4] A. T. Tsegaye, A. Ayele, and S. Birhanu, "Prevalence and associated factors of malaria in children under the age of five years in Wogera district, northwest Ethiopia: A cross-sectional study," PloS One, vol. 16, no. 10, p. e0257944, 2021, doi: 10.1371/journal.pone.0257944.

[5] B. A. Mensah, J. L. Myers-Hansen, E. Obeng Amoako, M. Opoku, B. K. Abuaku, and A. Ghansah, "Prevalence and risk factors associated with asymptomatic malaria among school children: repeated cross-sectional surveys of school children in two ecological zones in Ghana," BMC Public Health, vol. 21, no. 1, p. 1697, Dec. 2021, doi: 10.1186/s12889-021-11714-8.

[6] RBC-MOH, "Rwanda Malaria Programme: Mid Term Review 2023," https://www.rbc.gov.rw/fileadmin/user_upload/report23/Rwanda%20Malaria%20NSP%20Mid%20Term%20Report%202023.pdf

[7] RBC-MOH, "Annual malaria report 2020-

2021," 2021. https://www.rbc.gov.rw/fileadmin/user_upload/report23/Annual%20Report_Malaria%20and%20NTDs_2020-2021.pdf
[8] D. H. Mueller, T. A. Abeku, M. Okia, and J. Cox, "Costs of early detection systems for epidemic malaria in highland areas of Kenya and Uganda," Malar. J., vol. 8, no. 1, pp. 1–8, 2009, doi: 10.1186/1475-2875-8-17.

Immunization Saves Lives: Maintaining Good Immunization Coverage To Prevent Potential Outbreaks

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KEY MESSAGES

Measles Rubella (MR2) Vaccination coverage in Rwanda decreased from 96% to 84% during the pandemic.
The drop in vaccination coverage has led to measles outbreaks in Rwanda.
Matching Rwanda Civil Registration and Vital Statistics (CRVS) and Immunization Tracker can improve vaccination coverage
Integrating Digitalized Rapid Convenience Monitoring with community health workers (CHW) led MR2 vaccination campaign Performance-based financing

PROBLEM STATEMENT

Globally, more than 140,000 people died from measles in 2018; during 2000– 2018, measles vaccination prevented an estimated 23.2 million deaths [1]. Global measles deaths have decreased by 73% from an estimated 536,000 in 2000 to 142,000 in 2018 due to MR2 Vaccination, and 9 out of 10 non-immune people will catch measles if exposed to the virus [2]. The Government of Rwanda introduced in 2013 the MR combined vaccine as part of the country's efforts and goal to strengthen routine immunization and eliminate measles and rubella [3].
The MR vaccine is a combination of the measles and rubella vaccines, which are given together to provide protection against both diseases. The integration of the MR vaccine into the routine immunization program was intended to reach all infants and children under the age of five in Rwanda. Since 2014, when the MR2 was integrated into routine immunization, the coverage has been sustained according to DHIS2 data until the COVID-19 pandemic, when the MR2 vaccine coverage in Rwanda has declined from 93% in 2018 to 84% in 2022 (Figure 1) [4]. It was noticed that Measles cases in Rwanda increased from 94 cases in 2020 to 126 cases confirmed in 2021.

Studies conducted worldwide to evaluate the impact of the COVID-19 pandemic on routine immunization showed that during the initial

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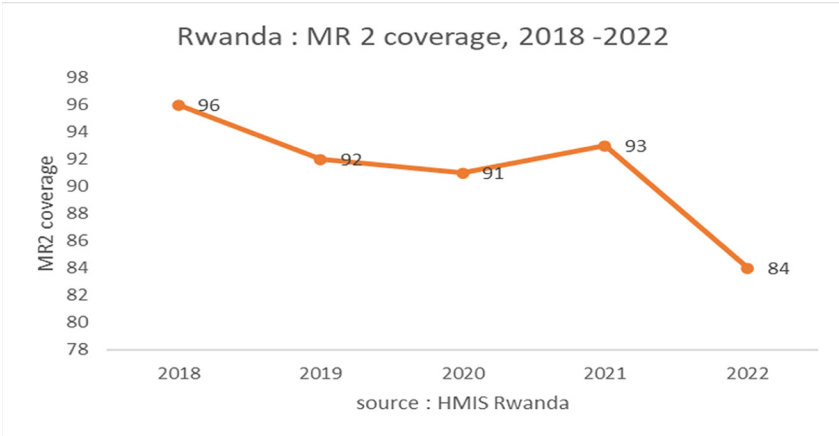

Figure 1: *MR2 Coverage from 2018-2022 (Source HMIS Rwanda)*

pandemic phase, there was a substantial reduction in all routine health services and a 70% reduction in routine immunization services [5,6]. During the COVID-19 pandemic, the unpreparedness of our health system, especially in protecting essential health services, led to an increased rate of unvaccinated children and measles-related cases [7]. Similarly, the COVID-19 pandemic disrupted healthcare services, including the MR2 vaccine routine in Rwanda. According to the Rwanda Biomedical Center (RBC) Epidemiology Department, there were 50 measles cases in 2019, 94 measles cases in 2020, 126 measles cases in 2021, and 93 measles cases in 2022. This was attributed to the decline in coverage in the previous years, from 93% in 2021 to 84% in 2022. National coverage of measles-containing vaccines never achieved its target to fully immunize at least 85% of children in 2022.

In a bid to counter this problem, there is a strong need to ensure the continuity of children's immunization through strategic intervention, such as recording all childbirths and improving the monitoring, tracking, and follow-up of children's immunization aged under 5 by leveraging digital technologies. This intervention will improve the readiness and efficiency of children under 5 years old in immunization programs.

POLICY OPTIONS

Status Quo: *Current Practices in Rwandan Hospitals*

What: To uphold the current practices in Rwandan children vaccination, including individual immunization e-tracker, which does not capture all ages of vaccination and complete information since birth and continue relying only on community health workers for vaccination follow-up and mass campaigns for tracking in the communities

Why: The status quo refers to the existing practices and procedures implemented in the child immunization program, serving as the benchmark against which alternative policy options can be evaluated. The limitations of existing methodologies underscore the necessity for enhanced strategies and actions to tackle the issue adequately.

Feasibility: Medium. The status quo requires no additional resources, as it represents the ongoing practices in Rwandan hospitals. However, it is not efficient because it does not record all ages of vaccination. Moreover, the follow-up and tracking of lost to immunization programs are not cost-effective, and campaigns rely more on the volunteerism of community health workers and donor funding. The consequences of maintaining the current practices will likely result in progressive loss, worsening of the immunization program, and an increase in measles-related hospitalization and mortality.

Policy Option 1: *Database Matching (CRVS & IMMUNIZATION TRACK, SMS Reminder)*

Routine measles vaccination is crucial for reducing measles deaths. The MR2 vaccine is safe, effective and inexpensive. One of the methods that can be used to increase measles vaccination and enhance tracking of children vaccinated is connecting/ integrating the Birth Registration System, such as Rwanda Civil Registration and Vital Statistics

(CRVS), and the individual immunization tracker system, and providing reminders through SMS to mobile phones of parents/carers about the vaccination schedules (Figure 2).

What: Rolling out Countrywide Matched CRVS system & immunization tracker and Providing SMS reminders to Children's parents to attend the immunization program and calendar.
Why: CRVS & immunization tracker, and the system have been working independently, though the matching has been tested and validated in certain health facilities. A unique Database with a unique identifier with complete parents' information will facilitate automated SMS reminders of all children born for monitoring and reaching vaccination targets.
Feasibility. High**:** Both systems already exist, and the matching has been piloted and validated in certain health facilities. Rolling out the matched System and adding automated SMS reminders for the immunization program aligns with Rwanda's ambitious eHealth strategic plan launched in 2009 and updated in 2016 [8]. Moreover, Rwanda gained experience from the COVID-19 vaccination tracking and SMS reminders, which were effective with a success rate of 99% [9].

Policy Option 2: *Integrating digitalized Rapid Convenience Monitoring in MR2 mass Vaccination program and Community health workers Performance Based Financing (PBF)*

Rwanda has demonstrated noteworthy advancements in the domain of routine vaccine coverage. Nevertheless, there are still obstacles that need to be overcome in order to attain and maintain high rates of vaccination coverage for all vaccinations, including the MR vaccine.

What: The aforementioned obstacles highlight a strong need for the Integration of digitalized Rapid Convenience Monitoring in the MR2 Vaccination campaign and Community Health Workers Performance-based financing (PBF).
Why: PBF, which is a pay-for-performance health system financing strategy in Rwanda [10], has been used in Rwanda since 2005 and has contributed significantly to achieving health-related Millennium Development Goals (MDGs) in Rwanda [11,12]. Rapid convenience monitoring (RCM) is a SIA monitoring technique that is specifically designed to locate children who have not been vaccinated, determine the reasons for their lack of vaccination, and implement appropriate measures to address this issue [13]. Integrating digitalized Rapid Convenience Monitoring in the MR2 Vaccination campaign and Community Health Workers Performance-based financing will facilitate real-time monitoring of vaccination campaign performance and enable timely corrective actions
Feasibility. High: Rwanda has standard operating procedures for the implementation of PBF, and it has been used at different levels of the Rwanda Health Sector. Customizing the Community health workers' PBF system in the MR2 mass vaccination campaign and integrating digitalized real-time

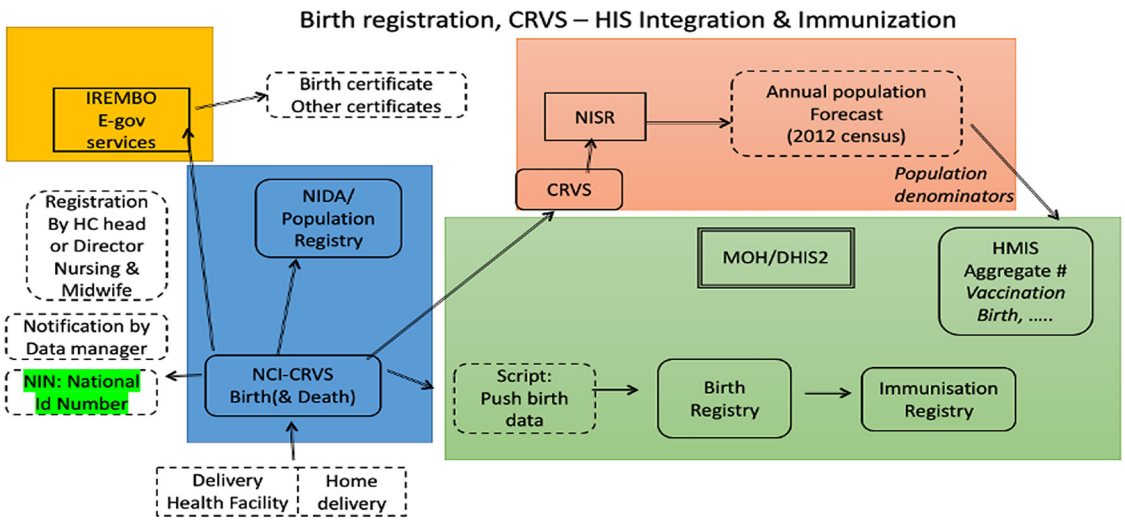

Figure 2: *Diagram showing the integration of Rwanda's CRVS and EIR systems (Source DHIS-Rwanda)*

Table 1: *Economic Evaluation of Policy Options*

	Status Quo	CRVS/Immunization Track	RCM- PBF-CHWs
Cost of intervention	$35,765,293.4	$62,953,728.8	$64,157,259.3
Incremental Cost		$27,188,435.4	$28,391,965.9
Effects	794784.3	1778613.7	1794395.9
Incremental Effects		983829.4	999611.6
ICER		$27.6	$28.4
Political feasibility	Medium	High	High
Operational feasibility	Medium	Medium	Medium

CRVS: Civil Registration and Vital Statistics; RCM: Rapid convenience monitoring; PBF: Community Health Workers; PBF: Performance-Based Financing

monitoring of vaccination campaign performance can have ripple effects, as it has been shown to be effective in Nepal [14]. It also aligns with the Government of Rwanda's digital health strategic plan [8].

The economic evaluation of measles and rubella intervention policies in Rwanda highlights three distinct strategies (Table 1): (i) maintaining the Status Quo, (ii) integrating the CRVS with an Immunization Tracker, and (iii) digitalized Rapid Convenience Monitoring in MR2 Vaccination campaign and Community Health Workers Performance-based financing (PBF-CHWs). The Status Quo requires the least investment at $35,765,293.4, yet its impact, gauged by its effects, is significantly lower at 794,784.3. The CRVS/Immunization Tracker integration, with an investment of $62,953,728.8, promises a substantial effectiveness leap to 1,778,613.7, enjoying a politically high feasibility.

Meanwhile, the Integration of RCM PBF-CHWs strategy, the most expensive at $64,157,259.3, yields the highest effects at 1,794,395.9. However, the added benefits of PBF-CHWs over the CRVS method come at an incremental cost of $28,391,965.9 for an incremental effect of 999,611.6, resulting in an Incremental Cost-Effectiveness Ratio (ICER) of $28.4 (Table 1). Thus, both advanced strategies are politically favorable, but their operational feasibility stands at a moderate level, underlining the need for a comprehensive review before endorsing either option.

RECOMMENDATIONS AND NEXT STEPS

Rwanda plans to roll out a nationwide matched CRVS system and immunization tracker and provide SMS reminders to children's parents to attend immunization programs.

To roll out the system: (i) high-level buy-in from the government and key stakeholders should be secured, a feasibility assessment should be conducted; (ii) the Validated System should be integrated with automated SMS reminders and piloted in certain health facilities to test its functionality and identify any areas for improvement. Once the pilot is successful, the rollout should be scaled up to all health facilities nationwide. Finally, (iii) partnering with mobile network operators is essential to provide SMS reminders at scale.

The integration of digitalized Rapid Convenience Monitoring (RCM) in the Measles-Rubella (MR2) Vaccination campaign and Community Health Workers (CHWs) Performance-Based Financing (PBF) in Rwanda requires the following: (i) assessing the current vaccination campaign and CHWs PBF systems; (ii) customizing the CHWs PBF system for the MR2 mass vaccination campaign; (iii) integrating digitalized RCM in the vaccination campaign, train CHWs on the use of digitalized RCM and the updated PBF system; and (iv) establishing a feedback mechanism for CHWs, monitor and evaluate the impact of the integrated system, and scale up the integrated system to other vaccination campaigns.

REFERENCES

[1] WHO, “More than 140,000 die from measles as cases surge worldwide.” [Online]. Available: https://www.who.int/news/item/05-12-2019-more-than-140-000-die-from-measles-as-cases-surge-worldwide

[2] M. K. Patel et al., “Progress Toward Regional

Measles Elimination — Worldwide, 2000–2018," MMWR Morb. Mortal. Wkly. Rep., vol. 68, no. 48, pp. 1105–1111, Dec. 2019, doi: 10.15585/mmwr.mm6848a1.

[3] RBC, "Comprehensive multi-year plan 2013-2017," 2012. [Online]. Available: https://extranet.who.int/countryplanningcycles/sites/default/files/country_docs/Rwanda/attachment_6_revised_cmyp_08.pdf

[4] UNICEF, "Rwanda: WHO and UNICEF estimates of immunization coverage: 2022 revision," 2023.

[5] A. Shet et al., "Impact of the SARS-CoV-2 pandemic on routine immunisation services: evidence of disruption and recovery from 170 countries and territories," Lancet Glob. Health, vol. 10, no. 2, pp. e186–e194, Feb. 2022, doi: 10.1016/S2214-109X(21)00512-X.

[6] M. Alsuhaibani and A. Alaqeel, "Impact of the COVID-19 Pandemic on Routine Childhood Immunization in Saudi Arabia," Vaccines, vol. 8, no. 4, p. 581, Oct. 2020, doi: 10.3390/vaccines8040581.

[7] GAVI, "Increase in Measles Deaths Demands Urgent Action to Save Lives," 2023. [Online]. Available: https://reliefweb.int/report/world/increase-measles-deaths-demands-urgent-action-save-lives

[8] Helina, "Rwanda National Digital Health Strategic Plan 2018-2023." [Online]. Available: https://elearning.helinanet.org/login/index.php

[9] DHIS2, "Rwanda uses DHIS2 as an interactive system for rapid and paperless COVID-19 vaccination." [Online]. Available: https://dhis2.org/rwanda-covid-vaccination/

[10] A. Binagwaho et al., "Impact of implementing performance-based financing on childhood malnutrition in Rwanda," BMC Public Health, vol. 14, no. 1, p. 1132, Dec. 2014, doi: 10.1186/1471-2458-14-1132.

[11] K. Kantengwa, L. De Naeyer, C. Ndizeye, A. Uwayitu, J. Pollock, and M. Bryant, "PBF in Rwanda: what happened after the BTC-experience?," Trop. Med. Int. Health, Nov. 2009, doi: 10.1111/j.1365-3156.2009.02426.x.

[12] M. Nyandekwe, J. B. Kakoma, and M. Nzayirambaho, "The health-related Millennium Development Goals (MDGs) 2015: Rwanda performance and contributing factors," Pan Afr. Med. J., vol. 31, p. 56, 2018, doi: 10.11604/pamj.2018.31.56.11018.

[13] E. T. Luman, K. L. Cairns, R. Perry, V. Dietz, and D. Gittelman, "Use and abuse of rapid monitoring to assess coverage during mass vaccination campaigns," Bull. World Health Organ., vol. 85, no. 9, p. 651, Sep. 2007, doi: 10.2471/blt.07.045328.

[14] D. H. Oh et al., "Real-Time Monitoring of Vaccination Campaign Performance Using Mobile Phones — Nepal, 2016," MMWR Morb. Mortal. Wkly. Rep., vol. 65, no. 39, pp. 1072–1076, Oct. 2016, doi: 10.15585/mmwr.mm6539a5.

Taking Action, Saving Our Women: Reducing Cervical Cancer Incidence in Rwanda by Increased Screening and Treating

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KEY MESSAGES

Rwanda has a high cervical cancer incidence rate of 28.2/100,000 women
Screening rate is low, with only 18% coverage against the target of 70%
Increasing the number of women screened for cervical cancer will have about 160,164 women with precancerous lesions treated and reduce the incidence of cancer cases.

PROBLEM STATEMENT

Globally, more than 604,127 new cervical cancer cases and 341,831 deaths have been reported by Globocan in 2020 [1], and 70-90% occurred in Low-Middle Income Countries (LMICs) with observed low screening rates, especially in sub-Saharan countries [2,3]. Rwanda has a high cervical incidence rate of 28.2/100,000 women (1229 new cases per year) and a mortality rate of 20.1/100,000 (829 deaths per year) observed in 2020 (Figure 1) [4,5]. However, cervical cancer can largely be prevented through the vaccination of young girls against HPV and screen-and-treat programs for pre-cancerous lesions.
Rwanda is the first country in Africa to vaccinate about 93 % of its target population (girls aged below 15) against HPV [6].

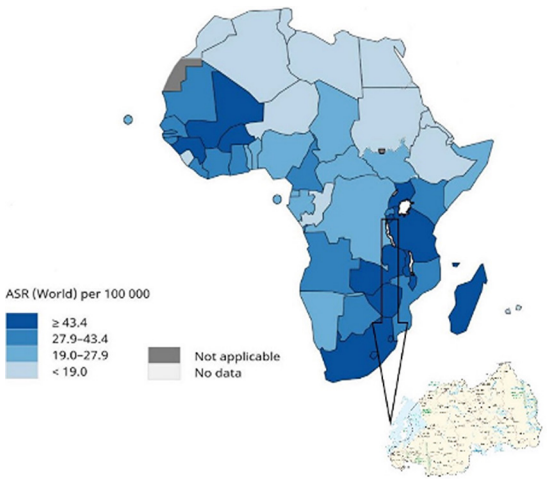

Figure 1: *Rwanda among countries with high cervical cancer incidence rate*

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However, the screening rate is low with only 18% coverage against the target of 70% recommended by the World Health Organization (WHO) [5,7].

ROOT CAUSES OF LOW SCREENING RATES

Lack or poor knowledge about cervical cancer, the importance of its screening and poor knowledge of the availability of screening services among women [5,7,8].
Fear of pain related to the procedure, concern about lack of privacy, social stigmatization or embarrassment to go for screening, and long waiting reported by some women [5,7,8].
Insurance companies (CBHI) do not cover screening services [9], resulting in a shortage of supplies or materials, especially at Health Centers [5,11].
Healthcare providers are not as motivated as those on a Performance-based Finance (PBF) incentivizing platform for the services [10].
Lack of training on Visual Inspection with Acetic acid (VIA) among healthcare providers since Nkurunziza et al. [11] found that only 17.6% of healthcare providers from 10 health centers enrolled in their study were trained.

POLICY OPTIONS

To reduce the high incidence of cervical cancer, it is crucial to increase the screening rate and the rate of treating precancerous lesions. This ensures a reduction in the incidence of invasive cervical cancer [12]. To address this, two policy options have been proposed and compared with the status quo below.

Policy option 1: *Status quo*

What: Providing cervical cancer screening to clients at the facility whenever they come, as well as through targeted campaigns and when possible
Challenge: With this current option, only about 18% of the eligible women have been reached with this approach [5,7,8]. This is because, as much as it is provided free of charge, most facilities may not have the supplies required to conduct the service. Further, studies have shown that there is a lack of awareness of this service and its benefits [11].

Policy option 2: *Including cervical cancer screening and treatment on Community-Based Health Insurance (CBI) and Performance-Based Financing (PBF) for volunteers*

What: To get all Community Health Workers (CHWs) across the country incentivized to raise awareness on cervical cancer screening programs and community-based health insurance (CBHI) cover the services
Why: Raising awareness by CHWs on cervical cancer screening programs has been implemented in 7 sub-districts and increased uptake of services from 2 % to 34%, according to Rwanda Integrated Health Management Information System (HMIS) data.
Studies conducted in Rwanda and other low- and middle-income countries (LMICs) showed that CBHI schemes had a significant positive impact on healthcare utilization, particularly for outpatient services [9,13]. Additionally, these schemes provided improved financial risk protection and households with insurance had a greater likelihood of utilizing healthcare services (Adjusted Odds Ratio [AOR] = 1.60, 95% Confidence Interval [CI]: 1.04–2.47), accessing outpatient health services (AOR = 1.58, 95% CI: 1.22–2.05), and receiving delivery services at a health facility (AOR = 2.21, 95% CI: 1.61–3.02) [9]. This indicates the significant impact of CBHI in allowing healthcare access. In this line, CBHI led to 61% of eligible women being screened for cervical cancer [9], indicating its importance in improving cervical cancer screening.
How: Community health workers will mobilize eligible women door to door in their communities, they will also use community events or activities such as Umuganda, Umugoroba w'ababyeyi. To motivate CHWs, $2 will be given per person mobilized in the PBF incentivization approach.
Feasibility: High. Easy to implement as the CHW approach of awareness has been used for a long, fast enough to maximize effects. Raising awareness on cervical cancer screening can be implemented like other different programs, preventing home delivery and family planning successfully implemented by motivated CHWs. Ensuring that cervical cancer screening programs are covered by CBHI would increase the rate of screening by ensuring the availability of screening materials at health facilities.

Policy option 3: *Facility Performance-Based*

Table 1: *Summary cost-effectiveness analysis of the policy options*

Policy Option	Cost	Outcomes	ICER	Feasibility
Status quo	$9893452	52139		High
Insurance	$28596769	160684	$172.31	High
PBF	$16697466	63010	$625.86	Medium

Discounted summary for 5 years; PBF: Performance based financing; ICER: Incremental Cost-Effectiveness Ratio

Financing (PBF) indicators

What: To have a cervical cancer screening program incorporated in the facility-based PBF indicators in all public health care settings at all levels across the country (health centers, district hospitals, provincial hospitals, and referral hospitals)

Why: Data from HMIS shows that in 6 sub-districts where PBF has been used to incentivize healthcare providers, cervical cancer screening was raised from 5% to 37%. Analysis of performance-based financing in Rwanda suggests that 27.5% of eligible women can be screened for cervical cancer if the program is incorporated in the PBF indicators [10].

How: Motivated healthcare providers will provide good service in screening eligible women and treating those found with precancerous lesions. Healthcare providers will be remunerated with $3.06 per person screened through the PBF incentivization approach.

Feasibility: Medium. It is easy to implement as it has already been tried in a few healthcare settings. Ensuring cervical cancer screening programs are incorporated into the PBF system would motivate healthcare providers to sensitize women attending health facilities for screening as it has been proven successful with other programs such as TB, HIV, and Eyecare.

The insurance policy option shows value for money with the cost of $172.31 for every additional case of a woman with precancerous lesions treated compared to the status quo. This option is cost-effective as the cost is below the country's GDP per capita of about $822 and henceforth an indication of the government's willingness to pay (Table 1).

RECOMMENDATIONS AND NEXT STEPS

We recommend introducing cervical cancer screening on the health insurance scheme. This option, combined with awareness raising in the community, will encourage women to screen for cervical cancer and, in turn, ensure that about 160,184 women with pre-cancerous lesions are treated and reduce the incidence of cancer cases (Table 1). To implement this option, the Ministry of Health, with support from partners would need to: (i) Add cervical cancer to CBHI as a matter of policy; (ii) Provide training to volunteers on how to raise awareness in the community; (iii) Train healthcare workers on cervical cancer screening and treating of precancerous lesions; and (iv) Early detection saves lives, and increasing the number of women screened and treated will save many women and society from the loss of women due to cervical cancer.

REFERENCES

[1] H. Sung et al., "Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries," CA. Cancer J. Clin., vol. 71, no. 3, pp. 209–249, May 2021, doi: 10.3322/caac.21660.

[2] R. Hull et al., "Cervical cancer in low and middle-income countries," Oncol. Lett., vol. 20, no. 3, pp. 2058–2074, Sep. 2020, doi: 10.3892/ol.2020.11754.

[3] D. Singh et al., "Global estimates of incidence and mortality of cervical cancer in 2020: a baseline analysis of the WHO Global Cervical Cancer Elimination Initiative," Lancet Glob. Health, vol. 11, no. 2, pp. e197–e206, Feb. 2023, doi: 10.1016/S2214-109X(22)00501-0.

[4] M. S. Bangura et al., "Case study of cervical cancer prevention in two sub-Saharan African countries: Rwanda and Sierra Leone," Front. Med., vol. 9, p. 928685, 2022, doi: 10.3389/fmed.2022.928685.

[5] J. P. Gafaranga et al., "Knowledge, Barriers and Motivators to Cervical Cancer Screening in Rwanda: A Qualitative Study," Int. J. Womens Health, vol. Volume 14, pp. 1191–1200, Sep. 2022, doi: 10.2147/IJWH.S374487.

[6] F. Sayinzoga et al., "Human papillomavirus vaccine effect against human papillomavirus infection in Rwanda: evidence from repeated cross-sectional cervical-cell-based surveys," Lancet Glob. Health, vol. 11, no. 7, pp. e1096–e1104, Jul. 2023, doi: 10.1016/S2214-109X(23)00193-6.

[7] G. Niyonsenga et al., "Knowledge, utilization and barriers of cervical cancer screening among women attending selected district hospitals in Kigali - Rwanda," Can. Oncol. Nurs. J., vol. 31, no. 3, pp. 266–274, Jul.

2021, doi: 10.5737/23688076313266274.
[8] G. Ruzigana, L. Bazzet-Matabele, S. Rulisa, A. N. Martin, and R. G. Ghebre, "Cervical cancer screening at a tertiary care center in Rwanda," Gynecol. Oncol. Rep., vol. 21, pp. 13–16, Aug. 2017, doi: 10.1016/j.gore.2017.05.005.
[9] P. Eze, S. Ilechukwu, and L. O. Lawani, "Impact of community-based health insurance in low- and middle-income countries: A systematic review and meta-analysis," PLOS ONE, vol. 18, no. 6, p. e0287600, Jun. 2023, doi: 10.1371/journal.pone.0287600.
[10] C. Nkurunziza, R. Ghebre, U. Magriples, D. Ntasumbumuyange, and L. Bazzett-Matabele, "Healthcare provider challenges to early detection of cervical cancer at primary healthcare level in Rwanda," Gynecol. Oncol. Rep., vol. 37, p. 100810, Aug. 2021, doi: 10.1016/j.gore.2021.100810.
[11] M. Priedeman Skiles, S. L. Curtis, P. Basinga, and G. Angeles, "An equity analysis of performance-based financing in Rwanda: are services reaching the poorest women?," Health Policy Plan., vol. 28, no. 8, pp. 825–837, Dec. 2013, doi: 10.1093/heapol/czs122.
[12] C. P. R. Casas et al., "Cervical cancer screening in low- and middle-income countries: A systematic review of economic evaluation studies," Clinics, vol. 77, p. 100080, Jan. 2022, doi: 10.1016/j.clinsp.2022.100080.
[13] M. Mukangendo, M. Nzayirambaho, R. Hitimana, and A. Yamuragiye, "Factors Contributing to Low Adherence to Community-Based Health Insurance in Rural Nyanza District, Southern Rwanda," J. Environ. Public Health, vol. 2018, p. 2624591, 2018, doi: 10.1155/2018/2624591.

Original Research

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The role of Key Performance Indicators (KPIs) in Clinical Self-Assessment of Quality of Service Offered to the Patients under Chronic Hemodialysis in Rwanda

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ABSTRACT

Introduction: Key Performance Indicators (KPIs) are quantifiable metrics used in managing patients under hemodialysis and measuring performance in care quality. This study examined the performance of hemodialysis centers at Africa Healthcare Network, Rwanda using KPIs.
Methods: We analyzed the data recorded in Clinicea (electronic file) between February and November 2022, using KPIs.
Results: In all three centers during the above-mentioned period, all sessions were recorded; in more than 94% of patients, their Kt/V urea was recorded, and the target varied between 69% to 85%; almost half of the patients did their blood tests, and less than three quarters met the target. Few patients had AVF (30% in November). The beds were under-used; no center has met two shifts per day at 100%, the same for the nurses with less than 2.5 sessions per nurse per day.
Conclusion: This study showed that the hemodialysis centers were performing fairly and highlights the need for improving the quality of care, especially in Low-Income Countries like Rwanda, where there is a shortage of Physicians and Nephrologists.

INTRODUCTION

Hemodialysis is needed when kidneys are not able to clean the blood by removing fluid and enough waste. This procedure uses the dialysis machine and a special filter, an artificial kidney called a dialyzer, and through vascular access, it is connected to the patient [1]. It helps control blood pressure and balance important minerals, such as serum sodium, potassium, and calcium. It gives supportive care to improve quality of life and live longer but does not cure kidney failure [2].
Chronic kidney disease (CKD) is defined as a clinical syndrome associated with a definitive change in the structure of the kidney or kidney function; it is mainly irreversible or associated with slow and progressive evolution [3].

CKD is associated with high-risk complications and mortality3. In adult patients, CKD is defined with a glomerular filtration rate (GFR) less than 60 ml/min/1.73m2 or greater than 60 ml/min/1.73m2 when there is evidence of renal structure injury [4]. Worldwide, the incidence of CKD is increasing; the average is estimated to be 150-200 per million population, and its prevalence is estimated to be

800 per million population [4]. Globally, there is an annual increase of 7% in needing chronic dialysis [4,5]. In sub-Saharan Africa, aging, lifestyle modification, and rapid urbanization are the basis of CKD increment in addition to the overspreading of HIV, diabetes mellitus, hypertension, and obesity [5].

Physicians and patients have to decide together subjective and objective parameters before starting dialysis [3]. The physician has to evaluate the quality of life, fall in renal function, and the patient's psychology since the dialysis is started when the patient becomes symptomatic or if there are remarkable changes in laboratory results suggesting a high risk of developing symptoms [3].

Hemodialysis outcomes are influenced by several factors, such as quality of life, socio-demographics, and comorbidities, making it difficult to do follow-up and may worsen outcomes [6]. Therefore, Key Performance Indicators (KPIs) are essential in managing patients under hemodialysis. KPIs are quantifiable metrics that express an institution's performance in fulfilling its goals and objectives [7].

KPIs are used to assess and improve the quality of renal services at CKD clinics, dialysis clinics, and transplant clinics without extra funding [7]. KPIs are used to set measurable goals in a certain time range, followed by performance assessment, recommendations, and next steps [7]. This study examined the performace of hemodialysis centers at Africa Healthcare Network (AHN) using KPIs, and its findings can help improve clinical service provided to CKD patients in Rwanda. AHN is the first and largest dialysis chain across Sub-Saharan Africa, with dialysis centers in Rwanda. The findings would inform strategies under development to expand the dialysis centers countrywide since Rwanda has only 7 centers, mostly concentrated in Kigali city.

METHODS

Study design: This was a retrospective study conducted at three hemodialysis centers of AHN, Rwanda (Gihundwe dialysis center and Gisenyi dialysis center in remote area and Kimihurura standalone center in the City of Kigali). We analyzed the recorded data in Clinicea (electronic file in use at Africa Healthcare Network, Rwanda, in consultation) from February to November 2022. The hemodialysis sessions, blood tests results, Kt/V urea, vascular access types, catheter infections breakdown, admissions, bed occupancy, deaths, and daily presented nursing staff were recorded.

Statistical analysis: Recorded data in Clinicea were exported to Microsoft Excel 2021 for analysis. Descriptive statistics was performed and data was presented in frequencies (n) and percentages (%).

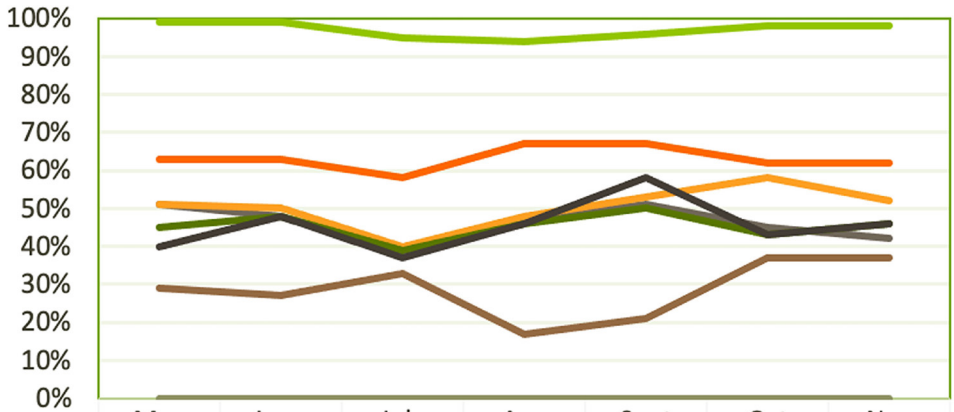
Ethical considerations: Both ethical approval and informed consent were waived by Gihundwe Hospital and Gisenyi Hospital, Education and Research Committees considering the study's retrospective nature, as it used the anonymized records that existed in dialysis centers and did not involve interaction with the patients.

RESULTS

We found 67 patients at all centers, with all sessions (100%) recorded in Clinicea (Table 1). From May to November 2022, more than 94% of their Kt/V urea was tested and recorded, the patients who did serum albumin test dropped from 51% to 42%. There was an improvement in

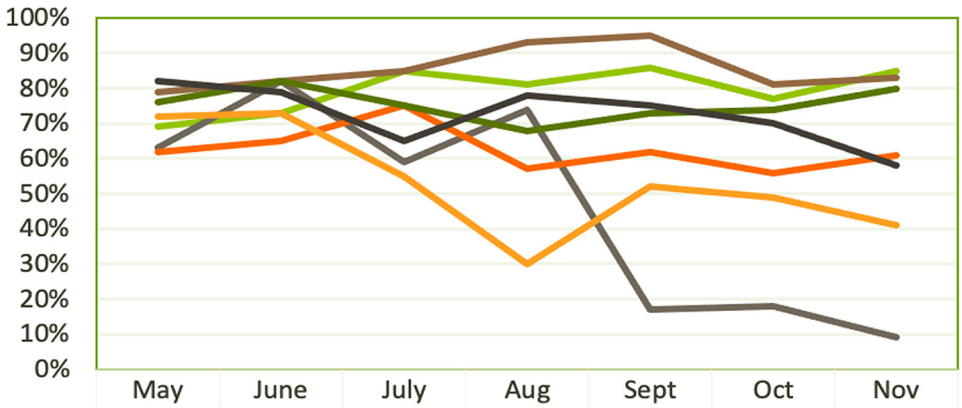
Table 1: *Clinicea Data Entry*

	Total Sessions	Sessions entered in Clinicea	% of sessions entered in Clinicea
Total	1,053	1,052	100%
Kimihurura	671	670	100%
Gisenyi	192	192	100%
Gihundwe	190	190	100%



	May	June	July	Aug	Sept	Oct	Nov
Kt/v	99%	99%	95%	94%	96%	98%	98%
Albumin	51%	48%	39%	47%	51%	45%	42%
Hemoglobin	63%	63%	58%	67%	67%	62%	62%
TSAT	0%	0%	0%	0%	0%	0%	0%
Ferritin	29%	27%	33%	17%	21%	37%	37%
Calcium	51%	50%	40%	48%	53%	58%	52%
Phosphorous	45%	48%	39%	46%	50%	43%	46%
Ca*Po4	40%	48%	37%	46%	58%	43%	46%

Figure 1: *Patient level KPIs: Blood tests (percentage of the patients tested from May to November)*



	May	June	July	Aug	Sept	Oct	Nov
Kt/v	69%	73%	85%	81%	86%	77%	85%
Albumin	63%	82%	59%	74%	17%	18%	9%
Hemoglobin	62%	65%	75%	57%	62%	56%	61%
TSAT	-	-	-	-	-	-	-
Ferritin	79%	82%	85%	93%	95%	81%	83%
Calcium	72%	73%	55%	30%	52%	49%	41%
Phosphorous	76%	82%	75%	68%	73%	74%	80%
Ca*Po4	82%	79%	65%	78%	75%	70%	58%

Figure 2: *Patient level KPIs review: Blood tests (Percentage of the patients meeting target values)*

testing Ferritin from 29% to 37%. Other elements like Calcium, Phosphate, and Hemoglobin did not change (Figure 1).

From May to November 2022, there was an improvement in patients meeting KT/v target levels from 69% to 85% with much difference between October and November 2022 (From 77% to 85%), there was a fall in patients with target levels of serum albumin and calcium-phosphorus tests from 63% to 9% and 82% to 58% respectively, and for other elements, there was no much change (Figure 2). For hemoglobin, 40% of the patients met the target levels (Hb 11-12g/dl). Gihundwe dialysis center had a high percentage of patients with anemia (Hb <8g/dl), and Kimihurura Standalone had a high number of patients with anemia (Hb<8g/dl) (Table 2).

Target hemoglobin levels over a period of time at Gisenyi dialysis centers had dropped to 30% by June 2022, while the patients of Gihundwe dialysis center had reached their apogee of 90% (Figure 3).

For vascular access type, there was an increase in the number of patients who had Arteriovenous fistula (AVF) (21% to 30%); on the other side, there was a fall in the number of patients who had Permanent cannula (PC) from 66% to 57% (Figure 4). June had the highest prevalence of infections

Table 2: *Patient Hemoglobin Breakdown*

HEMOGLOBIN (g/dl)	<8	8-9	9-10	10-11	11-12
RWANDA (%)	16%	7%	15%	21%	40%
KIMIHURURA (%)	16%	5%	19%	22%	38%
GISENYI (%)	7%	13%	20%	7%	54%
GIHUNDWE (%)	27%	7%	0%	33%	33%

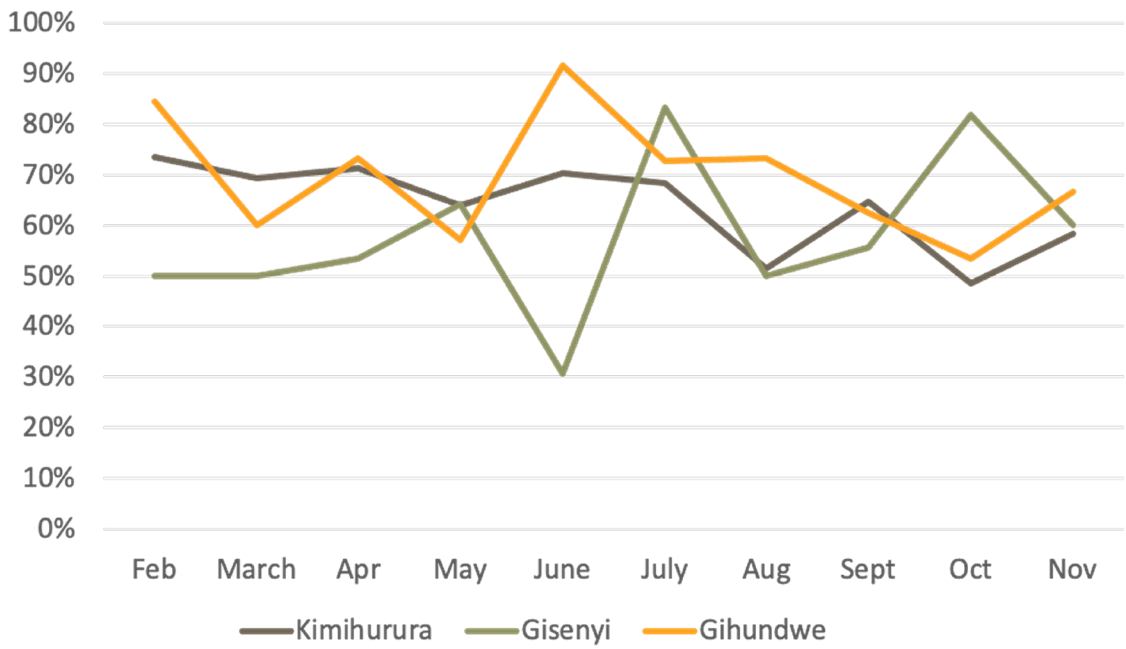
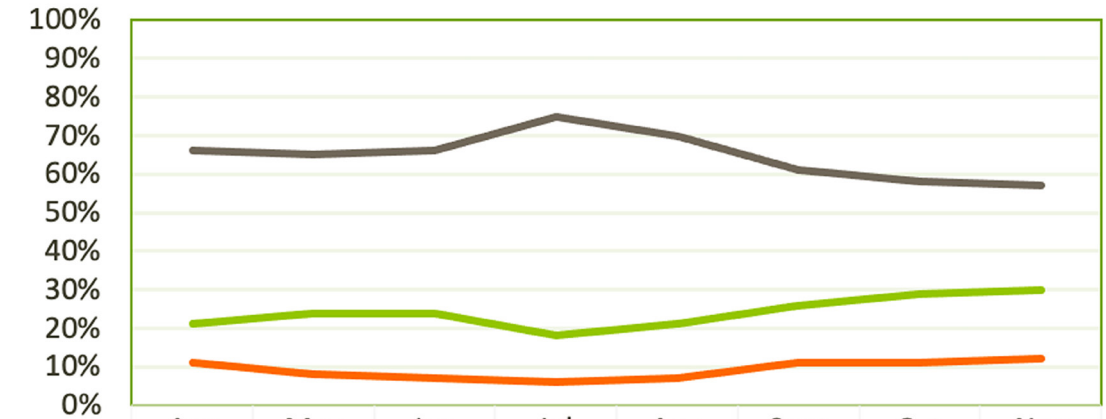
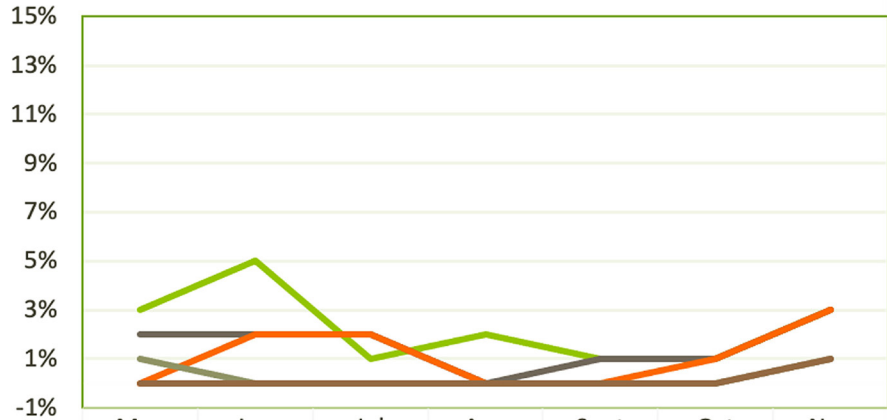


Figure 3: *Patient level KPIs: Blood tests (Patients meeting hemoglobin target overtime in centers*



	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov
AVF	21%	24%	24%	18%	21%	26%	29%	30%
PC	66%	65%	66%	75%	70%	61%	58%	57%
IJC	11%	8%	7%	6%	7%	11%	11%	12%

Figure 4: *Other clinical outcomes-Vascular access types (AVF: Arteriovenous fistula; PC: Permanent cannula, and IJC: Internal jugular catheter)*



	May	Jun	Jul	Aug	Sept	Oct	Nov
Catheter infection	3%	5%	1%	2%	1%	1%	3%
Admissions	2%	2%	2%	0%	1%	1%	3%
Admissions (CKD only)	0%	2%	2%	0%	0%	1%	3%
Mortality	1%	0%	0%	0%	0%	0%	1%
Mortality (CKD only)	0%	0%	0%	0%	0%	0%	1%

Figure 5: *Other clinical outcomes (Percentage of infections, admissions and mortality)*

(5%), and November recorded the highest prevalence of admissions (3%) and mortality (1%) (Figure 5).

The overall average sessions per day to nursing staff ratio was around 2.3 per nurse per day, with the highest record in Kimihurura standalone, where the ratio was 2.5 per nurse per day in September 2022 (Figure 6).

For the bed occupancy at all centers, many shifts were done in November 2022, with two full shifts at 60% on average, with the highest in Kimihurura standalone (85%) (Figure 7).

Comparing October and November 2022, in data recording in Clinicea, there was no much difference

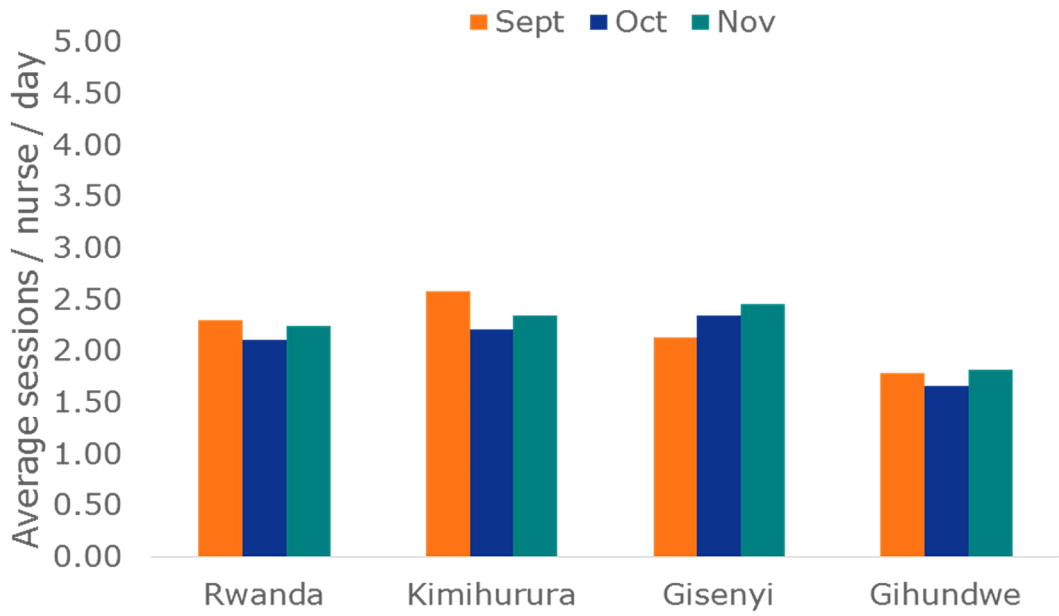


Figure 6: *Operational KPIs: Average sessions per day to nursing staff ratio*

Table 3: *Clinical KPI: October Blood tests (Percentage of patients tested in October and November)*

	Kt/V	Albumin	Hemoglobin	TSAT	Ferritin	Serum Ca	Serum Po4	Ca*PO4
OCTOBER BOOD TESTS								
Total	98%	45%	62%	0%	37%	58%	43%	43%
KIMIHURURA	97%	46%	52%	0%	37%	49%	43%	43%
GISENYI	100%	50%	69%	0%	38%	69%	50%	50%
GIHUNDWE	100%	38%	94%	0%	38%	81%	38%	38%
NOVEMBER BLOOD TESTS								
Total	98%	42%	62%	0%	37%	52%	46%	46%
KIMIHURURA	99%	42%	50%	0%	38%	42%	39%	39%
GISENYI	94%	69%)	94%	0%	44%	75%	56%	56%
GIHUNDWE	100%	17%	83%	0%	28%	72%	67%	67%

between the two months but by stratification, the Gihundwe dialysis center had recorded 100% Kt/V urea in both months (Table 3), and in meeting the target levels. No TSAT recorded.

At all centers, the percentage of patients achieving target Kt/V urea increased from 77% to 85%, the

Table 4: *Clinical KPIs: October Blood tests (Percentage of the patients meeting the target and average value between October and November)*

	Kt/v	Albumin	Hemoglobin	Ferritin	Serum Ca	Serum Po4	Ca*PO4
OCTOBER BLOOD TESTS							
Total	77%	18%	56%	81%	49%	74%	70%
KIMIHURURA	82%	13%	49%	80%	58%	76%	69%
GISENYI	44%	13%	82%	67%	18%	75%	75%
GIHUNDWE	94%	50%	53%	100%	54%	67%	67%
NOVEMBER BLOOD TESTS							
Total	85%	9%	61%	83%	41%	80%	58%
KIMIHURURA	84%	6%	59%	82%	55%	72%	69%
GISENYI	73%	9%	60%	71%	33%)	100%	44%
GIHUNDWE	100%	33%	67%	100%	15%	83%	42%

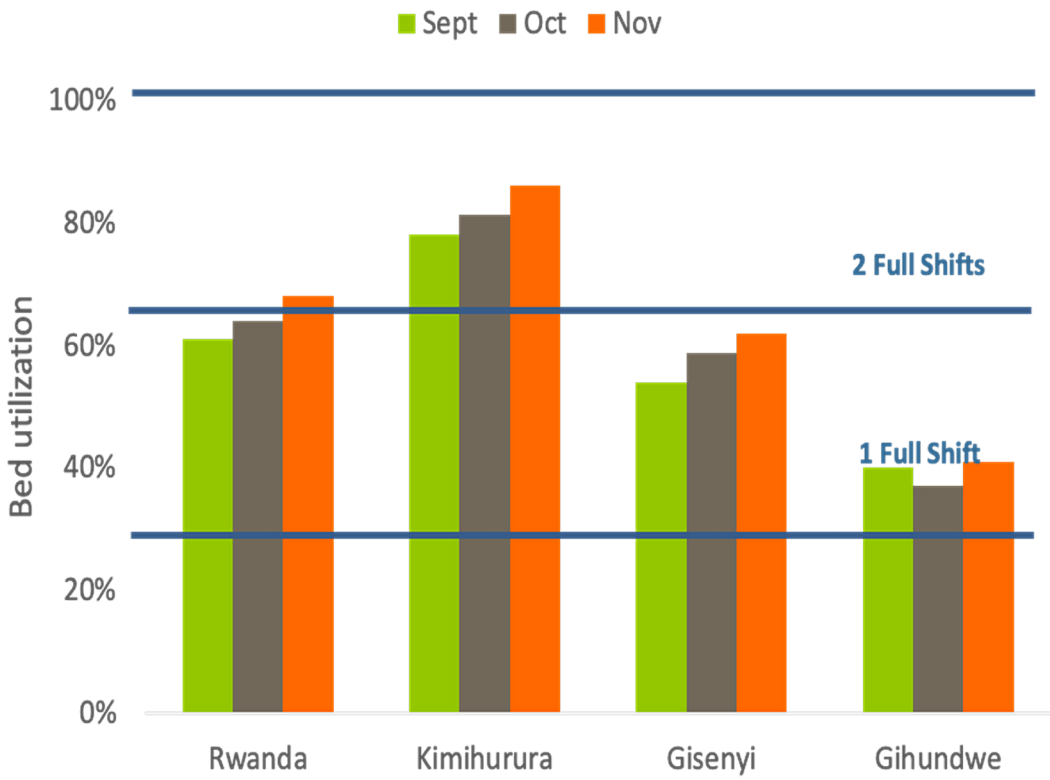


Figure 7: *Operational KPIs: Bed occupancy*

Table 5: *Clinical KPI: Other clinical outcomes (Vascular access between October and November)*

	Fistula	Permanent catheter	Acute catheter
VASCULAR ACCESS IN OCTOBER			
Total	29%	58%	11%
KIMIHURURA	39%	45%	13%
GISENYI	6%	81%	13%
GIHUNDWE	13%	88%	0%
VASCULAR ACCESS IN OCTOBER			
Total	30%	57%	12%
KIMIHURURA	38%	45%	16%
GISENYI	13%	88%	0%
GIHUNDWE	11%	83%	6%

Table 6: *Clinical KPIs: Catheter-related infection, hospital admissions and mortality between October and November*

	Catheter infection	**Hospital admission (all patients)**	**Hospital admission (CKD only)**	**Mortality (all patients)**	**Mortality (CKD only)**
OCTOBER CLINICAL OUTCOMES					
Total	1%	1%	1%	0%	0%
KIMIHURURA	1%	0%	0%	0%	0%
GISENYI	0%	5%	5%	0%	0%
GIHUNDWE	0%	0%	0%	0%)	0%
NOVEMBER CLINICAL OUTCOMES					
Total	3%	3%	3%	1%	1%
KIMIHURURA	4%	3%	3%	1%	1%
GISENYI	5%	0%	0%	0%	0%
GIHUNDWE	0%	10%	10%	0%	0%

Gisenyi hemodialysis center saw the most increase, from 44% to 73%. Patients with the hemoglobin target dropped from 82% to 60% at Gisenyi dialysis center, and patients with calcium target dropped from 54% to 15% at Gihundwe center but the percentage of patients with phosphorus target has increased from 67% to 83% at Gihundwe dialysis center and patients with albumin target dropped from 13% to 6% at Kimihurura standalone (Table 4).

In all centers, the patients using AVF increased from 29% to 30% between October and Novemeber with the highest increase at Gisenyi dialysis center (from 6% to 13%), and there was no patient using IJC at Gisenyi dialysis center in November 2022 (Table 5).

Regarding catheter-related bloodstream infections (CRBSI), hospital admissions (all patients or CKD patients only), and mortality of all dialysis patients or patients with CKD only at all centers, the highest percentage of admissions for CKD patients (5%) and all patients (5%), in general, was in Gisenyi dialysis center in October, which droped to 0% in Novemeber. In contrast Gihundwe dialysis center which had recorded no admissions in October, reported the highest percentage (10%) for both types of admissions in November. Gisenti dialysis center had the highest number of patients with CRBSI (5%) in November, while it had none (0%) in October (Table 6).

DISCUSSION

KPIs in monitoring and reporting are key to delivering standard hemodialysis service, and their implementation may help measure adherence to the dialysis standards [7]. Due to the increasing patients` number under chronic dialysis, implementing KPIs was found to help improve the CKD medical treatment system for early detection, optimal management, and criteria for referral to a nephrologist with the goal of achieving a reduction of new dialysis patients [8]. This study assessed how AHN dialysis centers performed in Rwanda, using KPIs.

The findings showed that an overall improvement in meeting target levels of Kt/v, and hemoglobin from May to November 2022. Kt/V urea of is associated with good general health status [9], but very difficult to achieve Kt/V urea of 1.45, especially in men with body weight between 70 kg to 80 kg for treatments of 4.5 hours during dialysis [10]. The patients with high or low serum concentrations of serum albumin-corrected calcium, phosphorus, and parathyroid hormone (PTH) have an increased risk of all-cause mortality [11]. We found a fall in patients with target serum albumin and calcium-phosphorus levels between May and November, indicating an increased risk for patients. Low hemoglobin levels may also be attributed to the inaccessibility of the erythropoiesis-stimulating agent. Though patients on dialysis tend to have anemia, 40% of the patients met the target hemoglobin levels. Hemoglobin increase depends on erythropoietin response, nutrition status, inflammation, and oxidative stress markers. In addition, serum albumin concentration strongly predicts baseline hemoglobin and erythropoietin sensitivity, and its improvement improves anemia in hemodialysis patients [12]. Moreover, serum albumin concentration level in patients under chronic dialysis was found to be a predictor to determine the nutrition status of the patients [13]. Therefore, the fall in target albumin levels might have affected the achievement of hemoglobin levels in 60% of patients through multiple factors. Many patients missed investigations, which is associated with high-frequency reagents stock-out in laboratories of public hospitals, and support the study which documented sub-optimal diagnosis capacity of kidney diseases in different hospitals in Rwanda [14].

We found an increase in the number of patients who had AVF. However, the patients with AVF remained few, which may be attributed to a lack of vascular surgeons in Rwanda. AVF is considered the gold standard hemodialysis vascular access [15], and efforts should be made to increase its use in patients under hemodialysis. At Kimihurura standalone, two full shifts reached 80% in November, which is attributed to the dialysis accessibility, and the patients rarely miss the scheduled dialysis sessions compared to the rest of the centers of remote areas. In Rwanda, 90% use Community Base Health Insurance (CBHI) [16], a public universal health insurance. The CBHI beneficiaries do not have access to chronic dialysis unless they are able to pay for 100% hemodialysis services. This may justify the low rate of bed occupancy, low nurse-to-hemodialysis session ratios, and the inability to reach at least two full shifts per day. Besides this, the nephrologist to hemodialysis patients ratio in the studied centers was 1:67, highlighting the need for nephrologists in Rwanda as one nephrologist covered all three centers during the study period.

The staff shortage might affect service delivery, leading to complications, such as infection [17,18]. In Sub-Saharan countries, the shortage of trained nursing staff and nephrologists was reported to affect the dialysis service delivery [17]. This aligns with our findings and might have contributed to CRBSI in dialysis centers, as it might lead to less change of catheters, increasing the risk of infections. CRBSI at some centers also aligns with low levels of hemoglobin and albumin recorded in those centers, indicating their contributions to the infection. Studies have shown that catheter type and duration, comorbidity, immunosuppression, low hemoglobin level, and low albumin level were significantly linked with CRBSI [19], all of which are more prevalent among dialysis patients.

There are some limitations to this study that should be considered. We could not include TSAT in KPIs. TSAT testing was not done at all centers, which might be attributed to the lack of materials/ reagents. However, testing TSAT is important as it helps monitor the response to erythropoiesis-stimulating agents and/or iron therapy in CKD. Moreover, the KPIs used in our study did not include injectable erythropoiesis-stimulating agent and iron sucrose, serum glucose, glycated hemoglobin, missed scheduled hemodialysis sessions, BMI, and vital signs monitoring because their details were missing or incomplete in patients' files.

CONCLUSION

Our findings show that services provided at AHN dialysis centers in Rwanda generally improved. This indicates that KPIs may help self-assessment of the dialysis services offered to chronic hemodialysis patients. The findings of this study highlight weaknesses to improve, such as increasing patients meeting Kt/v urea, hemoglobin, albumin, and calcium and phosphorus targets. The number of nutritionists and local vascular surgeons should also be increased. Health officials and partners should increase laboratory reagents to improve Kt/V urea testing has to be recorded 100% and meet the target as it is used to measure vascular access patency. The physicians have to check the adherence and compliance of the drug with the patients, and also to put enough effort in TSAT testing. The Ministry of Health needs to collaborate with different stakeholders in order to improve renal service in terms of dialysis accessibility and increase the number of nephrologists and laboratory equipment.

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REFERENCES

[1] National Kidney Foundation, "Treatment and Support." Accessed: Dec. 17, 2023. [Online]. Available: https://www.kidney.org/treatment-support

[2] National Institute of Diabetes and Digestive and Kidney Diseases, "Hemodialysis." Accessed: Dec. 17, 2017. [Online]. Available: https://niddk.nih.gov/health-information/kidney-disease/kidney-failure/hemodialysis

[3] A. L. Ammirati, "Chronic Kidney Disease," Rev. Assoc. Med. Bras., vol. 66, no. suppl 1, pp. s03–s09, 2020, doi: 10.1590/1806-9282.66.s1.3.

[4]A. Grassmann, S. Gioberge, S. Moeller, and G. Brown, "ESRD patients in 2004: global overview of patient numbers, treatment modalities and associated trends," Nephrol Dial Transplant, vol. 20, no. 12, pp. 2587–2593, Dec. 2005, doi: 10.1093/ndt/gfi159.

[5] J. W. Stanifer et al., "The epidemiology of chronic kidney disease in sub-Saharan Africa: a systematic review and meta-analysis," The Lancet Global Health, vol. 2, no. 3, pp. e174–e181, Mar. 2014, doi: 10.1016/S2214-109X(14)70002-6.

[6] C. R. Pretto, E. R. Winkelmann, L. M. Hildebrandt, D. A. Barbosa, C. D. F. Colet, and E. M. F. Stumm, "Quality of life of chronic kidney patients on hemodialysis and related factors," Rev. Latino-Am. Enfermagem, vol. 28, p. e3327, 2020, doi: 10.1590/1518-8345.3641.3327.

[7] N. D. Toussaint et al., "Implementation of renal key performance indicators: Promoting improved clinical practice: Renal key performance indicators," Nephrology, vol. 20, no. 3, pp. 184–193, Mar. 2015, doi: 10.1111/nep.12366.

[8] A. Fukui, T. Yokoo, M. Nangaku, and N. Kashihara, "New measures against chronic kidney diseases in Japan since 2018," Clin Exp Nephrol, vol. 23, no. 11, pp. 1263–1271, Nov. 2019, doi: 10.1007/s10157-019-01786-7.

[9] J. B. Chen et al., "Relationship between Kt/V urea-based dialysis adequacy and nutritional status and their effect on the components of the quality of life in incident peritoneal dialysis patients," BMC Nephrol, vol. 13, p. 39, Jun. 2012, doi: 10.1186/1471-2369-13-39.

[10] B. A. Fritz, S. Doss, L. M. McCann, and E. M. Wrone, "A comparison of dual dialyzers in parallel and series to improve urea clearance in large hemodialysis

patients," American Journal of Kidney Diseases, vol. 41, no. 5, pp. 1008–1015, May 2003, doi: 10.1016/S0272-6386(03)00198-7.

[11] M. Naves-Diaz et al., "Calcium, phosphorus, PTH and death rates in a large sample of dialysis patients from Latin America. The CORES Study," Nephrology Dialysis Transplantation, vol. 26, no. 6, pp. 1938–1947, Jun. 2011, doi: 10.1093/ndt/gfq304.

[12] R. Agarwal, J. L. Davis, and L. Smith, "Serum Albumin Is Strongly Associated with Erythropoietin Sensitivity in Hemodialysis Patients," Clinical Journal of the American Society of Nephrology, vol. 3, no. 1, pp. 98–104, Jan. 2008, doi: 10.2215/CJN.03330807.

[13] C. H. Yang, Y.-S. Chen, J.-B. Chen, H.-C. Huang, and L.-Y. Chuang, "Application of deep learning to predict the low serum albumin in new hemodialysis patients," Nutr Metab (Lond), vol. 20, no. 1, p. 24, Apr. 2023, doi: 10.1186/s12986-023-00746-z.

[14] G. Igiraneza, V. Dusabejambo, F. O. Finklestein, and A. Rastegar, "Challenges in the Recognition and Management of Acute Kidney Injury by Hospitals in Resource-Limited Settings," Kidney International Reports, vol. 5, no. 7, pp. 991–999, Jul. 2020, doi: 10.1016/j.ekir.2020.04.003.

[15] N. Gedney, "Arteriovenous Fistula or Dialysis Catheter: A Patient's Perspective," Kidney360, vol. 3, no. 6, pp. 1109–1110, Jun. 2022, doi: 10.34067/KID.0001462022.

[16] Pacific Prime, "Rwanda Health Insurance." Accessed: Sep. 26, 2023. [Online]. Available: https://www.pacificprime.com/country/africa/rwanda-health-insurance/

[17] M. Japiong, C. K. Landy, M. T. Fox, J. Mensah, and P. Adatara, "Factors affecting access to dialysis for patients with end-stage kidney disease in Sub-Saharan Africa: A scoping review," Nurs Open, vol. 10, no. 10, pp. 6724–6748, Oct. 2023, doi: 10.1002/nop2.1970.

[18] A. T. Tamata and M. Mohammadnezhad, "A systematic review study on the factors affecting shortage of nursing workforce in the hospitals," Nurs Open, vol. 10, no. 3, pp. 1247–1257, Mar. 2023, doi: 10.1002/nop2.1434.

[19] M. K. Weldetensae, M. G. Weledegebriel, A. T. Nigusse, E. Berhe, and H. Gebrearegay, "Catheter-Related Blood Stream Infections and Associated Factors Among Hemodialysis Patients in a Tertiary Care Hospital," Infect Drug Resist, vol. 16, pp. 3145–3156, 2023, doi: 10.2147/IDR.S409400.

Rwanda
Public Health Bulletin

About the Rwanda Public Health Bulletin (RPHB)

The Rwanda Public Health Bulletin (RPHB) is a printed and open access, peer-reviewed journal, published as the flagship scientific and technical periodical publication. RPHB is a public health bulletin launched in March 2019 by the Rwandan Ministry of Health, through the Rwanda Biomedical Centre (RBC) in collaboration with the CDC Foundation and with support from Bloomberg Philanthropies Data for Health Initiative.

Mission

To serve as a scientific information dissemination platform of national and international significance, mainly in areas related to the Rwanda Ministry of Health's essential mission to strengthen national and local health systems and improve the health of the people of Rwanda. The Rwanda Public Health Bulletin publishes disease surveillance summaries, public health response guidelines, public health notices, case reports, outbreak reports, original research papers, and policy briefs among others. It generally features issues of importance to its targeted audience, which is health professionals, academic researchers, policymakers and anybody interested in health issues. Articles for publication are received from doctors, nurses, allied health professionals, students, policymakers, government bodies, non-governmental bodies and others.

Aim

To bridge the gap in public health information sharing between policymakers, researchers, health professionals and practitioners.

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INSTRUCTIONS TO AUTHORS

All works submitted to this bulletin will have to belong to the types of articles stated below:

1. ORIGINAL RESEARCH

Referred to as "Primary Research" pioneer in a determined domain. It can be from various aspects: Clinical features, pathophysiology, biochemistry, molecular biology, etc.

THE TITLE

The title of the article should be concise and informative. It should contain enough thoughts on the subject.

ABSTRACT

Abstract of 250 words maximum must accompany each manuscript and be divided into 4 paragraphs with the following headings and MeSH keywords:

Introduction: stating the purposes/aims of the work; the research undertaken, the hypothesis tested or the procedure evaluated.
Materials and methods: briefly stating what was done and what materials were used, including the number of subjects, the methods to assess the data and to control bias.
Results: Providing key findings of the study, including indicators of statistical significance, actual numbers, as well as percentages.
Conclusion: Summarizing in 1 or 2 sentences the work on the basis of the findings. It emphasizes new and important aspects of the study or observations.

THE MAIN TEXT

The text of observational and experimental articles is divided into sections with the following headings: Introduction: should always begin the text, and requires brevity and focuses. It conveys the nature and purpose of the work, and quotes the relevant literature. Only strictly pertinent background information is necessary for understanding why the topic is important. We suggest the final paragraph clearly states the hypothesis or purpose of the study.

METHODS

Details of clinical and technical procedures should follow the introduction. A clear description of the selection of the observational or experimental subjects should be given. The identification of all aspects of the study, its reasoning, and the related relevance should be explicitly justified. In case, the study was done in a particular way, the guiding principles should all be clarified. Exclusion and inclusion criteria or partial inclusion, the reliability index, the confidentiality index, the analysis step, and the data collection processes should be also carefully specified. This section should provide sufficient details on the methods, instrumentation, procedures, all drugs and chemicals used (including generic names, doses, routes of administration). It should allow other workers to reproduce the study if necessary.
This section should also state the self-evaluation of the study by: independent/consensus readings blinded or unblinded to other information and estimate the fluctuation of recall biases by random ordering of studies.

Be clear about the retrospective or prospective nature of the study. Finally, provide references to established methods, including statistical methods that have been published, forthcoming, or that may not be well known. New description or substantially modified methods may be used however, give reasons for the use of these techniques, and evaluate their limitations. Statistical methods should be described with enough details to enable a knowledgeable reader with access to the original data to verify the reported results. A general description of methods would be defined in the methods section, whereas a specific statistical method used into analysis would be summarized in the results section. Any general use of the computer program should be

specified, and more details have to be clarified about any randomization issues.

RESULTS

Logical sequence of presentation of results is required in the text; along with tables, and illustrations. Repetition of data from illustrations into the text should be avoided; however, emphasize or summary of only important observations would be helpful. Avoid the ‘’non-technical use’’ of technical terms in statistics which should be defined and reserved for the right purpose. Moreover, define all those statistical terms aside with or including abbreviations and/or most used symbols. Any complication and/or unexpected finding should be reported and the more possibly explained and the author should report lost to follow up and dropouts from a clinical trial.

DISCUSSION

Use ample subheadings. Emphasize the new and important aspects of the study and the conclusions that follow from them. Avoid repetition of details included in other parts. This section requires the mention of the implication of the findings, and their limitations for future research, involving relating the observations to other relevant studies.

Finally, the conclusions should be linked to the goals of the study; though mostly avoiding:

Unqualified statement not completely supported by the data

Statement on economic benefits and costs unless the report includes economic data and analyses

Claim of priority and alluding to work that has not been completed.

Whereas new hypotheses could be suggested when warranted, but they should be clearly labeled as such and recommendations, when appropriate and needed, may be given.

Acknowledgments

List all contributors who do not meet the criteria of authorship, such as those who provided purely technical help, writing assistance, or a department chair who provided only general support; and their respective contribution will be headed as provided. Everybody must have given written permission to be acknowledged. References: References should be numbered consecutively in the order in which they were first mentioned in the text. They will be identified in the text, tables, and legends by arabic numbers. This bulletin uses the IEEE style (Institute of Electrical and Electronics Engineers) for referencing the citations. It is advised to avoid citations or personal communication unless they provide essential and pertinent information. In all case, the name of the person and date of communication should be cited in parentheses in the text.

2. CHECKLIST FOR SURVEILLANCE REPORTS

Disease surveillance summaries are reported following the checklist below:
Title: Compose a title that includes the name of the health condition, population, time and place.
Abstract: Provide a structured abstract including the following sub- headings: Background; Objectives; Methods; Results; and Conclusion.

INTRODUCTION

Context: Summarize the current situation regarding the health condition under surveillance and identify why it is important. Objectives: State the objective of the surveillance report.

METHODS

Setting: Describe the setting, locations and dates of the surveillance period.
Population: Describe the population under surveillance. Definitions: Provide definitions for each health event under surveillance, including

case definitions and any public health interventions. **Information sources**: Describe all data sources, including the objective of any surveillance systems, what data were collected and how data were gathered, transferred and stored. Supplementary data: If appropriate, note where to access supplemental material (e.g., www.opendata.gc.ca). **Data quality, missing data and reporting delays:** Describe how the data quality was assessed. Explain how missing data were addressed. If data is reported by date of diagnosis or symptom onset, include a statement about whether the data for the most recent periods may be revised.

DATA ANALYSIS

Describe any analytical methods used providing sufficient detail to enable a knowledgeable reader with access to the original data to judge its appropriateness and to assess the reported results.

RESULTS

Descriptive: Provide a summary of the descriptive data, including demographics.
Data Quality: Report on data quality (e.g., completeness, missing data, under reporting)
Analytic data: Provide a summary of the analysis including (when indicated) estimates of trends. When applicable, point estimates should include appropriate indicators of measurement error such as 95% confidence intervals (e.g., average annual percentage change used to describe trends or odds ratios used to describe subgroup differences).
Figures: Create the minimum number of figures to highlight key results. Create a title that includes person, time and place.

DISCUSSION

Key results: Summarize key results with reference to study objectives
Comparison: Consider these findings in relation to the current literature. Strengths and weaknesses: Discuss the strengths and weaknesses of the study (data quality, completeness, sources of potential bias). Interpretation and generalizability: Provide a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies and other relevant evidence.
Conclusion: Ensure conclusions address objectives and follow from the results.

3. PUBLIC HEALTH NOTICES / OUTBREAK REPORTS

Following the Center for Disease Control recommendations, for public heath notices and outbreak reports to be published they need to cover all four components as stated below:

INTRODUCTION

Generally, the introductory paragraph should begin with 1 to 3 sentences establishing the existence of the outbreak or underlying public health problem. E.g., "On January 2, 2008, the Nevada State Health Division contacted CDC concerning surveillance reports received regarding two persons recently diagnosed with acute hepatitis C." The introductory paragraph also usually contains: a) a statement that an investigation was conducted, when and by whom; b) the most important finding(s); c) the actions taken to stem the outbreak; and d) a statement of the public health implications and actions that should be taken in response to the investigation. Investigation and results: First, present the initial investigation and its findings. This might include: 1) a description of the setting and a statement of how the outbreak came to the attention of health authorities; 2) a clinical description of the index case or initial cases; 3) initial key test results; and 4) hypothesis generation activities and results. Next, summarize the full investigation, including: case definition, case-finding activities, method of investigation, and results. Cases should be counted and described by clinical characteristics, treatment, and outcome, as well as time, place, and person descriptive results. Next, present the methods and results of any analytic epidemiologic studies (e.g.,

cohort or case-control studies). Finally, provide the results of any relevant microbiologic, genetic, or toxicologic results, followed by the results of any testing of environmental samples. Public health response: When appropriate, a brief description summarizing any public health interventions taken and the results of the interventions follows.

DISCUSSION

Same as for a Full Report, except that a Limitations paragraph might not be required for an Outbreak Report.

4. POLICY BRIEFS

This bulletin will use guidelines on reporting/ publishing policy notes as they are suggested by the Center for Disease Control (CDC). As the CDC defines them; Policy Notes are intended to announce new official policies or recommendations (e.g., from ACIP or CDC). These reports can be thought of as briefs. Maximum word count at submission is 1,400 words. Up to three tables, figures, or boxes may be included. Policy Notes contain no Discussion or Limitations, and a summary box is not required. Although policy notes or brief might vary, following is a rough guide of what basic notes should have: Introduction: The introductory paragraph should be limited to 150–200 words. It might contain all or some of the following components: a brief introductory statement orienting the reader to the topic and placing it in context, a brief description of the public health problem, a brief statement of the rationale for the policy or recommendation, mention of the most important parts of the policy or recommendations, and one or two sentences stating the conclusions and the public health implications of the new policy or recommendations.

BACKGROUND

The Policy Note should include a paragraph after the introduction that summarizes background information relevant to the policy or recommendation that can help the reader understand the context and need for the policy or recommendation.

Methods: Should include a summary of the methods used to establish the policy or recommendation, including answers to some or all of these questions: Who was involved in the production of the guidelines or recommendations, and how? What evidence base was considered? What was the rationale for considering this evidence base? Was other evidence excluded from consideration and, if so, why? Rationale and evidence: The Policy Note should provide a concise review of the rationale for the policy or recommendation and a descriptive review of the scientific evidence used to establish it. It should include an explanation of how the policy or recommendation adds to, or differs from, relevant policies or recommendations established previously. Presentation of the policy or recommendation: The policy or recommendation should state clearly when it takes effect and to whom and under what circumstances it applies.

DISCUSSION OR COMMENT

The Policy Note should comment on the likely impact of the new policy or recommendation and plans for assessment of the policy or recommendation

5. CASE REPORTS

These are reports of an individual patient on their symptoms, treatment reactions on a disease or condition of interest. These reports normally focus on unusual reactions or occurrences. Similar cases to other research reports, case reports might include a literature review of previous similar. Case reports might also address positive patient outcome on particular treatment guidelines or individual impact of a particular intervention. These are mainly used for educational and decision-making purposes. Case reports are normally reported following a checklist found at the CARE Guidelines.

6. CASE STUDIES

We recommend authors to follow the "EQUATOR Network" for ample explanations and guidelines in the writing of such articles. They have to be well-described case studies on health care interventions of public health concern. These could be:

Rigorous assessments of processes and program interventions.

Recommendations on possible health interventions.

Never on individual patient (= case report)

7. COMMENTARIES / OPINION / METHODOLOGY ARTICLES

We recommend authors to follow the "EQUATOR Network" for ample explanations and guidelines in the writing of such articles. Though these articles are moderated, they should be:

Short, focused, opinionated to previous articles or any subject related to the journal entirely. Contemporary and focusing on specific issues. Normally up to 800 words.

Frank critics to the journal are bravely motivated and would be as much as possible published.

8. FORMATTING THE MANUSCRIPT

Please note that articles which are not correctly formatted will be returned to the authors

Format text: Style: No Spacing, Single column, Single Spacing
Font: Single Spacing, Times New Roman - size 12
Titles: Capitals and bold, size 14
Format tables: Times New Roman, Font size 9 No vertical lines. Horizontal lines in the table can be removed. No table should be larger than a single A4 page. Footnote should be size 9 and italic

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