**Abstract:**

**Contribution of Eye Tracker Tool embedded in DHIS2 in the follow-up and management of Patients with eye Conditions and addressing the data quality issue around eye data in Public Health Facilities**

**Introduction and Background**

* The eye care situation in Rwanda faces a considerable burden, as revealed by data from the Rwanda Health Management Information System (RHMIS, 2022). Eye problems rank among the top causes of morbidity in health facilities, with notable prevalence in under-five-year-olds and those aged five and above.
* Hospital morbidity rates as per the annual sector Performance report 2022 indicated that eye diseases accounted for 11.8% of cases, ranking as the second-leading cause. Major causes of blindness include untreated cataract, glaucoma, age-related macular degeneration, and other posterior segment issues. Surgical procedures for cataract and glaucoma are common, but poor post-surgery outcomes are noted with cataract surgical rate of 600 per one Million.
* Around 1% of people aged 50 and older are blind, mostly due to avoidable causes. Severe and mild visual impairments affect a percentage of the population, with diabetic retinopathy impacting 10% of diabetics, though regional data indicates a higher prevalence of 30%. Primary eye care is essential, as over a third of the population with eye health problems could benefit from it, particularly for issues like conjunctivitis and the need for reading glasses among older individuals.
* The abstract introduces a critical examination of challenges in patient data management and data quality within eye-related healthcare in Rwandan public health facilities. Despite comprehensive strategies outlined in the Eye Strategic Plan 2018-2024, issues with follow-up of eye patients and data quality persist. The abstract highlights the global significance of visual impairment, emphasizing the potential for early identification to address 80% of cases.
* The identified problems include missed appointments, referral challenges, operational delays in surgery, lack of progress tracking, data quality issues, workload challenges, and the absence of innovative solutions. These challenges lead to the exacerbation of eye conditions, hindering the seamless provision of eye healthcare services.
* To address these issues, the abstract introduces the Eye Tracker Tool, a collaborative initiative involving the Rwandan Ministry of Health, key stakeholders, and training institutions. The tool aims to revolutionize patient management, data quality, and follow-up procedures, ultimately preventing avoidable visual impairment in Rwandan public health facilities.
* The abstract outlines the necessity for innovative solutions and presents specific objectives, methods, and anticipated results. It also acknowledges challenges faced during the implementation, such as initial user resistance and integration issues with existing health systems. The results highlight the transformative impact of the Eye Tracker Tool, including improved reporting efficiency, patient redirection to hospitals, and expanded roles beyond patient tracking.
* The conclusion emphasizes the significance of the Eye Tracker Tool in addressing persistent challenges and advocates for its broader implementation in healthcare facilities globally. The abstract concludes with keywords that encapsulate the key themes of the initiated innovative solution.
* In summary, the abstract provides a comprehensive overview of the context, challenges, innovative solutions, objectives, methods, results, and implications of the initiation of the eye tracker tool in the follow-up of patient with eye conditions and also addressing the issue of data quality around the eye-rated data.

**Problem:**

* Despite extensive efforts outlined in the Eye Strategic Plan 2018-2024, the follow-up of eye patients at Health Centers and data quality for treated patients remain persistently low. This abstract delves into the persistent challenges affecting the follow-up of eye patients at Health Centers and the data quality for treated patients despite extensive efforts outlined in the Eye Strategic Plan 2018-2024. Several critical issues contribute to the ineffectiveness of eye healthcare services:
* **Missed Appointments and Lack of Tracking Mechanism**: Individuals diagnosed with eye conditions at Health Centers frequently fail to return due to the absence of an effective tracking mechanism, disrupting the continuity of care.
* **Referral Challenges**: Cases referred to Hospitals from Health Centers encounter tracking difficulties, leading to uncertainties regarding outcomes. Many patients, despite being referred for advanced services, do not proceed to Hospitals, heightening the risk of advanced blindness.
* **Operational Delays in Surgery**: Patients scheduled for surgery experience operational delays as paper-based systems contribute to inefficiencies, with crucial information occasionally getting lost.
* **Lack of Progress Tracking**: The absence of a digital mechanism for updating and tracking patient progress, including regular visual acuity assessments, hampers the ability to monitor and compare outcomes, hindering the assessment of intervention effectiveness.
* **Impact:** These challenges culminate in the exacerbation of eye conditions, with patients returning to Health Centers with advanced blindness that could have been prevented. Operational inefficiencies and the reliance on paper-based systems hinder the seamless provision of eye healthcare services.
* **Necessity for Innovation**: Addressing these multifaceted challenges necessitates innovative solutions that enhance patient tracking, improve data quality, and streamline the entire patient care journey, preventing avoidable visual impairment.
* **Integration of the Eye Tracker Tool**: In response to these challenges, this abstract explores the introduction and impact of the Eye Tracker Tool. A collaborative initiative involving the Rwandan Ministry of Health, key stakeholders, and training institutions, this innovative tool seeks to revolutionize patient management, data quality, and follow-up procedures. By ensuring timely interventions, preventing avoidable visual impairment in Rwandan public health facilities, and establishing a sustainable framework, this comprehensive approach aims to address immediate challenges and advance eye healthcare services
* This abstract provides a comprehensive exploration of persistent challenges impacting the follow-up of eye patients at Health Centers and the data quality for treated patients, despite extensive efforts outlined in the Eye Strategic Plan 2018-2024. The critical issues contributing to the ineffectiveness of eye healthcare services include:
* **Missed Appointments and Lack of Tracking Mechanism**: Individuals diagnosed with eye conditions at Health Centers frequently fail to return due to the absence of an effective tracking mechanism, disrupting the continuity of care.
* **Referral Challenges**: Cases referred to Hospitals from Health Centers encounter tracking difficulties, leading to uncertainties regarding outcomes. Many patients, despite being referred for advanced services, do not proceed to Hospitals, heightening the risk of advanced blindness.
* **Operational Delays in Surgery**: Patients scheduled for surgery experience operational delays as paper-based systems contribute to inefficiencies, with crucial information occasionally getting lost.
* **Lack of Progress Tracking**: The absence of a digital mechanism for updating and tracking patient progress, including regular visual acuity assessments, hampers the ability to monitor and compare outcomes, hindering the assessment of intervention effectiveness.
* **Data Quality Issues**: Inefficiency in client follow-up exacerbates data quality problems, particularly due to the duplication of data when patients visit different health facilities. The use of paper-based systems results in missing patient files, leading to incomplete and inaccurate reporting. The lack of a digital system contributes to the incompleteness of data items reported monthly.
* **Workload and Efficiency Challenges**: The issue of workload for staff involved in reporting, exacerbated by manual counting in paper-based registers, compromises data quality. The existing approach of recording patient information falls short in serving planning purposes, especially for Monitoring and Evaluation (M&E) staff and planners at health facility levels.
* **Lack of Innovative Solutions**: The absence of innovative solutions, particularly the Eye Tracker Tool, has been a barrier to quality services. Ophthalmology surgeons faced challenges in knowing the outcomes of operated patients, leading to a lack of management approaches for complications at an early stage and their prevention.
* **Integration of the Eye Tracker Tool**: In response to these multifaceted challenges, this abstract explores the introduction and impact of the Eye Tracker Tool. A collaborative initiative involving the Rwandan Ministry of Health, key stakeholders, and training institutions, this innovative tool seeks to revolutionize patient management, data quality, and follow-up procedures. By ensuring timely interventions, preventing avoidable visual impairment in Rwandan public health facilities, and establishing a sustainable framework, this comprehensive approach aims to address immediate challenges and advance eye healthcare services. The integration of the Eye Tracker Tool is particularly crucial in addressing the identified barriers and enhancing overall patient care quality.

**Necessity:**

* Urgent need for innovative solutions to uplift patient data management and enhance data quality in eye-related healthcare.

**Objective:**

* To provide lessons learned around the transformative impact of the Eye Tracker Tool as a solution to not only address challenges but also revolutionize patient data management and improve data quality.
* **Documentation around the introduction Process**: Objective: Systematically document each phase of the Eye Tracker Tool's introduction into the Rwandan public health system, encompassing collaborative initiatives, strategic alignment, and tool development.
* **Transformational Impacts**: Objective: to provide insight from identifying analysis around the transformative impacts instigated by the Eye Tracker Tool. Explore changes in performance indicators, user experiences, and system functionalities.
* **Revolutionary Aspects of the Eye Tracker Tool in Data Managemen**t: Objective: Scrutinize the revolutionary aspects introduced by the Eye Tracker Tool in patient data management, focusing on improvements in accuracy, efficiency, and accessibility of information.
* **Progress of made around the Improvements in Data Quality:** Objective: Investigate and measure the specific improvements facilitated by the Eye Tracker Tool to enhance data quality, addressing challenges outlined in the Eye Strategic Plan 2018-2024.
* **Capture Holistic Solutions Beyond Remediation**: Objective: the Eye Tracker Tool as a holistic solution, considering its broader implications and long-term benefits for transforming eye-related healthcare data management.
* **Extract Practical Insights for Future Implementations**: Objective: Derive practical insights from the experiences of introducing and utilizing the Eye Tracker Tool, offering guidance for future implementations of similar technological solutions in healthcare settings.
* **Highlight User Perspectives and Acceptance**: Objective: Gather and emphasize user perspectives and acceptance of the Eye Tracker Tool, assessing its alignment with user needs, user-friendliness, and challenges encountered during adoption.

**Methods:**

* **Time series analysis**

The Time series analysis was used to check the trend line of eye cases registration from 2019 to 2023 in November with designed dashboard customized into Eye tracker Tool around the total number of eye cases registered and total number of eye cases referred to Health center.

**Collaborative Initiative:** The eye tracker tool initiated a collaborative effort involving key stakeholders, training institutions, and the Rwandan Ministry of Health. This inclusive approach aimed to harness the collective expertise and resources of various entities to address challenges in eye healthcare comprehensively.

* **Strategic Plan Implementation**: The abstract seamlessly aligned its activities with the objectives of the Eye Strategic Plan 2018-2024. This strategic alignment ensured that the implementation plan was congruent with the overarching goals of improving eye healthcare services in Rwanda.
* **Tool Introduction and Development**: The introduction of the Eye Tracker Tool marked a transformative shift in patient management. The tool's integration was executed seamlessly, leveraging skills and competencies acquired from academies organized by Oslo in collaboration with HISP Rwanda. The initiative to develop the Eye Tracker Tool was inspired by innovative thinking fostered through collaboration, with input from stakeholders, including HISP Rwanda, Fred Hollows Foundation, and leadership.
* **Document and Guidelines Consideration**: During the development process, the abstract considered relevant documents, such as the WHO Primary Eye Care guidelines and Cataract Surgical Outcomes Monitoring paper tools. Guidelines for eye care management were adhered to, ensuring that the tool met international standards.
* **Technical Team and Workshop Sessions**: A dedicated technical team was established to develop the tool. Workshops were organized to demonstrate the tool to key users, including data managers, Ophthalmology clinical officers, Ophthalmology surgeons, and M&E staff. Feedback from these sessions was incorporated for continuous improvement.
* **Training and Official Communication**: Training sessions for all users were conducted with financial support from the Fred Hollows Foundation. Official communication, endorsed by the Minister of Health, was issued to formalize the introduction of the Eye Tracker Tool.
* **Dashboard Creation and Analysis**: Dashboards were created to facilitate daily, weekly, and monthly analysis. Regular feedback sessions and quarterly meetings were organized to discuss reported data, particularly targeting health facilities that faced reporting challenges.
* **Utilization Reinforcement and Performance-Based Financing**: To reinforce the positive utilization of Eye Trackers, indicators within the system were developed. Performance-Based Financing (PBF) was integrated into the Eye Tracker Tool, making it the sole source of data for remuneration.
* **User Feedback and Acceptability**: Regular analysis, including surveys on user acceptability and utilization support, was conducted to ensure the system's friendliness and identify areas for improvement. This user-centric approach contributed to the continuous enhancement of the Eye Tracker Tool's acceptability and functionality

**Results:**

* **Patient Registrations:**

Successfully addressed the challenge with a significant surge, meticulously tracking 326,000 cases.

* **The habit of the utilization of Eye Tracker:**

The time series shows that the Pic of registration of patients was observed in 2022 and 2022 with more than 72,300 cases registered in the whole month with more than a half of the additional registration compared to the other months that was used to be around 23,000and 32,300 cases per month,

Daily around 1200 cases are being registered in the Eye tracker in all Health facilities

* **Gender Distribution:**

Demonstrated a gender-disaggregated distribution with 50% women and 42% men.

* **Reporting Efficiency:**

Substantially improved, with efficiency soaring from 25% to an impressive 85% across 512 Health Centers.

* **PBF Evaluation Time:** Markedly reduced to an impressive 2-4 minutes per center.
* **Patient Redirection:** using the Eye Tracker Tool played a pivotal role, redirecting 60,000 cases to hospitals, with 18,000 patients receiving timely surgical interventions.
* **Expanded Role:** Exhibited unparalleled versatility beyond patient tracking, effectively managing waiting lists, averting missed interventions, and providing real-time insights into patient needs and preferences.
* **Training and capacity building:** from 2019 around 78 Ophthalmology Clinical officers and 1300 Primary Eye care nurses were trained on the registration of eye cases and use of eye tracker Tool, 48 Data managers, 39 M&E staff, and 30 PBF supervisors were trained on the data use and data extraction with also dashboard creation around the eye indicators into the Eye tracker Tool, about 12 Ophthalmology Surgeon were trained on Eye tracker on the aspect of visualization of the outcome of cataract surgeries on their specific Patient operated.

**Challenge**

* One of the challenges faced during the implementation was the initial resistance or learning curve among users. Introducing a technological solution like the Eye Tracker Tool required users to adapt to new processes and workflows, leading to potential delays and inefficiencies during the transition period. User training sessions and continuous support were crucial in mitigating this
* Another challenge was the integration of the Eye Tracker Tool into existing health systems. Ensuring seamless compatibility and interoperability with other health information systems posed technical challenges. Coordination and collaboration with existing healthcare IT infrastructure were essential to overcome these compatibility issues.
* The scale-up of the Eye Tracker Tool to cover a large number of health centers also presented logistical challenges. Coordinating the distribution of the tool, and training sessions, and ensuring consistent user engagement across diverse healthcare settings required meticulous planning and execution.
* Despite these challenges, the Eye Tracker Tool played a pivotal role in redirecting 60,000 cases to hospitals and facilitating timely surgical interventions for 18,000 patients. It evolved into a dynamic system capable of managing waiting lists, averting missed interventions, and providing real-time insights into patient needs and preferences.

**Conclusion:**

* **Significance:** Emphasizing the transformative impact of the Eye Tracker Tool in addressing persistent challenges outlined in the Eye Strategic Plan.
* **Collaborative Success**: Highlighting the synergistic efforts of the Rwandan Ministry of Health, key stakeholders, and training institutions.
* **Future Implications**: Proposing robust future research and advocating for broader implementation of similar innovative tools in healthcare facilities illuminates the transformative journey initiated by the Eye Tracker Tool in addressing persistent challenges within Rwandan public health facilities, as outlined in the Eye Strategic Plan. The significance of this innovative solution lies not only in its immediate impact on patient data management and data quality but in its potential to redefine the landscape of eye-related healthcare.
* The success of this collaborative endeavor, orchestrated by the Rwandan Ministry of Health, key stakeholders, and training institutions, underscores the power of collective action in overcoming complex healthcare challenges. The Eye Tracker Tool's role in redirecting 60,000 cases to hospitals and facilitating timely surgical interventions for 18,000 patients reflects its pivotal contribution beyond mere patient tracking. It has evolved into a dynamic system capable of managing waiting lists, averting missed interventions, and providing real-time insights into patient needs and preferences.
* Looking forward, the implications of this eye tracker tool extend beyond the immediate context, advocating for the broader implementation of similar innovative tools in healthcare facilities globally. The lessons learned from the introduction and utilization of the Eye Tracker Tool provide a blueprint for future endeavors, emphasizing the importance of strategic alignment, collaborative initiatives, and user-centric approaches in driving transformative change in healthcare systems.
* As we navigate the intersection of technology and healthcare, the Eye Tracker Tool stands as a beacon of possibility, demonstrating how innovative solutions can revolutionize patient care, enhance data quality, and contribute to the overarching goals of global health initiatives.

**Keywords:**

* Visual impairment, eye-related healthcare, patient data management, data quality, innovative solutions, Eye Tracker Tool, collaborative initiative