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Treatment of Hepatitis B (HBV) and C Virus (HCV) and Challenges in the Treatment in Rwanda: Ruli District Hospital

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Abstract

It is estimated that 3% and 4% of Rwandans living with hepatitis B and C respectively. Both HBV and HCV are more infectious than HIV and untreated chronic hepatitis B and C infection can result in liver cirrhosis and liver cancer. Despite to severity of these diseases numerous challenges exist for effective management of chronic HBV and HCV infections, particularly in resource-limited regions. The aim of this study was to explore the treatment of hepatitis B and C infection as well as challenges related to its treatment at Ruli District Hospital.

A non-experimental quantitative descriptive cross-sectional was used and sampling strategy was total population sampling (TPS).

Of all participants 22% to 68.3% and 22% to 61% reported that people in risk groups are screened routinely for HBV and HCV respectively, the percentage vary according to each specific category. Lamivudine and Tenofovir were selected by the majority 58.5% and 61% respectively, as very commonly used drugs for HBV while most of participants reported that they're not sure about the usage of treatment on WHO essential list for HCV. Numeral challenges and barriers for the treatment of HBV and HCV were found; these include difficulties to reach specialized care, lack of Accurate Statistics Regarding the Burden of HBV and HCV Infections, low public Awareness and Education and Limited knowledge of health care providers on viral hepatitis B/C.

There are still numerals challenges to be addressed for improvement of the treatment viral hepatitis infections.

Keywords*: Hepatitis B, Hepatitis C, Treatment, Challenges.*

Introduction

Viral hepatitis is a global health problem from which no country rich or poor, is spared and affects hundreds of millions of people worldwide. Five distinct hepatitis viruses have been identified (A, B, C, D and E) as the cause of viral hepatitis. But only Hepatitis B and C, which can lead to chronic hepatitis, are particularly prevalent; 240 million people are thought to be chronically infected with hepatitis B and 184 million people have antibodies to hepatitis C worldwide (1).

While present all over the world, Hepatitis B and C, they disproportionately affect Africa; where the prevalence of hepatitis B is estimated at 8% in West Africa and 5%–7% in central, eastern and southern Africa. The prevalence of hepatitis C is even higher in some areas, reaching levels of up to 10% (2). There is a paucity of data on HBV and HCV zero-prevalence in Rwanda, with only a few non-representative studies conducted among high-risk groups including antenatally screened pregnant women, HIV-positive patients and health care workers with reported prevalence rates ranging between 2.4–5.2% for hepatitis B surface antigen (HBsAg) positivity and 1.3–5.7% for anti-HCV antibodies, and among blood donors, with 1.6–3.5% and 2.6–2.9% seropositive for HBsAg and anti-HCV, respectively (3).

Due to its largely asymptomatic nature, viral hepatitis is a silent epidemic; most people are unaware of their infection and hence they seek medical care while the disease has become more severe.

Untreated chronic hepatitis B and C infections can result in liver cirrhosis and liver cancer. According to the Global Burden of Disease,

hepatitis B and hepatitis C together caused 1.4 million deaths in 2010, including deaths from acute infection, liver cancer and cirrhosis (4).

Modes of transmission are via direct contact with the blood or body fluids of an infected person. Although there is a vaccine for HBV, there is none for HCV until now. Furthermore, two products are FDA-approved for HBV prevention: hepatitis B immune globulin (HBIG) and hepatitis B vaccine (5).

In addition to the prevention of HBV infection through vaccination, it is important to treat persons with CHB at high risk of progression to reduce the considerable morbidity associated with CHB. Over the past three decades, treatment outcomes have improved, first with conventional and then pegylated (PEG) interferon (IFN) and more recently with the advent of nucleotide analogues (NAs). Currently, seven antiviral agents (lamivudine, adefovir, entecavir, telbivudine, tenofovir, emtricitabine, standard and PEG-IFN) are recommended by WHO and have been shown to suppress HBV replication, prevent progression to cirrhosis, and reduce the risk of HCC and liver-related deaths (6). The treatment is lifelong. Even though there is no vaccine for HCV infection, treatments to cure the infection are available. Currently WHO recommends that direct-acting antiviral (DAA) regimens be used for the treatment of persons with hepatitis C infection rather than regimens with pegylated interferon/ribavirin. Of these, daclatasvir, ledipasvir, and a combination of ombitasvir, paritaprevir and dasabuvir were added to the WHO Model List of Essential Medicines in 2015 (7).

These medicines are transforming the treatment of HCV, enabling the use of regimens that can be administered orally, are shorter in duration (up to eight weeks), result in cure rates higher than 90%, have a lower pill burden (as few as one pill/day) and are associated with fewer serious adverse events (SAEs) than the previous interferon-containing regimens. However, sofosbuvir/pegylated interferon and ribavirin is still recommended as an alternative treatment option to patients with HCV genotype 3 infection with cirrhosis, and patients with genotypes 5 and 6 infection with and without cirrhosis (7).

Numerous challenges exist for effective management of chronic HBV and HCV infections, particularly in resource-limited regions. These challenges include lack of accurate prevalence data, absence of a surveillance program, and poor political will of governments in resource-poor countries to enforce effective measures to control the disease. There is a lack of understanding regarding HBV and HCV infection by both the general public and health care providers (8, 9, 10).

A better understanding of the pathogenesis and treatment of this condition is necessary. The acute shortage of trained medical manpower necessary for accurate diagnosis and treatment of both infections in resource-poor countries is a formidable challenge. The most critical problem in the management of CHB and CHC is the high cost of laboratory tests and drugs. Drugs are also not readily available. Other challenges include stigmatization of patients, co-infection with other viruses, lack of management guidelines, and absence of an effective patient referral system (8, 9,10).

In Rwanda, chronic Hepatitis B infection is treated by lifelong antiviral treatment, Tenofovir is available at all public health facilities offering HIV services and Currently, Tenofovir is still available free of charge for those in need (11).

Again, the Rwandan health system is well set up to deliver HCV care and new antiretroviral treatments with less toxicity, effectiveness and easy mode of administration such as Harvon, ledipasvir/ sofosbuvir are available in the country. However, the treatment cost is still being prohibitively expensive and reached very few patients (12). For those who are already infected with HBV in Rwanda, selecting cases for treatment and monitoring treatment success poses fresh challenges. HBV viral load testing, which is needed for treatment decisions, can now be done in the country, but few public hospitals can do the test and the high cost makes it inaccessible to many who need it most (11). Others challenges include few doctors and nurses with knowledge and clinical expertise required to manage HBV patients, very complex treatment algorithms without any clear endpoint and expansion of health settings which can deliver care for HBV infected patients which is now only available in referral hospitals (11).

Rwanda has made great strides in public health policy and delivery in the last two decades, and the stories of HIV prevalence reduction and childhood vaccine delivery are two of its most prized successes (11). However, few studies have been done on hepatitis B and C which are most

prone to lead chronic infection, particularly in Rwandan district hospitals. In spite problematic prevalence, its possible increase and impacts on Rwandans, there is still paucity of data regarding treatment of hepatitis B and C infection. Therefore, this study aims to explore the treatment of hepatitis B and C infection as well as challenges related to its treatment at Ruli District Hospital one of Rwandan district hospitals.

Methods

In Rwanda, Health service delivery is structured as a pyramid referral hospitals and provincial Hospitals at the apex followed by district hospitals, and health centers (13). Ruli District Hospital, one of Rwandan district hospitals is an approved hospital owned by the Catholic Archdiocese of Kigali. According to the catchment area, Ruli District Hospital oversees seven health centers covering a total population of about 119,617 inhabitants. Its medical services include Internal medicine, outpatient department, Pediatric and neonatology, maternity; surgical services including theatre, and surgical ward. The Hospital has also medical specialties such as Eye Nose Throat, mental health, ophthalmology, dental and oral, physiotherapy (14).

The researcher used descriptive cross-sectional design to collect data regarding the treatment of HBV and HCV as well as identifying challenges faced by health care providers in the treatment of these viral hepatitis at Ruli District Hospital. The population in this study comprised of 41 health care providers including physicians, General practitioner, nurses and other health care providers working in medical services which are involved in the treatment of viral hepatitis such as medical, pediatric, surgical and outpatient units at Ruli Hospital.

In this study, a purposive sampling strategy on health care providers working in Medical services which are involved in the treatment of viral hepatitis were selected as study population as most of patients with HBV and HCV are treated in these units of interest.

Semi-structured questionnaires for evaluating treatment of hepatitis B and C and challenges in the treatment: Ruli District Hospital were used to collect data. Self-administered questionnaire was set out to gather information on socio-demographic, drugs used in the treatment of hepatitis B and C, how are treated and challenges in the treatment.

Collected data were analyzed using Statistical Package for Social Sciences (SPSS) version 16.0. Demographic characteristics of respondents were analyzed by use of frequency distribution. Microsoft Excel 2013 was used for graphical presentation using frequency tables and histogram.

Study results

The table 1, displays social demographic data of respondents, the majority was females 51.2%. Of all respondents, 29.3% were aged between 20-29 years of old, 53.7% between 30-39, 14.6% between 40-49 and only 2.4% were aged above 50 years. The mean age was 33.34; the minimum was 23 and the maximum 55. Regarding participants professional the majority were nurses 58.5% (A2, A1 and A0 Nurses), 12.2% general practitioners, 7.3% physiotherapists, 4.9% midwives and 17.1% others (lab technicians, radiographers, and pharmacists). About experience, the majority of participants 51.2% were with experience of 5 years and above, 29.3% with experience between 2-5 years and 19.5% were under 2 years of experience. Furthermore, all participants 100% were with clinical experience.

The table 2 shows the data about how frequent respondents see patients with hepatitis B and C. The majority (61%) of participants reported that they see few patients per years, 17.1% on monthly basis, 2.4% on weekly basis while 19.5% had never seen a patient with hepatitis B and C.

The table 3 displays the results about how patients in different HBV risk category are tested. Respondents were asked how common a patient with above enumerated (in the table) risk indicators is tested. Of all respondents, 46.3% reported that on request from a patient who may have been exposed is very common tested, those who reported that migrants from HBV endemic region are very common tested the percentage was 22%, 31.7% for Injecting drug users, 53.7% for sex workers, 31.7% for Homosexual men, 68.3% for HIV positive patients, 56.1% for hepatitis C positive, 58.5% for patients with abnormal liver function tests, 48.8% for patients with second (repeat) abnormal liver function test as well as for patients with jaundice or exhibiting signs and symptoms.

The table 4 shows the results about how patients in different HCV risk category are tested.

Respondents were asked how common for patient with above enumerated (in the table) risk indicators are tested for hepatitis C. Of all respondents, 46.3% reported that on the request from a patient who may have been exposed is tested very common, for those who reported that migrants for HCV endemic region and injecting drug users are tested very common the percentage was 22%, 41.5% for sex workers, 29.3% for Homosexual men, 56.1% % for HIV positive patients and those with abnormal liver function tests as well as for patients with jaundice or exhibiting signs and symptoms , 61% for those with hepatitis B positive and 51.2% for patients with second (repeat) abnormal liver function test.

Participants were asked how common they use different diagnostic tests for hepatitis B and C. According to the results shown in the table 5, 65.9% of all participants replied that they use HBeAg and/or anti-HBe to diagnose HBV very common, those who reported the use of ALT for HBV and HCV diagnosis very common were 51.2% while 34.1%, 31.7% and 26.8% reported that they use Other biochemical markers (AST, GGT, serum albumin,etc), Quantitative viral load (hepatitis B DNA or hepatitis C RNA and Ultrasound respectively for the diagnosis of both hepatitis B and C. However, only 9.8% and 4.9% reported that they use very common Genotype, liver biopsy and Transient elastography (e.g. fibroscan) respectively.

Participants were asked to state who has the main responsibility of providing disease-related counselling/advice and guidance to patients following a positive diagnosis for viral hepatitis. As per the table 6, 85% of all participants stated General practitioners and 55% nurses and midwifes, 20% social affairs in charge, 40% specialist physicians, 7.5% other health care providers (trained social workers) and 2.5% stated that they do not know who has the main responsibilities to offer counselling.

The table 7 displays the results about topics which are included in disease related advice and guidance to patient following a positive test result for hepatitis B and/or C, 85.4% of all participants reported that general information about the disease and hygiene measures to protect transmission to others are included very common, those who stated that contact tracing and other tests required are included very common were 36.6%, 31.7% for what to expect and onward referral as well as for patient organizations / support groups, 68.3% for treatment options, benefits and side effects as well as for the importance of a healthy lifestyle, especially the damaging role of alcohol consumption,43.9% for mental health promotion and staying positive, and finally 73.2% for access to health care.

The table 8 shows the results about different antiviral drugs used to treat hepatitis B. Participants were asked how common different antiviral drugs are used to treat hepatitis B and as per the results in the table only Lamivudine and Tenofovir were selected by the majority 58.5% and 61% respectively, as very commonly used drugs.

The table 9 shows the results about different antiviral drugs used to treat hepatitis C. Participants were asked how common different antiviral drugs are used to treat hepatitis C and as per the results in the above table most of participants are not sure about the usage of hepatitis C treatment. Of all participants 53.7% reported that they are not sure about the use of Ribavirin, Telaprevir, Boceprevir, Daclatasvir, ledipasvir, Ombitasvir/paritaprevir/ritonavir and dasabuvir, and Sofosbuvir with or without ledipasvir; Whereas 51.2% and 56.1% reported that they are not sure about the use of (Pegylated) Interferon alpha, and Simeprevi respectively.

According to the table 10 70%, 42.5% and 40% of all participants replied that patients with hepatitis B and C are referred based on viral load, HBe antigen status and ALT level respectively; while 22.5% reported that they are not sure about referral criteria and 2.5% stated other referral criteria (clinical status).

The table 11 shows the results regarding barriers of patients with hepatitis B and C in reaching specialized care. Respondents were asked to choose to what extent they agree with the above statements (in the table) as explanations of why hepatitis B/C cases do not reach specialized health care for further investigation and treatment. Respondents who replied strongly agree and agree were considered as those who agree with the statement while those who answerer strongly disagree and disagree were considers as those who do not agree with the statement. As per the results in the table the majority 68.3% agreed with the statement saying that “Time constraints affect health care professionals ability to provide patients with disease-related counselling and referral advice” as one of the reasons, those who agreed with the

one saying: ”Some health care services are not reimbursed for providing disease-related counselling and referral advice to patients” as well as “the antiviral treatment itself is generally not covered under the general health care service/insurance scheme in my country “ were 70.7%, 61% for “Newly diagnosed patients generally do not receive comprehensive counselling on the consequences of the disease, treatment options and referral, and hence do not seek specialist care”, 92.7% for “There are too few specialists to whom the patients can be referred to for specialized care”, 63.5% for “There is limited guidance available to secondary health care professionals about onward referral, counselling and patient management of hepatitis B/C patients”, 56.2% for “Although training on viral hepatitis management is available for health care providers, uptake is generally low among professionals”, however 61% disagree with “Patients are referred to the specialist but refuse further investigation or treatment”.

The table 12 displays the results about challenges in the treatment of hepatitis B and C. participants were asked to choose to what extent they agree the above statements (in table) as challenges in the treatment of hepatitis B and C in their clinical setting. Respondents who replied strongly agree and agree were considered as those who agree with the statement. As per the results in the table all statement were agreed as challenge in their clinical setting as follow: 80.5% for “Lack of Accurate Statistics Regarding the Burden of HBV and HCV Infection” 87.8% for “Public Awareness and Education (many people do not know their status regarding Hepatitis B and C as well general information on the disease process”, 83% for “Limited knowledge of health care providers on the management of viral hepatitis B/C”, 80.5% for “Shortage of health care providers”, 80.5% for “High cost of laboratory and diagnostic equipment”, 73.2% for “High cost of treatment regimens for hepatitis C”, 78% for “Side effects and difficult follow up of patient on treatment”, 65.8% for “Co-infection of both hepatitis B and C or HIV/AIDS”, and 75.6% for “Stigmatization of people who tested positive to HBV and/or HCV”.

According to the results summarized in table 13, the relation between respondents’ experience and the frequency to see patients with hepatitis B and C was not statistically significant (p= 0.237).

According to the results summarized in table 14, the relation between respondent professionals and the frequency to see patients with hepatitis B and C was not statistically significant (p= 0.141).

The table 15 shows the distribution of findings concerning participants’ suggestions for effective treatment of HBV and HCV. The majority 73% suggested stall training about HBV and HCV treatment**.**

Table 1. Description socio-demographic characteristics of respondents (N=41)

Social demographic characteristics		**Frequency**	**Percentage**
Gender	Male	20	48.8
	Female	21	51.2
	Total	**41**	**100**
Age group, mean age was 33.3, minimum age 23 and maximum 55	20- 29 years	12	29.3
	30-39years	22	53.7
	40-49years	6	14.6
	50 years and above	1	2.4
	Total	**41**	**100**
Participant professional	A2 Nurse	5	12.2
	A1 Nurse	14	34.1
	A0 Nurse	5	12.2
	General practitioner	5	12.2
	Physiotherapist	3	7.3
	Midwife	2	4.9
	others	7	17.1
	Total	**41**	**100.0**
Working experience	under 2 years	8	19.5
	between 2-5years	12	29.3

	5 years and above	21	51.2
	Total	**41**	**100**
Clinical experience	Yes	41	100
	No	0	0
	Total	**41**	**100**

Table 2 Participants' frequency to see patients with hepatitis B and C (N=41)

Frequency to see patients	**Frequency**	**Percentage**
Never	8	19.5
few patients per year	25	61
monthly basis	7	17.1
Weekly basis	1	2.4
Total	**41**	**100**

Table 3. How common patients with high risks of getting hepatitis B are tested for it (N=41)

HBV high risk categories	**Total**	**Very common**	**Variable or not routinely**	**Rarely or never**	**Unsure**	**Total**
A request from a patient who may have been exposed	41	46.3% (19)	24.4 (10)	9.8% (4)	19.5% (8)	100%
Migrants from hepatitis B endemic areas	41	22% (9)	12.2% (5)	19.5% (8)	46.3% (19)	100%
Injecting Drug Users (IDUs)	41	31.7% (13)	7.3% (3)	14.6% (6)	46.3% (19)	100%
Sex workers	41	53.7(22)	7.3% (3)	14.6% (6)	24.4% (10)	100%
Homosexual men (MSM)	41	31.7% (13)	4.9% (2)	9.8% (4)	53.7(22)	100%
HIV positive patients	41	68.3% (28)	14.6% (6)	2.4% (1)	14.6% (6)	100%
Hepatitis C positive patients	41	56.1% (23)	7.3% (3)	4.9(2)	31.7% (13)	100%
Patients with abnormal liver function tests	41	58.5% (24)	14.6% (6)	9.8% (4)	17.1% (7)	100%
Second (repeat) abnormal liver function test	41	48.8% (20)	22% (9)	9.8% (4)	19.5% (8)	100%
Jaundiced patients or those exhibiting signs and symptoms	41	48.8% (20)	14.6% (6)	4.9(2)	31.7% (13)	100%

Table 4. How common patients with high risks of getting hepatitis C are tested for it (N=41)

HBV high risk categories	**Total**	**Very common**	**Variable or not routinely**	**Rarely or never**	**Unsure**	**Total**
A request from a patient who may have been exposed	41	46.3% (19)	19.5% (8)	7.3% (3)	26.8% (11)	100%
Migrants from hepatitis C endemic areas	41	22% (9)	14.6% (6)	% (7)	46.3% (19)	100%
Injecting Drug Users (IDUs)	41	22% (9)	7.3% (3)	29.3% (12)	41.5% (17)	100%
Sex workers	41	41.5% (17)	12.2% (5)	17.1% (7)	29.3% (12)	100%
Homosexual men (MSM)	41	29.3% (12)	7.3% (3)	17.1% (7)	46.3% (19)	100%
HIV positive patients	41	56.1% (23)	14.6% (6)	7.3% (3)	22% (9)	100%
Hepatitis B positive patients	41	61% (25)	9.8% (4)	4.9(2)	26.8% (11)	100%
Patients with abnormal liver function tests	41	56.1% (23)	14.6% (6)	9.8% (4)	19.5% (8)	100%
Second (repeat) abnormal liver function test	41	51.2% (21)	17.1% (7)	4.9(2)	26.8% (11)	100%
Jaundiced patients or those exhibiting signs and symptoms	41	56.1% (23)	7.3% (3)	9.8% (4)	26.8% (11)	100%

Table 5. The frequency of using below diagnostic tests in the initial evaluation of a hepatitis B or C positive patients (N=41)

Diagnostic tests	Total	Very common	Variable or not routinely	Rarely or never	Unsure	Total
HBeAg and/or anti-HBe (for hepatitis B only)	41	65.9% (27)	12.2% (5)	2.4% (1)	19.5% (8)	100%
ALT	41	51.2% (21)	14.6% (6)	4.9(2)	29.3% (12)	100%
Other biochemical markers (AST, GGT, serum albumin, etc)	41	34.1% (14)	26.8% (11)	2.4% (1)	36.6% (15)	100%
Quantitative viral load (hepatitis B DNA or hepatitis C RNA	41	31.7% (13)	19.5% (8)	9.8% (4)	39% (16)	100%
Genotype	41	9.8% (4)	14.6% (6)	12.2% (5)	63.4% (26)	100%
Ultrasound	41	26.8% (11)	14.6% (6)	12.2% (5)	46.3% (19)	100%
Liver biopsy	41	4.9(2)	12.2% (5)	24.4(10)	58.5% (24)	100%
Transient elastography (e.g. fibroscan)	41	4.9(2)	7.3% (3)	14.6% (6)	73.2% (30)	100%

Table 6. Distribution of participants who have the main responsibility of offering viral hepatitis related counselling

Health care providers		Responses		Percent of Cases
		N	Percent	
Who provide counselling	General practitioner offers counselling on hepatitis	34	40.50%	85.00%
	Are nurses and midwives offering counselling	22	26.20%	55.00%
	Do social affairs offer counselling?	8	9.50%	20.00%
	Do specialists (physicians) offer counselling	16	19.00%	40.00%
	other health care providers	3	3.60%	7.50%
	participants who do not know or didn't provide an answer	1	1.20%	2.50%
Total		84	100.00%	210.00%
a. Dichotomy group tabulated at value 1				

Table 7. Topics used in disease-related advice and guidance to patient following a positive test result for hepatitis B and/or C

Topics for counseling	Total	Very common	Variable or not routinely	Rarely or never	Unsure	Total
General information about the disease	41	85.4% (35)	12.2% (5)	0% (0)	2.4% (1)	100%
Hygiene measures to protect transmission to others	41	85.4% (35)	12.2% (5)	0% (0)	2.4% (1)	100%
Contact tracing	41	36.6% (15)	36.6% (15)	4.9% (2)	22% (9)	100%
Other tests required	41	36.6% (15)	53.7% (22)	4.9% (2)	4.9% (2)	100%
What to expect, onward referral	41	31.7% (13)	51.2% (21)	2.4% (1)	14.6% (6)	100%
Treatment options, benefits and side effects	41	68.3% (28)	19.5% (8)	2.4% (1)	9.8% (4)	100%

The importance of a healthy lifestyle, especially the damaging role of alcohol consumption	41	68.3% (28)	14.6% (6)	2.4% (1)	14.6% (6)	100%
Mental health promotion and staying positive	41	43.9(18)	14.6% (6)	7.3% (3)	14.6% (6)	100%
Patient organizations / support groups	41	31.7(13)	12.2% (5)	9.8% (4)	46.3% (19)	100%
Access to health care	41	73.2% (30)	19.5% (8)	2.4% (1)	4.9% (2)	100%

Table 8. Antiviral drugs used to treat hepatitis B

HBV drugs	**Total**	**Very common**	**Variable or not routinely**	**Rarely or never**	**Unsure**	**Not available/ not in our scope**	**Total**
(Pegylated) Interferon alpha	41	9.8% (4)	4.9% (2)	2.4% (1)	41.5% (17)	41.5% (17)	100%
Lamivudine	41	58.5% (24)	4.9% (2)	2.4% (1)	17.1% (7)	17.1% (7)	100%
Telbivudine	41	9.8% (4)	7.3% (3)	4.9% (2)	43.9% (18)	34.1% (14)	100%
Adefovir	41	14.6% (6)	4.9% (2)	0% (0)	43.9% (18)	36.6% (15)	100%
Entecavir	41	4.9% (2)	4.9% (2)	2.4% (1)	51.2% (21)	36.6% (15)	100%
Tenofovir	41	61% (25)	4.9% (2)	2.4% (1)	19.5% (8)	12.2% (5)	100%
emtricitabine	41	9.8% (4)	7.3% (3)	2.4% (1)	48.8% (20)	31.7% (13)	100%

Table 9. Antiviral drugs used to treat hepatitis C

HBV drugs	**Total**	**Very common**	**Variable or not routinely**	**Rarely or never**	**Unsure**	**Not available/ not in our scope**	**Total**
(Pegylated) Interferon alpha	41	2.4% (1)	7.3% (3)	4.9% (2)	51.2% (21)	34.1% (14)	100%
Ribavirin	41	7.3% (3)	2.4% (1)	4.9% (2)	53.7%% (22)	31.7% (13)	100%
Telaprevir	41	7.3% (3)	2.4% (1)	4.9% (2)	53.7%% (22)	31.7% (13)	100%
Boceprevir	41	7.3% (3)	2.4% (1)	4.9% (2)	53.7%% (22)	31.7% (13)	100%
Daclatasvir	41	4.9% (2)	4.9% (2)	4.9% (2)	53.7%% (22)	31.7% (13)	100%
ledipasvir	41	4.9% (2)	4.9% (2)	4.9% (2)	53.7%% (22)	31.7% (13)	100%
Ombitasvir/paritaprevir/ritonavir and dasabuvir	41	7.3% (3)	7.3% (3)	2.4% (1)	53.7%% (22)	29.3% (12)	100%
Simeprevir	41	7.3% (3)	2.4% (1)	2.4% (1)	56.1% (23)	31.7% (13)	100%
Sofosbuvir with or without ledipasvir	41	7.3% (3)	4.9% (2)	2.4% (1)	53.7%% (22)	31.7% (13)	100%

Table 10. Clinical indicators for referring patients to specialists

Clinical indicators for referral		**Responses**		**Percent of Cases**
		N	**Percent**	
What are Indicators for Referring Client	Referral to specialist based on Viral load	28	39.40%	70.00%
	Referral to specialist based on HBe antigen status	17	23.90%	42.50%
	Referral to specialist based on ALT level	16	22.50%	40.00%
	Not sure about referral criteria	9	12.70%	22.50%
	Other criteria for referral to specialist	1	1.40%	2.50%

Total	71	100.00%	177.50%
a. Dichotomy group tabulated at value 1.			

Table 11. Barriers of patients with hepatitis B and C in reaching specialized health care (N=41)

Barriers	**Total**	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Total**
Time constraints affect health care professional's ability counselling	41	2.4% (1)	14.6% (6)	14.6% (6)	36.6% (15)	31.7% (13)	100%
counselling and referral advice patients are not reimbursed	41	2.4% (1)	14.6% (6)	12.2% (5)	46.3% (19)	24.4% (10)	100%
Newly diagnosed patients generally do not receive comprehensive counselling	41	2.4% (1)	22% (9)	14.6% (6)	36.6% (15)	24.4% (10)	100%
There are too few specialists to refer to	41	2.4% (1)	0% (0)	4.9% (2)	24.4% (10)	68.3% (28)	100%
The antiviral treatment not covered insurance scheme	41	4.9% (2)	4.9% (2)	19.5% (8)	34.1% (14)	36.6% (15)	100%
Patients refuse further investigation or treatment	41	7.3% (3)	53.7% (22)	19.5% (8)	12.2% (5)	7.3% (3)	100%
There are limited guidelines available	41	2.4% (1)	12.2% (5)	22% (9)	41.5% (17)	22% (9)	100%
low uptake among professionals' training	41	2.4% (1)	22% (9)	19.5% (8)	26.8% (11)	29.3% (12)	100%

Table 12. Challenges to the treatment's hepatitis B/C in your clinical setting (N=41)

Challenges	**Total**	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Total**
Lack of Accurate Statistics Regarding the Burden of HBV and HCV Infection	41	2.4% (1)	12.2% (5)	4.9% (2)	31.7% (13)	48.8% (20)	100%
Public Awareness and Education	41	4.9% (2)	2.4% (1)	4.9% (2)	26.8% (11)	61% (25)	100%
Limited knowledge of health care providers on of viral hepatitis B/C	41	2.4% (1)	7.3% (3)	7.3% (3)	29.3% (12)	53.7% (22)	100%
Shortage of health care providers	41	4.9% (2)	4.9% (2)	9.8% (4)	31.7% (13)	48.8% (20)	100%

High cost of laboratory and diagnostic equipment	41	4.9% (2)	7.3% (3)	7.3% (3)	39% (16)	41.5% (17)	100%
High cost of treatment regimens for hepatitis C	41	7.3% (3)	4.9% (2)	14.6% (6)	31.7% (13)	41.5% (17)	100%
Side effects and difficult follow up of patient on treatment	41	4.9% (2)	2.4% (1)	14.6% (6)	39% (16)	39% (16)	100%
Co-infection of both hepatitis B and C or HIV/AIDS	41	7.3% (3)	4.9% (2)	22% (9)	34.1% (14)	31.7% (13)	100%
Stigmatization of people with HBV and/or HCV	41	2.4% (1)	4.9% (2)	17.1% (7)	39% (16)	36.6% (15)	100%

Table 13. Relationship between respondent's experience and the frequency to see patients with hepatitis B and C

Years of Experience		**Frequency to see patients with hepatitis. B and C**				**P-Value**
		Never	**few patients per year**	**monthly basis**	**Weekly basis**	
working experience	under 2 years	0% (0)	75% (6)	25% (2)	0% (0)	.237
	between 2-5years	25% (3)	41.7% (5)	33.3% (4)	0% (0)	
	5 years and above	23.9% (5)	66.7% (14)	4.8%	4.8% (1)	

Table 14. Relationship between respondent professional and the frequency to see patients with hepatitis B and C

Participants Professions		**Frequency to see patients with hepatitis B and C**				**P-Value**
		Never	**few patients per year**	**monthly basis**	**Weekly basis**	
Participant professional	A2 Nurse	20% (1)	60% (3)	20% (1)	0% (0)	.141
	A1 Nurse	7.1% (1)	78.6% (11)	7.1% (1)	7.1% (1)	
	A0 Nurse	0% (0)	80% (4)	20% (1)	0% (0)	
	General practitioner	0% (0)	40% (2)	60% (3)	0% (0)	
	Physiotherapist	66.7% (2)	33.3% (1)	0% (0)	0% (0)	
	Midwife	0% (0)	100% (2)	0% (0)	0% (0)	
	others	57.1% (4)	28.6% (2)	14.3% (1)	0% (0)	

Table 15. Participants suggestions for effective treatment of viral hepatitis B and C in your health facility

Suggestions	**Frequency**	**Percentage**
staff training about HBV and HCV treatment	**30**	**73%**
Supply of diagnostic materials	**2**	**5%**
Decentralization of treatment	**2**	**5%**
Awareness campaign on HBV and HCV	**3**	**7%**
Reduce cost of Treatment	**3**	**7%**
Increase number of health care providers	**1**	**2%**

Figures

According to the Figure 1, 63.4% of all participants were working in units which offered counselling about hepatitis B and C.

Participants were asked how common is it that they would be involved in monitoring the following indicators in a patient undergoing antiviral treatment for hepatitis B or C. As per the results in the Figure 2 of all respondents 65.9%,

68.3% and 43.9% stated that ALT levels, viral load and side effect respectively are monitored very common.

According the Figure 3 above 46.3% of all respondents reported that all patients with hepatitis B and C are referred to specialists, those who said that patients are referred based clinical indicators were also 46.3% and 7.3% for those who reported that they are not sure about the referral criteria.

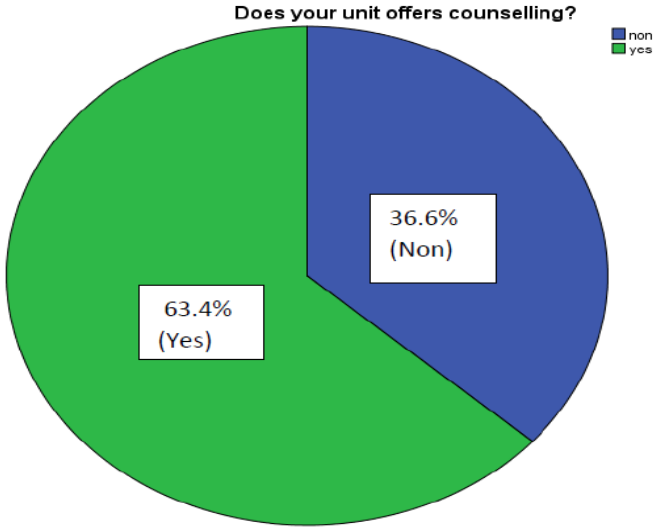

Figure 1. Distribution of participants according to whether they work in unit which offers counselling or not

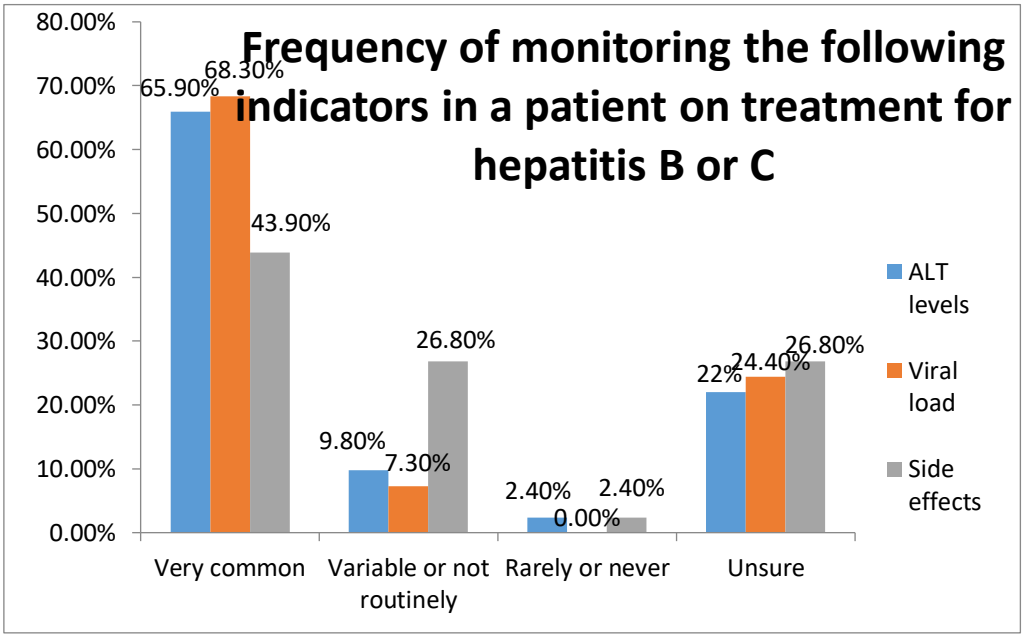

Figure *2.* Frequency of monitoring ALT level, viral load and side effects in patients on treatment for HBV or HCV

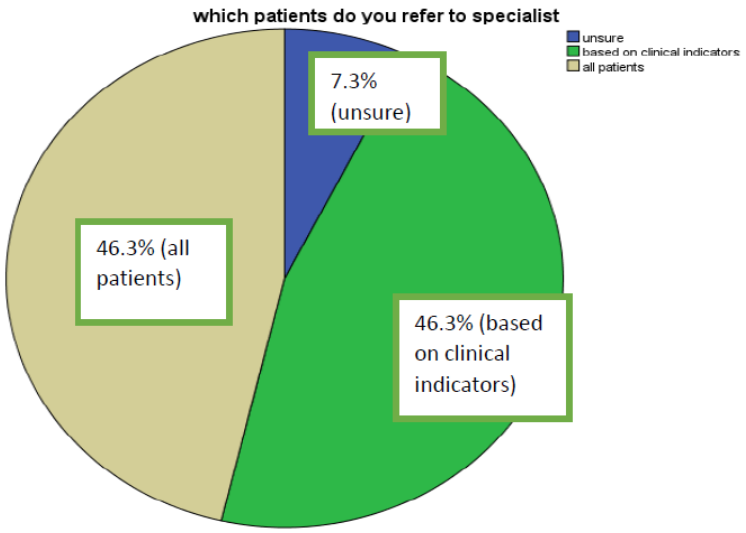

Figure *3.* Criteria of referring patients with hepatitis B and C to specialists

Discussion

Sociodemographic profile

The profile of participants as it is revealed by this study, the participants were predominantly composed by female 51.2%, the majority 53.7% were aged 30-39years old and the mean age was 33.34. Most respondents were with working experience of 5 years and more. Most of the participants were staff nurses 58.5%. The results are comparable to a similar conducted in Nigeria where the mean age was 33.8 and the number male participants were 182 while for female it was 200 (16). Furthermore, the study revealed that regarding participants professional the majority were nurses 58.5% (A2, A1 and A0 Nurses), 12.2% general practitioners, 7.3% physiotherapists, 4.9% midwives and 17.1% others (lab technicians, radiographers, and pharmacists). About experience, the majority of participants 51.2% were with experience of 5 years and above, 29.3% with experience between 2-5 years and 19.5% were under 2 years of experience. Furthermore, all participants 100% were with clinical experience.

The majority (61%) of participants reported that they see few patients with hepatitis B and C per years and the frequency to see patients had neither significant association with applicant's professional (p.141) nor with their experience (p.237). The results are comparable to ones of similar study done in Europe where most clinicians (73%) reported seeing just a few chronic hepatitis B/C patients (1-10) per year (17). However this may not be related to the low prevalence of both viral infections as most of patients with hepatitis B and / or C have no symptoms and are unaware that they carry the virus hence they do not seek medical care as reported by Lozano R et al in their research entitled "systematic analysis for the Global Burden of Disease Study 2010" (4).

Screening of hepatitis B

Of all respondents, 46.3% reported that on request from a patient who may have been exposed is very common tested, those who reported that migrants from HBV endemic region are very common tested the percentage was 22%, 31.7% for Injecting drug users, 53.7% for sex workers, 31.7% for Homosexual men, 68.3% for HIV positive patients, 56.1% for hepatitis C positive, 58.5% for patients with abnormal liver function tests, 48.8% for patients with second (repeat) abnormal liver function test as well as for patients with jaundice or exhibiting signs and symptoms. According WHO Guidelines for the Prevention, Care and Treatment of Persons with chronic hepatitis B infection all persons in these categories should be screened for hepatitis B infection (6).

Furthermore the results for this study differ from the one for a similar study done in European countries where in United Kingdom those who reported to a patient on his/her request were 80%, for migrant from HBV endemic region were 20%, 90% reported that they would routinely offer hepatitis B screening to IDUs, 70% for sex workers, 60% for homosexual men, 56% HIV positive patients, 40% for those with abnormal liver function test and 80% for symptomatic patient (16).

Screening of hepatitis C

Of all respondents, 46.3% reported that on the request from a patient who may have been exposed is tested very common, for those who reported that migrants for HCV endemic region and injecting drug users are tested very common the percentage was 22%, 41.5% for sex workers, 29.3% for Homosexual men, 56.1% % for HIV positive patients and those with abnormal liver function tests as well as for patients with jaundice or exhibiting signs and symptoms , 61% for those with hepatitis B positive and 51.2% for patients with second (repeat) abnormal liver function test. Even though the routine screening of people in high risk category of getting hepatitis C varies (from 22% to 61%) with each category in this study, WHO recommend a routine screen to all people at high risk of getting HCV (18). However, a study from the US showed that only 10-16% of tests for HCV in primary care were based on risk factors identified by the physician.

Diagnostic tests used in the initial evaluation of hepatitis B or C positive patients

The EASL guidelines were used as a reference to construct a list of diagnostic tools that are recommended in the clinical management of chronic hepatitis B/C patients. According to the results shown in the table 5, 65.9% of all participants replied that they use HBeAg and/or anti-HBe to diagnose HBV very common, those who reported the use of ALT for HBV and HCV diagnosis very common were 51.2% while 34.1%, 31.7% and 26.8% reported that they use Other biochemical markers (AST, GGT, serum albumin, etc), Quantitative viral load (hepatitis B DNA or hepatitis C RNA and Ultrasound respectively for the diagnosis of both hepatitis B and C. However, only 9.8% and 4.9% reported that they use very common Genotype, liver biopsy and Transient elastography (e.g. fibroscan) respectively. In a similar study done in Europe percentages were higher than the ones for this study, in Spain the percentage ranged from 75% to 100% for most of these tests except on liver biopsy (0%), ultrasound and elastography (50%) for those who reported to use them very common (17).

Disease related counselling

The majority (63.4%) of health care providers who reported that they were working in units which offered counselling about hepatitis B and C. Another the study conducted in USA revealed that only 54 percent of treatment programs provide education about hepatitis (20). As per the table 6 above, 85% of all participants stated General practitioners and 55% nurses and midwifes, 20% social affairs in charge, 40% specialist physicians, 7.5% other health care providers (trained social workers) and 2.5% stated that they do not know who has the main responsibilities to offer counselling. In the study done in Europe revealed that all GPs in Germany and Spain and almost all (93%) in Italy and in the Netherlands, always or often provide disease-related counselling. Furthermore, in Italy gastroenterologists/hepatologists (71%) were more frequently mentioned (20).

Topics used in disease-related advice and guidance to patients with for hepatitis b and/or C

85.4% of all participants reported that general information about the disease and hygiene measures to protect transmission to others are included very common, those who stated that contact tracing and other tests required are included very common were 36.6%, 31.7% for what to expect and onward referral as well as for patient organizations / support groups, 68.3% for treatment options, benefits and side effects as well as for the importance of a healthy lifestyle, especially the damaging role of alcohol consumption,43.9% for mental health promotion and staying positive, and finally 73.2% for access to health care. In another study, regarding covering the above topics in disease related counselling for hepatitis B and C patients, in Germany and Italy, a notable proportion was awarded excellent but most were awarded good (75% and 64% respectively) and excellent was given if at least one topic was very commonly covered and the other two were variably covered. For good to be given, either one topic was very commonly covered or one was variably covered, with the response to the last one being rarely or never or unsure (15).

Antiviral drugs used to treat hepatitis B

Participants were asked how common different antiviral drugs (listed in WHO essential drugs for hepatitis B) are used to treat hepatitis B and as per the results in the table only Lamivudine and Tenofovir were selected by the majority

58.5% and 61% respectively, as very common used drugs, In their study Lok and McMahon; interferon, tenofovir, or entecavir are preferred and these medications might be prescribed individually or in combination (21).

Antiviral drugs used to treat hepatitis C

Of all participants 53.7% reported that they are not sure about the use of Ribavirin, Telaprevir, Boceprevir, Daclatasvir, ledipasvir, Ombitasvir/paritaprevir/ritonavir and dasabuvir, and Sofosbuvir with or without ledipasvir; Whereas 51.2% and 56.1% reported that they are not sure about the use of (Pegylated) Interferon alpha, and Simeprevi respectively. Even though most of healthcare providers who participated in the study were not sure about the usage of WHO essential drugs for HCV, the first national treatment guidelines for HCV and hepatitis B were released in Rwanda (12).

Referral of HBV an HCV patients to specialists

As per the results in the diagram 2 of all respondents 65.9%, 68.3% and 43.9% stated that ALT levels, viral load and side effect respectively are monitored very common. The American Association for the Study of Liver Disease (AASLD) guidelines recommend that *during* the course of antiviral therapy, patients undergo assessment of liver tests every 12 weeks and HBV DNA levels every 12 to 24 weeks (22). Furthermore, WHO recommend the monitoring of side effects, viral load and liver function for patient on HCV treatment (7).

This study also revealed that 46.3% of all respondents reported that all patients with hepatitis B and C are referred to specialists, those who said that patients are referred based clinical indicators were also 46.3% and 7.3% for those who reported that they are not sure about the referral criteria. Another study conducted by Miriam Levi et al. in six European countries 60% of GPs report referring all patients to specialist care (20).

Moreover 70%, 42.5% and 40% of all participants replied that patients with hepatitis B and C are referred based on viral load, HBe antigen status and ALT level respectively; while 22.5% reported that they are not sure about referral criteria and 2.5% stated other referral criteria (clinical status). This almost similar the results of another study in Italy where 71%, 50% and 50% of participants highlighted viral load, HBe antigen status and ALT level respectively as indicator of referral of patients with hepatitis B and C to specialists.

The majority agreed with almost all statements as reasons of not reaching specialized care for patients with HBV and HCV except with "Patients are referred to the specialist but refuse further investigation or treatment", which the majority 61% disagree. The parentages of those who agree with other statements range from 61% to 92.7% of all participants. Another study on HVC revealed that only one-half of HCV-infected patients are referred to a specialist for evaluation and management and for patients with normal liver tests, the likelihood of referral is below 30% (23). In the study done in Burkina Faso approximately one-quarter of participants (8/30) were linked to care for hepatic assessment (24). Moreover, lack of trained medical personnel was reported as one of the barriers.

Challenges to the treatment's hepatitis B/C

As per the table 12 all statements were agreed by the majority of participants as challenges of the treatment of HBV and HCV in their clinical setting, the percentages range from 65.8% to 87.5%. Another study in Nigeria on chronic hepatitis B reported the same challenges (8). In their study Morrill JA et al. reported that obstacles to treatment of HCV exist at the level of patients, providers, and the system as a whole (25). At the patient level, lack of awareness, fear of side effects, poor adherence and comorbid conditions may prevent treatment. For providers, limited knowledge, lack of availability and communication difficulties (delayed referrals). At the government and payer level, a lack of promotion, surveillance and funding may interfere, high cost of HCV treatment (23). Furthermore, participants suggested staff training about HBV and HCV treatment, supply of diagnostic materials, decentralization of treatment, awareness campaign on HBV and HCV, reduction cost of Treatment and Increase number of health care providers.

Conclusion

The study concludes that the majority of participants see few patients per year. Screening of risk groups of HBV and HCV were not a routine practice. HBeAg and/or anti-HBe I and

ALT were the tests mostly used in the initial evaluation of patient with HBV and HCV, tests were unfrequently used.

General practitioners and nurses/midwives were reported as health care providers who offer diseases related counselling. However, all important topics were not always included in counselling. From all drugs on WHO essential lists for HVB and HCV, two drugs Lamivudine and Tenofovir were most used for HBV however health care providers in Ruli District Hospital were not sure about the treatment of HCV.

Barriers to reach specialized care for HBV and HCV exist, the following were found: Time constraints affect health care professionals ability to provide patients with disease-related counselling and referral advice, Some health care services are not reimbursed for providing disease-related counselling and referral advice to patients, the antiviral treatment itself is generally not covered under the general health care service/insurance scheme in my country, Newly diagnosed patients generally do not receive comprehensive counselling on the consequences of the disease, treatment options and referral, and hence do not seek specialist care; There are too few specialists to whom the patients can be referred to for specialized care, There is limited guidance available to secondary health care professionals about onward referral, counselling and patient management of hepatitis B/C patients, Although training on viral hepatitis management is available for health care providers, uptake is generally low among professionals. Furthermore numerals challenges in the treatment of HBV and HCV were found such as: “Lack of Accurate Statistics Regarding the Burden of HBV and HCV Infection”, “Public Awareness and Education (many people do not know their status regarding Hepatitis B and C as well general information on the disease process”, for “Limited knowledge of health care providers on the management of viral hepatitis B/C”, “Shortage of health care providers”, “High cost of laboratory and diagnostic equipment”, “High cost of treatment regimens for hepatitis B/C”, “Side effects and difficult follow up of patient on treatment”, “Co-infection of both hepatitis B and C or HIV/AIDS”, and “Stigmatization of people who tested positive to HBV and/or HCV”.

With reference to findings of this study I can recommend Ruli District Hospital to prepare continuous professional training on the treatment of HBV and HCV for all staff who are involved in the treatment of these viral hepatitis, the Ministry of Health in Rwanda should raise awareness on existing guidelines regarding HBV and HCV treatment and encourage their implementation among health care providers. Finally, it is highly recommended that additional studies be conducted in all Rwandan district hospitals to compare findings and provide additional information as well as a general aspect about the treatment of HBV and HCV countrywide.

Declaration

I, Patrick Munezero, hereby declare that this work is original and the result is from my own effort. It has never on any previous occasion been submitted in part or whole to any Institution for publication

Also, I do declare that an inclusive list of references is provided indicating all the sources of information quoted or cited.

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