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Ministry of Health

Rwanda Biomedical Centre
Healthy People, Wealthy Nation

Rwanda
Public Health Bulletin

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

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CONTENT

Dear Readers,

I appreciate your continuous interest in the Rwanda Public Health Bulletin (RPHB); we hope that its content is still informative and relevant to your work and overall career development.

It is needless to mention that Rwanda and the entire world are still battling the COVID-19 pandemic crisis. In fact, many countries are currently experiencing second surges in new COVID-19 infections. However, in addition to already established preventive measures, a number of COVID-19 vaccines candidates has been developed and some approved at certain levels. Rwanda is also working to secure the purchase of COVID-19 vaccine in the shortest upcoming months. Unfortunately, several SARS-CoV-2 new variants have emerged in the fall of 2020 and are circulating globally. Among these, there are variants of concern that have been recently identified in UK, South Africa and Brazil which are widely spreading in several countries with suspicion in our settings as well. Scientists are working to learn more about these variants to better understand how easily they might be transmitted and the effectiveness of currently authorized vaccines against them.

In this issue, you will read about the COVID-19 updates, and on the development and usage of COVID-19 vaccines worldwide as well as new emerging SARS-CoV-2 variants. Considering that the health system is still demanded to address other diseases areas and health programs, this issue also includes topics on the provision of family planning services in Rwanda.

As I encourage you to continue supporting the RPHB by submitting your works, I call for your maintenance for your maintenance of COVID-19 preventive measures. As public health experts, we are very much expected to serve as good role models in communities where we live. Doing so will allow us to serve as field ambassadors to address, control and pull the country out of the current COVID-9 pandemic crisis.

Stay safe

Dr. Sabin Nsanzimana, MD, PhD
Director General
Rwanda Biomedical Centre

Dear Colleagues,

I am pleased to present to you the fourth issue of the Rwanda Public Health Bulletin (RPHB) second volume.

Although there is an increasing global trend in COVID-19 numbers, this issue comes in a period when a few of COVID-19 vaccines is approved and being administered worldwide. While countries are racing to secure the purchase of enough vaccines, countries are still encouraged to continue and reinforce all protective measures. However, the current rapid spread of SARS-CoV-2 new variants has put the world on alert and triggered new restriction measures. The upsurge of COVID-19 cases and deaths that Rwanda is facing since November 2020 raise a concern about the current capacity of containing the spread of COVID-19. Three global variants of interest D614G, N501Y and E484K mutations which occur in the spike (S) protein identified in the UK, in South Africa, and Brazil respectively, have called to attention to improve the laboratory diagnostic capacity in place. These mutations in the SARS-CoV-2 spike (S) protein raise a concern about the potential impact on viral infectivity and immune escape.

To reinforce our knowledge on COVID-19, the content in this issue will provide you with information on the global trend of COVID-19 vaccine, challenges of new emerging SARS-CoV-2 variants, the body immune response against COVID-19 in Africa. Although the national health system is currently challenged by the pandemic crisis, the Rwanda Public Heath Bulletin did not want to oversee the need of scientific content on other health topics; hence in this issue, will also have topics on the the utilization of modern contraceptives in refugee camps and antibiotics prescription practices in health centers, as the primary care level of the Rwandan health system.

I hope you will enjoy reading RPHB Vol. 2 Issue 4. We are expecting that you consider sharing your scientific content on RPHB content in return.

Prof. Leon Mutesa, MD, PhD
Editor-in-Chief

The Global Trend of COVID-19 Vaccine and Challenges of New Emerging SARS-CoV-2 Variants

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INTRODUCTION

Since Coronavirus Disease (COVID-19) was declared a Public Health Emergency of International Concern on January 30, 2020 [1-4] and later declared a pandemic by the World Health Organization on March 11, 2020 [2], it has claimed over 1,754,000 lives worldwide and over a total of 79,231,000 cases reported [3]. New infection cases are continuously rising as well as deaths and other health complications and cases with new variants are increasing [5,7-9].

Even if SARS-CoV-2 was identified as the virus causing COVID-19, during earlier stages of COVID-19, mutations of the virus have been reported and Chinese researchers identified two SARS-CoV-2 variants. However, by sequencing more SARS-CoV-2 genome, they identified more variants [4,8].

Since then, other mutations have been reported in different countries and some new variants were found to be more transmissible and more virulent [4,8-12]. COVID-19 has also caused other social and economic devastations [5,6].

To mitigate these, scientists worldwide are deploying their time and different resources in developing the urgently needed vaccines [1-3,6] and investigations on how new variants react to the current vaccines are underway. The World Health Organisation (WHO) has launched a COVID-19 Vaccines Global Access (COVAX) initiative for the global and non-discriminatory access to the vaccine [6,7].

NEW EMERGING SARS-CoV-2 VARIANTS

Viruses constantly change through mutation, and new variants of a virus are expected to occur over time. Sometimes new variants emerge and disappear. Other times, new variants emerge and persist. Mutations are common, but the majority of them cause no alteration in the structure of the proteins they encode—these are called "silent" mutations, as they eventually translate to the same amino acids. Another type is "missense" mutation, which could result in an amino acid change.

The failure of current public health measures to contain the spread of SARS-CoV-2 within

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and between countries has given rise to many virus lineages across the world. Open genomic surveillance data sharing and collaborative online platforms have enabled real-time tracking of these lineages' emergence and spread [10–13]. Genomic sequencing has been critical in identifying and responding to new SARS-CoV-2 variants. Increased recognition that viral genome sequencing can contribute to improve public health is driving more laboratories to invest in this area.

The rise of SARS-CoV-2 variants with spike (S)-proteins mutations that are now predominant globally, have raised a concern and call for attention to put in place a program to identify circulating variants in the population in order to strengthen the laboratory and diagnostic and monitoring capacity for SARS-CoV-2. The SARS-CoV-2 virus mutates just like other viruses. To date there have been about 4,000 mutations in its spike protein alone [11,14,15].

Three global variants of interest D614G, N501Y and E484K mutations which occur in the spike (S) protein identified in the UK, in South Africa, and Brazil, respectively, have called to attention to improve the laboratory diagnostic capacity in place.

These mutations mostly occurring in the spike protein that the virus uses to bind to the human angiotensin-converting enzyme 2 (ACE2) receptor increase the ability of the virus to be transmitted [11,14,16,17]. Hence, changes in the receptor-binding domain (RBD), that the virus uses to bind to the human ACE2 receptor can result in the virus changing its ACE2 binding specificity and alter antibody recognition [11].

The COVID-19 Genomics UK (COG-UK) consortium, a partnership of the UK's four public health agencies, as well as the Wellcome Sanger Institute and 12 academic institutions has been created since April 2020, has sequenced 140,000 virus genomes from people infected with COVID-19. It uses the data to track outbreaks, identify variant viruses, and publish a weekly report (https://www.cogconsortium.uk/data/) [7].

According to the most recent report from COVID-19 Genomics UK (COG-UK) consortium a new variant reported in December named VUI-202012/01 (the first "Variant Under Investigation" in December 2020) and is defined by a set of 17 changes or mutations. N501Y mutation is one of the most significant mutations in the spike protein that the virus uses to bind to the human ACE2 receptor. Changes in this part of spike protein may, in theory, result in the virus becoming more infectious and spreading more easily between people [11,16]. Apart from the N501Y mutation, other mutations of importance appeared in the UK are D614G with a high transmissibility rate and , A222V, N439K, Y453F one deletion (del) and co-occurrence of some of these changes are actively being investigated by COG-UK [16].

Most of the variants tracked by COG-UK are mutations occurring in the lineage B.1.1.71 which is of interest and is notable for a higher number of mutations in one lineage than observed previously. COG-UK is actively investigating five amino acid replacements (D614G, A222V, N439K, Y453F and N501Y), one deletion (del) and co-occurrence of some of these changes due to their importance and to their high transmissibility [15]. One of these (the N501Y mutation) occurs in the Spike protein region, the receptor-binding domain (RBD), that the virus uses to bind to the human ACE2 receptor. Changes in this region of the Spike protein can result in the virus changing its ACE2 binding specificity and alter antibody recognition [16]. There is no evidence suggesting that the variant has any impact on the severity of disease or vaccine efficacy.

Recently South Africa also reported new SARS-CoV-2 lineage (501Y.V2) characterized by eight lineage-defining mutations in the spike protein, including three at important residues in the receptor-binding domain (K417N, E484K and N501Y) that may be associated with increased transmissibility [10]. E484 is in the receptor-binding motif (RBM) and interacts with the K31 interaction hotspot residue of hACE2. Studies have shown that E484K mutation may modestly enhance binding affinity [10]. In adition, in Brazil, the lineage P.1 (alias of B.1.1.28.1) an emerging variant that harbors several amino acid mutations including S:K417T, S:E484K, and S:N501Y has been reported. These mutations in the spike (S) protein raises concern about the potential impact on viral infectivity and immune escape [17].

MUTATIONS CHALLENGES AND POSSIBLE IMPACT ON VACCINATION

SARS-CoV-2 is an RNA virus that belongs to coronaviruses and have at least four essential proteins: spike (S), envelope (E), membrane (M), and nucleocapsid (N) proteins. The coronavirus

spike (S) protein mediates receptor binding and fusion of the viral and cellular membrane [20]. Mutations in the SARS-CoV-2 genome arise naturally as the virus replicates and accumulate at a rate of about one to two mutations per month in the overall phylogeny. However, only a very small minority are likely to be important and change the virus appreciably. In order words, the majority of mutations observed in SARS-CoV-2 have no apparent effect on the virus, and only a very small minority are likely to be significant and modify the virus appreciably (for example, a change in the ability to infect people; cause a disease of different severity; or become insensitive to the effect of the human immune response, including the response generated by a vaccine) [11]. Because of this ongoing process, several thousand mutations have already appeared in the genome of SARS-CoV-2 since the appearance of the virus in 2019. As mutations continue to appear, new combinations are increasingly observed, and these changes jeopardize the current treatment strategies under construction. Although these mutations present a risk, no studies have proved the variant has any impact on the severity of disease or vaccine efficacy.

Currently, most COVID-19 vaccines target the SARS-CoV-2 spike protein. There are some vaccines, such as inactivated virus vaccines developed in China and India, that target the whole virus. Mutations may reduce vaccine efficacy directed against the spike protein but will not obliterate their effects. This is because the immune responses they induce target more than a single part of the spike protein. Inactivated vaccines target an even greater array of viral proteins, inducing several protective immune responses.

However, scientists are working to learn more about these variants to better understand how easily they might be transmitted and the effectiveness of currently authorized vaccines against them.

RESEARCH AND DEVELOPMENT OF COVID-19 VACCINE

Since the COVID-19 emerged in Wuhan, China, late 2019, significant progress has been made towards developing a vaccine. To date, a number of vaccines have been approved by licensing institutions and are currently being administered to identified high-risk groups [18,19]. Currently, 73 vaccines are still at different developmental stages. Among these, 18 vaccines are in Phase II, under clinical trials, 32 vaccines and 23 vaccines in Phase II and I, respectively [2,6].

There are also 7 vaccines approved for early or limited use and 3 vaccines approved for full use. Pfizer/BioNTech vaccine was approved for use across North America, Europe and the Middle East. The same vaccine is being studied to be approved in many other regions and countries (Figure 1) [1,20].

Developer	Type	Phase	Status
Pfizer-BioNTech	mRNA	II III	Approved in Canada, other countries. Emergency use in U.S., other countries.
Moderna	mRNA	III	Approved in Canada. Emergency use in U.S., Israel.
Gamaleya	Adenovirus	III	Early use in Russia. Emergency use in Belarus, Argentina.
Oxford-AstraZeneca	Adenovirus	II III	Emergency use in Britain, India, Argentina.
CanSino	Adenovirus	III	Limited use in China.
Johnson & Johnson	Adenovirus	III	
Vector Institute	Protein	III	Early use in Russia.
Novavax	Protein	III	
Sinopharm	Inactivated	III	Approved in China, U.A.E., Bahrain. Emergency use in Egypt.
Sinovac	Inactivated	III	Limited use in China.
Sinopharm-Wuhan	Inactivated	III	Limited use in China, U.A.E.
Bharat Biotech	Inactivated	III	Emergency use in India.

Figure 1: *Leading vaccines (Adapted from Covid-19 Vaccine Tracker - The New York Times, December 27, 2020).*

VACCINE RESERVATIONS

Since the early development of COVID-19 vaccines, different countries have entered a race to ensure accessibility to an effective vaccine [21-23]. High-income countries have premarket purchased majority of doses while their populations represent only 14% of the global population [7,24,25]. By the end of December 2020, up to 8.25 billion doses were already reserved mostly by high-income countries, with Canada securing more doses than three times (303.5%) its population size (Figure 2) [7,22,23]. This is contrary to the WHO commitment to ensure fair and equitable distribution of COVID-19 vaccines among its member states [25].

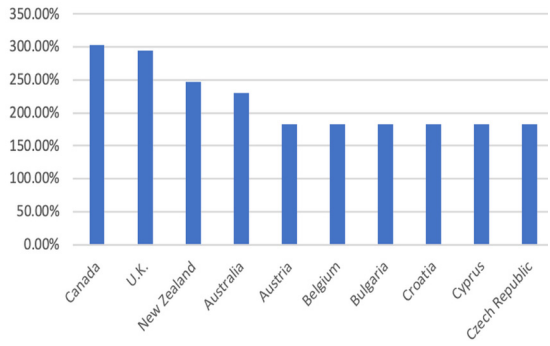

Figure 2: *Top 10 countries with the most Covid-19 vaccine reservations by percentage of the population as of December 30 2020.*

GLOBAL COVID-19 VACCINE COMPAIGN

By the end of December 2020, more than 12 million COVID-19 vaccines were already administered in 35 countries with China leading in numbers of administered doses with over 4.5 million doses (0.32% of population covered), followed by the United States of America with over 4.2 million administered doses (1.30% of population covered). Israel was ahead with a cumulative percentage of 10.5% of the total population vaccinated (Figure 3) [26].

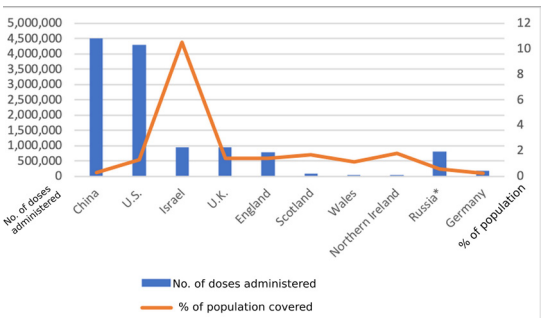

Figure 3: *Top 10 countries with the highest number of COVID-19 vaccines administered as of December 31, 2020.*

Both Pfizer/BioNTech and Moderna vaccines (the two leading COVID-19 vaccines) are mRNA based and 2 doses are given with 21 days apart for Pfizer/BioNTech vaccine and 28 days apart for Moderna vaccine [25].

However, the required freezing temperatures for storage make these vaccines vulnerable, and hence their distribution and storage are expected to be highly challenging, especially in low-income countries [16]. Pfizer/BioNtech vaccine needs to be kept at minus 70 degrees Celcius and Moderna's vaccine at minus 20 degrees Celcius for 6 months for both vaccines [23,24].

COVID-19 VACCINATION IN RWANDA

The government of Rwanda plans to acquire the COVID-19 vaccine in the first quarter of 2021 [27]. Vaccination will start with people at high risk such as health professionals, people with comorbidity, and the elderly 65 years and above [27,28].
Rwanda has already applied for different vaccines including Pfizer/BioNTech, Moderna and AstraZeneca vaccines among others. Rwanda has also submitted all required documents to COVAX; a framework aimed to ensure equitable access and fair allocation of COVID-19 health products [27].

ACCEPTANCE OF A COVID-19 VACCINE

In a survey done by Nature Medicine in 19 countries, over 70% of the respondents agreed that they would accept the vaccine if available. The highest acceptance rate was reported in China (90%). In contrast, the lowest acceptance rate was found in Russia [1] while in Rwanda, the Ministry of Health forecasts good acceptance of the vaccine among Rwandan citizens [28].

In conclusion, COVID-19 remains a global pandemic, keeps claiming more lives and causing devastating social and economic impacts. There are still no effective treatments or cures for COVID-19 and prevention measures should be maintained. Continuous efforts should continue to be deployed to educate the population about the vaccines to ensure acceptance and successful vaccination. Governments and manufacturers of the vaccines will have to fully collaborate to ensure fair and equitable distribution of COVID-19 vaccines to the entire world population to fight and eradicate the COVID-19 pandemic.

Surveillance of SARS-CoV-2 and its variants requires proper identification of each strain to guide preventive measures, and to help inform development of future treatments.

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The Body Immune Response Against COVID-19 in Africa

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INTRODUCTION

On 31 December 2019, pneumonia of unknown cause was detected in Wuhan, China. Later it was named "Severe Acute Respiratory Syndrome" [1]. On 30 January 2020, the outbreak was declared a Public Health Emergency of International Concern [1,2]. Later on, WHO named this pneumonia a coronavirus disease 2019 (COVID-19) and the virus was named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-COV-2) [3].

Infectious diseases like influenza have been claiming millions of lives. The first outbreak of influenza known as Spanish flu occurred in 1918 and by 1920, the pandemic had infected about one-third of the world's population and resulted in an estimated 50 million deaths [4].

Africa is known to face a double burden of chronic and infectious diseases attributed to factors like under-funded healthcare facilities, poor hygiene, malnutrition, and overcrowded households [5], making it hard to contain outbreaks on Africa. However, Africa has not suffered a great deal of COVID-19 in terms of severity and prognosis compared to the rest of the continents [2,6,7].

In early April 2020, the African region had fewer than 6,700 confirmed cases of COVID-19, a significantly lower count than the 112,000 cases reported in the Western Pacific and the 655,000 cases reported in Europe [6]. The puzzle that remains to solve is finding the source of the claim that Africans were more resistant to the first wave of COVID-19 or that when infected, they were less likely to suffer severe complications than other races [7]. Nevertheless, the World Health Organization has warned Africa to prepare for the worst of COVID-19 in the near future [6].

Therefore, while the scientific community is focused on developing vaccines against the SARS-CoV-2, it is imperative to understand clearly the body immune response against this virus [8].

HUMAN IMMUNE SYSTEM RESPONSE TO COVID-19

Immune system Overview

The immune system is a defense system for the human body to clear up pathogens like viruses, bacteria and others [8]. The innate response components include natural killer cells and physical barriers [1,7], but it is not specific to foreign materials invading the body [7]. On the other hand, the adaptive response is specific and produces memory cells to each pathogen. It is mainly composed of T-cells that coordinate

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and regulate the immune system and destroy the infected cells [9,12]. B-cells present the pathogens to the macrophages for elimination and secrete antibodies that stop the multiplication of pathogens hence limiting the infection [9]. Different factors play a role in determining the immune system's quality, including vitamin D, microbiota, psychosocial status, sleep, and previous exposure to diseases [8,12].

Vitamin D modulates the innate and adaptive immune responses by downregulation of pro-inflammatory cytokines [10]. Deficiency in vitamin D is associated with chronic diseases like autoimmune diseases, cardiovascular and neurological diseases that compromise the immune system and render a person a significant risk to infections. Vitamin D, stored in the form of 25-hydroxyvitamin D, is produced from exposure to the sun and it is determined by both ultraviolet exposure and dietary vitamin D intake [11].

Immune response to the COVID-19 in Africa

The African continent straddles the equator and has northern and southern temperate zones that enjoy sunshine all year long [12]. Therefore, Africans are privileged to benefit from the sun to boost their vitamin D levels. This could be one factor that explains why Africa has not suffered a great deal of COVID-19 during the first wave.

Africa faces a double burden of infectious and chronic diseases [13]. Chronic infection can enhance the immune system's ability to control unrelated pathogens. It has been made clear that a pathogen's persistence, even at very low levels, can enforce the immune system's ability to react to a new unrelated infection [14]. It was observed that many B and T-cell epitopes were conserved between SARS-CoV-1 and SARS-CoV-2, and the human immune response to SARS-CoV-2 was thought to target these pillars of the adaptive immune response [8]. The acquired immunity against infectious diseases depends upon B and T-lymphocytes and can be nonspecific to the pathogens [14]. Since infectious diseases like Tuberculosis, Malaria, Ebola and others are common in Africa. Almost everyone has been significantly exposed to them and Africans may have developed immunity that clears most infections off the body, which is why infections like COVID-19 may not severely threaten life as they do on the rest of the continents [7,11].

Moreover, COVID-19 has been found to affect people in old age more and the highest mortality rate has been documented in elderly people. Data of approximately 90% of mainland China's confirmed COVID-19 cases found a death rate of 13.4% among people of 80 years and 0.32% for people under 60 years [3]. One in five patients over the age of 80 were likely to require hospitalisation compared to around 1% of people under 30 [15]. Africa has the youngest population globally, whereby, for example, 65% of Africa's 1.25 billion people are under age 25 [16]. Thus Africa's youth bulge may be a buffer against the most devastating medical complications of COVID-19 on the continent [17].
In addition, rich intestinal microbiota provides the Africans with enhanced protection against their immune system's pathogens [11].
The African diet is low in fat and animal protein and rich in starch, fibre, and plant polysaccharides [17. In a study done assessing intestinal microbiota produced by a modern western diet in the Italian children versus a traditional rural African diet in the Burkinabé children, the later was found to have more intestinal microbial diversity [18].

COVID-19 outcome among Africans

Poor outcomes of COVID-19 have been reported in African American ethnicities. Factors like underlying medical comorbidities, social and structural determinants of health, crowded neighbourhood and household conditions, historical and ongoing discrimination, and chronic stress have exposed them more than their counterpart white ethnicities [19].
Case fatality rate for COVID-19 in Africa is lower than on other continents. The contributing factors were reported to be: relatively young populations, adherence to the preventive measures, quick action by African governments and their experience in dealing with other outbreaks like Ebola [20,21].

In conclusion, claims that Africans are immune to COVID-19 have been proved wrong. However, in Europe and the Americas, patients with African ethinicitied have been reported among the most affected mainly due to socio-economic disadvantages. Less severity of COVID-19 in

Africa has been attributed to its population's youth, exposure to Vitatmin D, diet, and its experience with other infectious diseases. African continent should be prepared for new peaks of COVID-19 infection due to new SARS-CoV-2 variants that might be more virulent and thus compromise the immune system. Mitigation strategies should be strengthened as the new variants might differ significantly in their transmission mode or disease course.

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Original Article

Open Access

The Utilisation of Modern Contraceptives in Refugee Camps

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ABSTRACT

BACKGROUND: Sexual and reproductive health services are fundamental rights. However, healthcare providers poorly address reproductive health issues in most humanitarian crises due to other health competing priorities, resulting in unwanted pregnancies and short interpregnancy intervals. This study aimed to evaluate the demand, supply, and utilization of family planning commodities in the Nyabiheke and Gihembe refugee camps in Rwanda.
METHODS: Data was extracted from family planning registers, electronic Logistics Management Information System, and the Rwanda Health Management Information System. We used descriptive statistics to analysze key outcomes such as the number of refugees who attended Information Education and Communication sessions, family planning commodities supplied throughout the year 2017, and women who adhered to various contraceptives methods.
RESULTS: The majority of refugees who attended reproductive sessions were women (74,4%). Various family planning commodities were supplied in the camps with high portions of condoms and injectables. The prevalence of family planning uptake was 40% and 32% in Nyabiheke and Gihembe camps. The most adhered method was injectable with more than 70%, and the least was Intra Uterine devices with a proportion of 0.2%.
CONCLUSION: Having optimal family planning commodities available was a significant determinant of contraceptive uptake. However, much effort is needed to increase family planning uptake among refugees.

INTRODUCTION

Accessibility and availability of reproductive health services, including family planning, are fundamental rights [1]. During and after crises, women are at significant risk of pregnancy-related deaths due to the inaccessibility of adequate services [2]. During a humanitarian crisis, family planning services are significantly reduced due to limited access to health care services as a result of other competing priorities. The number of displaced people increased from 65.6 million refugees in 2015 [3] to 79.5 million at the end of 2019. The majority of refugees are women and children, with a proportion of 51% and 48%, respectively [4]. This increment was due to vulnerable individuals who fled from their countries due to various human rights violations, and the majority were from low and middle-income countries [5]. The Great Lakes region in Africa hosts the highest number of these

refugees. In 2013, the World Bank reported that of an estimated 3.3 million people who were forced to leave their homes, 82% were internally displaced people, and 18% refugges refugees [6].

Since 1997, Rwanda has hosted refugees from neighboring countries, and the majority live in Nyabiheke and Gihembe refugee camps. Due to limited resources, comprehensive family planning services were not often available in the early years. The different humanitarian organizations have offered limited contraceptive methods, usually condoms and pills [7]. Since 2007, the Government of Rwanda, in partnership with its development partners, integrated family planning services into the national program. We conducted this study to evaluate the demand, supply, and utilization of family planning commodities in refugee camps.

METHODS

This study was conducted in the Nyabiheke refugee camp located in Gatsibo district and Gihembe refugee camp in Gicumbi district, Rwanda. The total population in both camps was 26,970 refugees [8]. This population receives healthcare services from two HCs, both founded by UNHCR in partnership with the government of Rwanda and other humanitarian actors.

This was a descriptive cross-sectional study conducted interrogating data from January to December 2017. Participants in this study were refugees from the two camps mentioned above, targeting a total of 7,062 women of reproductive age (15-49 years) and sensitized men attending Information Education and Communication (I.E.C.) sessions. The study analyzed secondary data from Rwanda Health Management Information System (RHMIS) and Electronic Logistics Management Information System (eLMIS) and routine data from registers in the family planning program.

We used descriptive statistics to analyze outcomes such as the number of refugees reached in I.E.C. sessions, the contraceptives supplied throughout the year 2017, and the number of contraceptive methods used. Contraceptive methods considered in the study were Depo-Provera, Intra-Uterine Device (I.U.D.), Implanon, Cycle Beads, Microgynon, Microlutes, male and female condoms

RESULTS

Demographic distribution of participants

A total of 11328 (75,4%) women and 3696 (24,6%) men from Nyabiheke, and 4678 (72,2%) women and 1799 (27,8%) men from Gihembe refugee camps attended I.E.C. sessions on the family planning use and adherence in which they were motivated to avoid unintended pregnancies.

Contraceptives supplied to Nyabiheke and Gihembe refugee camps in 2017

Throughout 2017, both refugee camps received contraceptives through e-LMIS as follows: In Gihembe refugee camp, received 450 vials of Depo-Provera, three I.U.D. devices, seven Implanon implants, 45 cycles of Microlutes, 300 cycles of Microgynon, and 21000 male condoms. In Nyabiheke refugee camp, 800 vials of Depo-Provera, 270 cycles of Microlutes, 450 cyles of Microgynon, 200 Implanon implants, 20 I.U.D. devices, and 6000 male condoms.

Contraceptives used in Nyabiheke and Gihembe refugee camps in 2017

By the end of 2017, women from Gihembe and Nyabiheke used long and short-acting contraceptive methods according to their choices. In Gihembe refugee camp, 1012 women of reproductive age used contraceptive methods as follows: 798 vials of Injectables (Depo-Provera), one I.U.D. device, 107 Implanon implants, 3 Cycle Beads, 47 cycles of oral contraceptives, 649 cycles of combined oral contraceptives, and 1060 male condoms. In the Nyabiheke refugee camp, 1579 women used contraceptives: 3789 injections of Depo-Provera, 612 cycles of contraceptives, 649 cycles of combined oral contraceptives, 85 Implanon implants, 2 I.U.D. devices and 1968 male condoms.

Percentage of family planning Methods used in Nyabiheke and Gihembe Refugee camps

In the Nyabiheke refugee camp, 3913 women were expected to uptake contraceptive methods. However, only 1579 (40%) have used modern contraceptives, among which 1152 (73%) women mostly used injectables, combined oral contraceptive pills by 252 (16%) women,

implant by 164 (10.4%) women, I.U.D. by 7 (0.4%) women, and male condoms by 4 (0.3%) women. In the Gihembe refugee camp, a total of 3,149 women were to demand any contraceptive method. However, only 1012 (32%) women used contraceptives with a high proportion of Injectables at 70.4% (712), 248 (20.4%) implants, 28 (2.8%) contraceptive pills, 22 (2.2%) male condoms and 2 (0.2%) I.U.D. devices.

DISCUSSION

Inadequate information and insufficient knowledge about sexual and reproductive health are barriers to family planning uptake in most humanitarian crisis settings [9]. This study shows that refugees from both camps received free information about family planning, which increased their knowledge and contributed to family planning uptake.

In Rwanda, the pharmaceutical supply chain is integrated. All health facilities request health commodities through e-LMIS at the central medical store (C.M.S.) and get products through an active distribution system. In this regard, refugee camps are integrated as well [10]. Findings from this study show that these settings received family planning commodities from district pharmacies. Most products derived in both settings are male condoms because these commodities are used in H.I.V. and other sexually transmitted infections (S.T.I.s) prevention programs.

Our study results revealed that contraceptives uptake was at 40% in Nyabiheke, higher than 32% in Gihembe. These percentages are relatively higher compared to findings from other studies conducted by UNHCR in Djibouti (5.1%), Kenya (6.8%), Uganda (14.6%), Malaysia (34,2%), and Jordan (21,4%) [11]. However, this uptake remains low compared to findings from a study carried out in Shimelba Refugee Camp situated in Northern Ethiopia (47.7%), hosting Eritreans refugees [12]. From this study, preferred contraceptives methods in Nyabiheke camp were mainly short-term contraceptive methods, namely injectable. These figures have similarities to those found in Shimelba Refugee Camp, as migrant women used injectables at 63.1%. But these findings defer from our study results on the usage of implants (3.8%) and male condoms (3.8%) [12]. Our results were similar to Djibouti's (56.5%) and Uganda (63.2%), where women used injectable contraceptives in the same proportion. However, our results were different from Somalian and Burnese refugees hosted in Kenya and Malaysia, where contraceptive pills uptake rate was higher than other methods at 41.9% and 37%, respectively [9]. This difference may be due to the availability of various contraceptive methods in the camps.

Limitations

Certain limitations could influence the findings of this study. As the study was cross-sectional, it was impossible to measure the relationships between the family planning uptake and the corresponding causalities. We observed the family planning uptake at one point in time, which may cause bias in measuring some indicators, such as the number of women adhering to long-term methods.

In conclusion, it was noted the prevalence of family planning uptake is still low in the study area. Countries hosting refugees, development partners, and humanitarian actors should foster the family planning uptake for refugees through integration in their national existing programs. Therefore, further research is needed to document the knowledge, attitudes, and behaviors of Nyabiheke and Gihembe refugees towards family planning services.

Authors' contributions

N.J.D: Conceptualization, Investigation, original draft preparation, data collection, and analysis. **B.B:** Data collection, **M.C.I:** Conceptualization, **M.M:** Conceptualisation and original draft preparation, **P.C.K.:** Supervision, original draft preparation, data curation, and formal analysis.

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Original Article

Open Access

Antibiotic Prescription Suitability Assessment in Health Centers of Gisagara District, Rwanda

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ABSTRACT

INTRODUCTION: Antibiotic over-prescription is a global public health problem. This leads to increased antimicrobial resistance, health costs and other adverse effects. In Rwanda, most outpatient visits take place in health centers where most of the antibiotics are prescribed. This study aimed to assess antibiotic prescription suitability in selected health centers in the District of Gisagara, Rwanda.

METHODS: This is a cross-sectional study which included 645 antibiotic prescriptions between January and December 2017 in the health centers of Kigembe, Kibayi and Agahabwa of Kibilizi Hospital, Gisagara district in Southern province, Rwanda. Data were collected from outpatient consultation registries. A systematic sampling technique was used to select study participants. A checklist comprising clinical symptoms, signs, diagnosis and prescribed antibiotics was used for data collection. EPI DATA and STATA software were used respectively for data entry and data analysis.

RESULTS: Average of antibiotic prescription was 54.2%. The mean age of patients treated was 26.6 years. The common symptoms related to antibiotics prescription were fever at 29%, cough at 26.9% and running nose at 17%. The most prescribed antibiotics were: Amoxicillin (37.1%), Penicillin V (13.2%) and Cloxacillin (12.1%). The main indication was upper respiratory tract infection at 40.6%. Among all antibiotics prescriptions, only 38.6% were found to be suitable.

CONCLUSION: Based on the recommended antibiotic prescription rate set at 30% by WHO, the rate antibiotics prescription in the three health centers is higher. There is a need to train health center nurses in diagnostic and rational antibiotic practices to limit the antibiotics' over-prescription and antimicrobial resistance.

INTRODUCTION

Antibiotic over-prescription, which leads to antimicrobial resistance (AMR), is a current global health challenge [1,2]. AMR leads to increased health expenditure due to the high cost of developing new antibiotics or purchasing more expensive but currently effective antibiotics [3,4]. Studies done in European and South American outpatient clinics have shown high prescription

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rates of antibiotics [5,6]. Studies in Sub-Saharan Africa showed that antibiotics treat more than 70% of upper respiratory infections (URTI) without clinical evidence of bacteria as a causative agent [7,8]. It was also found that 40% of infectious diarrhea is treated with antibiotics without confirmation of bacterial cause [9]. A study done in a tertiary hospital in Rwanda documented that Amoxicillin was commonly used even though bacteria resistant to Amoxicillin were present in 89.3% of bacterial cultures [10].

The 2017 Rwanda Health Management Information System report showed in March 2017 an increased trend towards antibiotic prescriptions in health centers of Kibilizi District Hospital, Gisagara compared to the previous years. The National Institute of Statistics in Rwanda (NISR) report from 2018 showed that most outpatient visits (77.0%) occur at health centers. We could not find any study conducted at the health center level about antibiotics prescription. Most of the primary health care is provided by nurses at health centers [11,12]

Our study's objectives are to assess the proportion of outpatients receiving antibiotic prescriptions and evaluate the antibiotic prescriptions' suitability based on diagnosis.

METHODS

Study type: This is a descriptive retrospective cross-sectional study done in 2019.

Study site: This study was conducted in three of nine health centers of Kibilizi Hospital, Gisagara District, Rwanda. The hospital serves a population of 207,883. The three health centers, Kigembe, Kibayi and Agahabwa, were selected for this study because they treated the largest number of patients (125,805) from a total of 345,846 patients consulted from January to December 2017.

Study design: We checked the hospital data for the year 2017. We reviewed all patients' registries for each of the three selected health centers and counted all the patients who visited the health centers. We divided the number of patients who received antibiotics by the number of those who received any prescription to calculate the antibiotics prescriptions rate. We also reviewed the symptoms and diagnoses for which the antibiotics were prescribed. We matched the diagnosis and the criteria for prescribing antibiotics to determine the suitability of the antibiotic prescription.

Study population: This consisted of patients who were prescribed antibiotics in outpatients' consultations (68,186) for the period from January to December 2017. We included patients who received antibiotic prescriptions and had complete required information in the health center registry in the study. We excluded from the study those whose record had incomplete information.

Sampling: WHO recommends investigating at least one hundred of all prescriptions in a facility when researching drug use indicators [13]. We set the proportion of the antibiotic prescription's suitability at 50% as there were no data about the previous prevalence in our setting. The rate of the incompleteness of the register was set at 40% to increase the sample size. We divided 384 (minimum sample size for a population where an expected proportion of the element studied is set at 50%, precision at 5%) and 1 (100% completeness) minus the above rate of incompleteness, the sample size became 645. We considered a number of more than a hundred participants (patient who received antibiotic prescriptions) enough recommended by WHO. We considered almost an equal number of sample size for each health center. The sample sizes were 213,217, and 215 patients from Kibayi, Kigembe, and Agahabwa health centers, respectively. For each of the health centers, patients were registered by order of arrival from the first to the last day of the month. We set a new order from 1st January to 31st December 2017 from which to allow sampling. We used a systematic sampling technique to select study participants from the list of patients who received antibiotic prescriptions. We obtained the sampling interval by dividing the total number of patients by the sample size. We considered the first patient who took the antibiotic then we found the second by adding the interval to the first one and so on until the required number was reached

Data Collection: We trained three nurses, one for each health center, to collect information from the registry. A predefined questionnaire (checklist) was used. The questionnaire included patient age, sex, symptoms, signs, diagnosis, treatment (antibiotics), and dosage. These elements were used to determine the suitability of the prescription, which is the outcome variable. We completed the data collection from July to August 2018.

Data Analysis: We set criteria (with reference to a study done in Lesotho) to determine suitable or unsuitable antibiotic prescription [14]. A suitable antibiotic prescription was defined as one that

includes the drug prescribed with dosage and duration appropriately indicated for the patient's clinical condition or prophylaxis [15,16]. The prescription was considered suitable when it met the following criteria: suggestive signs and symptoms of bacterial infection present, or presence of infection established by laboratory test if any; presenting signs and symptoms absolute for bacterial infection; site of infection or possible areas of infection identified; potential site of infection (i.e. open wound); antibiotic prescribed is only one and indicated against all commonly likely pathogens associated with the area of infection; the prescribed antibiotic, the dosage, and duration of treatment are correct; and antibiotics in multiple therapies are compatible.

We considered the antibiotic prescription unsuitable when it did not meet the above criteria. We entered data in Epidata and exported these in STATA. Descriptive analysis for demographics and other variables (clinical signs and symptoms, prescribed antibiotics) were done using frequency and proportions.

Ethical approval: Rwanda National Ethics Committee reviewed and approved this study (Ref: NHRC/2018/PROT/023).

RESULTS

Out of 125,805 patient visits at the three selected HCs, 68,186 (54.2%) were prescribed antibiotics. The mean age of study participants was 26.6 years. Children under five years old represented 21.4% of patients. More than half of the study population were female (Table 1).

Table 1: *Age and gender distribution of study participants (n=645)*

Characteristics	n (%)
Age group (years)	
< 5	138 (21.4)
5-14	96 (14.9)
15-24	101 (15.7)
25-44	166 (25.7)
45-64	105 (16.3)
65+	39 (6.0)
Sex	
Male	281 (43.6)
Female	364 (56.4)

Fever was the most common presenting symptom (29%), followed by dry cough (26.9%), runny nose (17.0%), productive cough (12.5%) and dysphagia (10.9%). Upper respiratory tract infection was the most frequent clinical diagnosis at 40.6% followed by non-specific infection (no clear diagnosis) at 26.7%, tonsillitis at 21.5%, intestinal parasites at 13.2% and wound at 10.1% (Table 2).

Table 2: *Distribution of the symptoms and diagnosis (n=645)*

Characteristics	n (%)
Symptoms	
Fever	176 (29.0)
Dry cough	163 (26.9)
Running nose	103 (17.0)
Productive cough	76 (12.5)
Dysphagia	66 (10.9)
Wound	33 (5.4)
Liquid diarrhoea	30 (4.9)
Abdominal pain	30 (4.9)
Dysuria	30 (4.9)
Skin ulceration	29 (4.8)
Dyspnea	16 (2.6)
Ear discharge	15 (2.5)
Thoracic pain	13 (2.1)
Urethral/vaginal discharge	12 (2.0)
Abscess	11 (1.8)
Vomiting	10 (1.7)
Hemoptoic cough	2 (0.3)
Bloody diarrhoea	2 (0.3)
Eye discharge	1 (0.2)
Other	49 (8.1)
Clinical Diagnosis	
URTI	262 (40.6)
Urinary tract infection	42 (6.5)
Pneumonia	14 (2.2)
Gastroenteritis	10 (1.6)
Other	326 (50.5)
Other (specified diagnosis)	
Non-specific infection	87 (26.7)
Tonsillitis	70 (21.5)
Intestinal parasites	43 (13.2)
Wound	33 (10.1)
Cutaneous infections	32 (9.8)
Otitis media	15 (4.6)
Abscess	12 (3.7)
Dental decay	8 (2.5)
Sexually transmitted infection	5 (1.5)

The most commonly used antibiotic was amoxicillin at 37.1%, followed by penicillin at 13.2%, cloxacillin at 12.1%, cotrimoxazole at 11.0% and metronidazole at 9.8% (Table 3).

Table 3: *Distribution of type of antibiotic prescribed (n=645)*

Antibiotics	n (%)
Amoxicillin	239 (37.1)
Penicillin V	85 (13.2)
Cloxacillin	78 (12.1)
Cotrimoxazole	71 (11.0)
Metronidazole	63 (9.8)
Erythromycin	59 (9.2)
Ciprofloxacin	32 (5.0)
Chloramphenicol	1 (0.2)
Doxycycline	14 (2.2)
Tetracycline	1 (0.2)

The study findings revealed that, of all antibiotics prescriptions, the antibiotic prescription suitability was 38.6%.

Lowest test rate (24.6%) of the antibiotic prescriptions suitability was observed in children less than five years of age. Among the antibiotics prescribed, amoxicillin was associated with the lowest rate (20.1%) of prescription suitability. URTI was the diagnosis most frequently associated with unsuitable antibiotic prescribing at 98.1% (Table 4).

Table 4: *Characteristics of antibiotic prescription in relation to the appropriateness*

	Antibiotic prescription appropriateness		
Characteristics	**Yes**	**No**	**Total**
Overall	249 (38.6%)	396 (61.4%)	645
Age group			
< 5 years	34 (24.6)	104 (73.4)	138
5-14 years	41 (42.7)	55 (57.3)	96
15-24 years	51 (50.5)	50 (49.5)	101
25-44 years	72 (43.4)	94 (56.6)	166
45-64 years	38 (36.2)	67 (63.8)	105
65+ years	13 (33.3)	26 (66.7)	39
Type of antibiotics			
Amoxicillin	48 (20.1)	191 (79.1)	239
Ciprofloxacin	18 (56.3)	14 (43.8)	32
Penicillin V	60 (70.6)	25 (29.4)	85
Metronidazole	31 (49.2)	32 (50.8)	63
Cloxacillin	43 (55.1)	35 (44.9)	78
Cotrimoxazole	12 (16.9)	59 (83.1)	71
Erythromycin	26 (44.1)	33 (55.9)	59
Clinical diagnosis			
Pneumonia	13 (92.9)	1 (7.1)	14
URTI	5 (1.9)	257 (98.1)	262
Gastroenteritis	3 (30.0)	7 (70.0)	10
UTI	39 (92.9)	3 (7.1)	42

DISCUSSION

In this study, we assessed antibiotic prescriptions' suitability in three HCs of Kibilizi District Hospital, South Rwanda.

The percentage of patients receiving antibiotic prescriptions was 54.2%. This was more than the WHO's standard, which is less than 30% [13]. It was almost equal to what has been found in a study done in Ghana where the percentage of patients receiving antibiotic prescriptions was 55.2% but considerably higher than that found in Egypt and Saudi Arabia at 39.2% and 32.2% respectively [17,18].

There was a clear difference in age distribution: children below 5 years old had the lowest suitability rate. This may be explained by the fact that children suffer more frequently from URTIs compared to adults.

We have observed that antibiotics are commonly prescribed inappropriately for this condition [19].

Clinical diagnosis and antibiotic prescriptions

Among the diagnoses made based on the presenting symptoms and signs, we have observed that URTI constitutes 40.6% of the diagnoses. This is not different from the observations made in other studies done in Japan, Cameroon, or Brazil where the percentage of patients diagnosed with URTI were 46,2%, 21,27% and 50%, respectively [19,20,21]. The most prescribed antibiotic for this condition was amoxicillin (37.1%), followed by penicillin V (13.1%). The use of amoxicillin for this common condition has been observed in many other studies done elsewhere including studies done in Ethiopia, Botswana and Bangladesh where the percentage of patients prescribed amoxicillin

was 64,4%, 28,4% and 17% respectively [22, 23, 24]. Amoxicillin is frequently used in URTI management, which seems to be linked to low cost and availability as a generic antibiotic. It is also recommended as the first-line medication in the management of URTI of bacterial origin.

Clinical conditions and antibiotic prescriptions

The three most common clinical conditions where antibiotics were prescribed were fever at 29%, dry cough at 26.9% and runny nose at 17.0 % (Table 4). In studies done in Ethiopia and the United Kingdom, acute cough accounted for 22.7% and 34.4% respectively, of the clinical conditions where antibiotics have been prescribed [25,26]. These symptoms are usually related to the upper respiratory tract infections and do not require antibiotics in their management [21].

Suitability of antibiotic prescription

We found that antibiotics were used suitably at a rate of 38.6%. Suitability is defined as prescriptions given with clinical evidence of bacterial infection. In Lesotho, the suitability of the antibiotic prescription was 76.8% [14]. In a study done in Ecuador, the antibiotic prescription's suitability was found to be 9.7%, both very different from the results of our study [27]. Similar results were found in a study done in China, where 39.4% of the antibiotic prescription was suitably done [15].

CONCLUSION

Though our study is purely descriptive, we found that the suitability of antibiotic prescription is low in the three health centers, the decision making is mainly based on clinical symptoms. This is likely the primary factor leading to the high rate of unsuitable antibiotic prescription. unsuitable use of antibiotics is felt to be one of the major causes of antibiotic resistance.

Recommendations: Physicians at District hospital should supervise the application of the available guidelines on managing different clinical conditions, mainly upper respiratory tract infection. Training of nurses regarding on use of antibiotics and misuse effect, primarily Amoxicillin, is necessary. A countrywide prospective research on antibiotics prescription at the primary health care level is recommended to investigate antibiotic over-prescription.

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Rwanda
Public Health Bulletin

About the Rwanda Public Health Bulletin (RPHB)

General Information

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 Centres for Disease Control and Prevention 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 policy-makers, 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 objective and follow from the results.

3. PUBLIC HEALTH NOTICES / OUTBREAK REPORTS

Following the Center for Disease Control recommendations, for PH 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 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.

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

Are normally up to 800 words.

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 10
Titles: Capitals and bold, size 14
Format tables: Times New Roman, Font size 7
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 7 and italic.

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