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The implications of the COVID-19 pandemic on hepatitis B and C elimination programs in Egypt: current situation and future perspective

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Abstract

Hepatitis B virus (HBV) and hepatitis C virus (HCV) are amongst the most common causative agents of viral hepatitis with its severe complications, including liver cirrhosis, decompensation, and hepatocellular carcinoma (HCC). Elimination of viral hepatitis, a significant challenge, has become an adopted global goal with certainly designed targets set by the World Health Assembly to be met by 2030. While many countries, including Egypt, have started executive plans for viral hepatitis elimination and achieved remarkable progress, the emergence of the COVID-19 pandemic has markedly affected all the machinery of the healthcare systems and specifically laid countries off their track in their viral hepatitis elimination process. The pandemic disrupted most healthcare services, and health staff and hospital resources were recruited mainly for managing the crisis, which significantly negatively impacted the management of other less severe diseases, including viral hepatitis. Social distancing and restrictive measures applied by most countries to contain the pandemic have affected medical services offered to patients with hepatitis. All supply chains of medications and vaccinations concerned with treating and preventing viral hepatitis have been markedly compromised. Many efforts and strategies are required to combat the severe and deleterious implications of the pandemic on the management of viral hepatitis worldwide in an attempt to get the situation under control and resume the pathway towards viral hepatitis elimination.

Keywords COVID-19, Viral hepatitis, HBV, HCV, Elimination, Impact

Introduction

COVID-19 and its impact on healthcare management and different programs

After the emergence of the COVID-19 disease caused

by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), it was announced as a pandemic by the World Health Organization (WHO) in March 2020 [1]. The pandemic provoked many severe challenges for health care systems, including inadequate capacity, shortages of supplies, the need for care triaging, and financial loss. Healthcare utilization has decreased by about a third during the pandemic, with more significant reductions among patients with illnesses with lower severity [2].

Not only did the COVID-19 pandemic contribute directly to morbidity and mortality, but it also caused indirect effects on healthcare for other diseases, called collateral damage. Since the start of the pandemic, strict

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measures were adopted by different health systems in order to prevent disease transmission and be well-prepared for the surge of COVID-19 patients. Most of the elective medical procedures, as well as consultations and routine diagnostic evaluations, were re-arranged and delayed to set the care of patients with COVID-19 as a top priority and to control the risk of contamination at the hospital. This aimed to preserve health staff and hospital resources, making them more available to manage the crisis [3].

As the COVID-19 pandemic continues, considerable reductions in medical services were witnessed, along with selective increases toward establishing telemedicine [4]. Many people missed vaccination appointments, and life-extending interventions for cancer have been postponed [5, 6]. A survey by the WHO found that lower-income countries were the most commonly affected by the pandemic [7]. There are also estimates that essential maternal and child health interventions were markedly affected, with more than a million additional child deaths anticipated [8]. Concurrently, the pandemic may also have resulted in some people being spared unnecessary or inappropriate care [9].

Significant barriers to diagnosis, management, and follow-up of chronic diseases have emerged. The regular and routine integrated care for chronic patients was disrupted due to the lockdown and sealing of healthcare facilities, lack of transportation, or reductions in services, in addition to directing all hospital resources and health system services in most countries to confront the pandemic [10]. According to a survey implemented by Chudasama et al., diabetes (38%) was the condition reported to be most impacted by the reduction in healthcare resources due to COVID-19, followed by chronic obstructive pulmonary disease (COPD, 9%), hypertension (8%), heart disease (7%), asthma (7%), cancer (6%), and depression (6%). Additionally, the two most common co-occurring chronic diseases for which care was impacted by COVID-19 were estimated to be diabetes and hypertension (30%), diabetes and COPD (13%), heart failure, and COPD (8%) [11]. Moreover, 80% of health care professionals reported that the mental health of their patients deteriorated during COVID-19. According to a systematic review, the COVID-19 pandemic has led to a significant reduction in the rate of admissions for acute cardiovascular diseases, a decrease in the number of procedures, shortened lengths of stay at the hospital, and longer delays between the onset of the symptoms and hospital treatment [12].

Remarkably, the COVID-19 pandemic disrupted cancer services, especially in low-resource settings. Cancer programs, including prevention, screening, diagnosis, treatment, and research, were wholly impaired during

the pandemic with dramatic affection of patients' clinical conditions and outcomes [13]. Regarding infectious diseases, measures implemented to fight the COVID-19 pandemic have strongly affected other programs directed against various infectious diseases. The disruption of drug and equipment supply chains, the interruption of treatments, and the impaired detection of new cases resulted in excess morbidity and mortality linked to many other diseases, including HIV, malaria, and tuberculosis [14].

As regards viral hepatitis, management has been markedly affected by the pandemic. It is well documented that control of hepatitis B virus (HBV) and hepatitis C virus (HCV) are the most challenging aspects of viral hepatitis elimination. Regrettably, social distancing rules and COVID-19-related anxieties have negatively affected access to treatment and screening. This resembled a threat to deviate most countries off course in their elimination efforts [15].

Egyptian efforts in hepatitis C and hepatitis B management and prevention

Controlling viral hepatitis was one of the Sustainable Development Goals adopted by the United Nations General Assembly in 2015 [16]. Consequently, the World Health Assembly set targets for eliminating viral hepatitis [17], including reaching 90% diagnosis and 80% treatment coverage by 2030 [18]. When these targets were set, Egypt had the highest prevalence of HCV infection, with most infections being genotype 4 [19, 20]. The Egyptian efforts to eliminate the disease from the country started early with the previous HCV treatment (pegylated interferon and ribavirin) [21].

With the introduction of effective direct-acting antiviral drugs (DAAs) in 2014 to treat HCV infection, more than 4 million patients (40% of the whole HCV-infected patients) were treated till 2018 with cure rates above 90%. With the outstanding efforts of the National Committee for Control of Viral Hepatitis (NCCVH), the Egyptian Ministry of Health and Population (MOHP) set a national strategy making treatment paid for by the Egyptian government and available to all people. At that time, the only obstacle was that most infected individuals remained unidentified [22].

Identifying and treating all HCV-infected patients is considered a significant step toward eradication, especially in a country with the highest global prevalence of the disease like Egypt. Accordingly, in early 2018, the Egyptian government decided to exert a massive effort to achieve disease eradication over the shortest time possible. Consequently, an inspiring nationwide HCV screening and treatment program was implemented through a substantial presidential campaign (100 million healthy

lives). About 50 million persons over 7 months were screened for the disease, of which 2.2 million HCV-seropositive persons were diagnosed and referred for evaluation and treatment [23].

Two months before launching the screening program, a team of physicians, nurses, and data entry personnel were adequately trained to ensure the optimum medical service. The country was divided into three screening phases, each to be screened over 2 or 3 months. The screening was expanded to take place in all Ministry of Health hospitals; all primary and rural health units; Egyptian Health Insurance Organization–managed clinics, university hospitals, military and police hospitals; and all youth centers in all screened areas. Mobile screening teams in special vehicles visiting crowded areas on special occasions, including mosques, churches, and soccer stadiums, established augmentation of the screening efforts. Despite being voluntary, participation was encouraged through massive widespread media campaigns using television advertisements with the participation of famous movie stars and newspaper advertisements. In each screening phase, millions of text messages were sent to cell phones. Continuous political support from the Egyptian presidency ensured the availability of all necessary resources [23].

Seropositive patients were scheduled electronically for the closest date and referred to the nearest center for clinical evaluation by abdominal ultrasonography, and also blood was drawn for HCV RNA and liver-function tests. Treatment was prescribed for those with viremia with DAAs with or without ribavirin for 12 or 24 weeks. About 381,491 of those with a known outcome had a sustained virological response (SVR). Patients with viremia who did not show up for treatment were reached by phone, ensuring that many would be or were receiving treatment in the private sector. After treating patients diagnosed in this campaign, Egypt had the potential to be the first country with a considerable HCV burden to meet elimination targets set by the World Health Assembly. According to a WHO report, Egypt succeeded in treating about 94.2% of persons with chronic HCV infection [23, 24].

In addition to the previously mentioned efforts in managing HCV, the Egyptian government also cares for the management and prevention of HBV. In the early 1980s, HBsAg demonstrated a high prevalence, identified in 10.1% of the Egyptian population [25]. Since the hepatitis B vaccine is considered the cornerstone in hepatitis B prevention; in 1992, the WHO recommended the implementation of universal childhood vaccination, and by the end of 2012, 181 countries had adopted this measure, Egypt being one of them by the introduction of HBV vaccine in the Egyptian compulsory list of vaccination

[26]. Since this HBV immunization program for infants in Egypt was commenced in 1992 with a schedule of 2, 4, and 6 months of age, the HBV prevalence rate has declined [27]. A meta-analysis covering the period before and after the vaccination era (1980–2007) reported a 6.7% prevalence of HBsAg among the general population in Egypt (a lower rate than that in the 1980s) [28]. Several years later, in 2015, a cross-sectional analysis conducted by the Egypt Health Issues Survey estimated the HBV infection rate among Egyptians aged 15–59 to be 1.4% [29]. The complete vaccination series induces protective antibody levels in more than 95% of infants, children, and young adults [30]. The Egyptian national HBV vaccination offers adequate protection for 1 to 16 years following vaccination. Successful implementation of universal vaccination policies in Egypt with a reasonable coverage rate, along with the general improvement in infection control measures and blood donation, could help minimize the hepatitis B disease burden [31].

The COVID-19 situation in Egypt

Until mid-October 2022, a total of 515,388 infections and 24,797 coronavirus-related deaths have been reported in Egypt since the pandemic began [32].

The Egyptian government implemented a nationwide lockdown and social distancing measures to control the spread of COVID-19 starting in March 2020. The highest levels of the central government were responsible for executing the country's policy and institutional response, which was coordinated through the Higher Committee to Combat Coronavirus chaired by the prime minister. The government rapidly launched an online portal through the Crisis Management Unit within the Cabinet's Information and Decision Support Center, which publishes and communicates various COVID-19-related information to the public through various media channels. The MOHP has played a crucial role in overseeing the government's ongoing health response, releasing daily briefings on total confirmed cases, recoveries, and death rates across the country. Other state organizations, including the armed forces and state enterprises, have been mobilized to support the government's response to the crisis [33].

The COVID-19 pandemic has significantly affected healthcare machinery worldwide. While most infected people may be asymptomatic, they transmit the infection. Consequently, primary prevention at the community level is inherently a problematic task, deviating the attention towards vaccinating people to eradicate the disease. COVID-19 vaccines may stimulate the immune system to produce protective antibodies to protect people from getting infected or developing severe clinical manifestations [34]. Such antibodies adhere to the spike protein of the

virus preventing its access to the cells [35]. The Egyptian government exerted considerable efforts to make COVID vaccines available at no cost to all citizens, and vaccination programs started in March 2021. An electronic system was designed to register on the vaccination site, and then, everyone received a message with the closest date and center to go for his first vaccination dose, followed by another date for the second dose. Egypt has administered at least 82,828,973 doses of COVID vaccines so far. Assuming every person needs two doses, that is enough to have vaccinated about 41.3% of the country's population [36].

Impact of COVID-19 on viral hepatitis elimination worldwide

The COVID-19 pandemic has driven profound implications which have directly affected management strategies for different diseases. Namely, the anxiety rising from being exposed to COVID-19 in a healthcare facility, disruption in access to care, and the driven global attention to the containment of the pandemic have all significantly affected the long-term plans against various diseases [37]. A clear and crucial example is how the pandemic could impact the WHO viral hepatitis elimination strategy set to be met worldwide in 2030 [17].

Impact of COVID-19 on HBV elimination worldwide

Impact of COVID-19 pandemic on global HBV vaccination

The highest burden of HBV lies in sub-Saharan Africa and the Asia Pacific region, with over three fourth of this global burden concentrated in only twenty countries worldwide [38, 39]. HBV vaccination has a crucial role in controlling the disease, clearly manifested when childhood vaccination campaigns prevented 310 million new infections during the last 30 years [38]. Tremendous efforts and plans were continued to achieve the goal of disease elimination by 2030 until the emergence of the COVID-19 pandemic, which negatively affected more than 90% of viral hepatitis services [40].

Some reports estimated that overall global vaccination coverage levels in 2020 have declined sharply compared to coverage levels in the 1990s [41]. Additionally, childhood vaccination programs in the USA were significantly affected by the disruption of the number of doses and order of doses after the national emergency declaration in March 2020 [42]. As a result of the global drop in HBV immunization coverage, a marked increase in HBV incidence in infancy and early childhood was noted, resembling an ongoing source of disease transmission, further delaying plans for disease elimination. HBV vaccination administration was further complicated by difficulties in the chain of vaccine supply as well as the rising incidence

of home birth affecting the administration of the birth dose of the vaccine [43].

Impact of COVID-19 pandemic on HBV disease transmission

Data about the impact of the COVID-19 pandemic on HBV transmission is sparse and contradicting. Despite the effect of restrictive measures and social distancing applied in order to control the pandemic, which directly decreased physical contact and so disease transmission, the same measures have contributed to the spread of risk behaviors, including drug abuse and unprotected sex with decreased antiviral availability; all of which might have resulted in increased transmission [44]. In addition, the limited availability of harm reduction services and opioid substitution therapies directly affected and facilitated the transmission of all blood-borne diseases, including HBV [45]. Regarding vertical transmission, it has been facilitated by the limited antenatal care services and increased home births. The pandemic significantly compromised interventions to limit mother-to-child transmission, including the availability of antivirals, hepatitis B immunoglobulin, and birth doses of vaccine, which created a significant threat to an individual generation who will probably acquire chronic infection due to such early exposure. This generation will continue to spread infection and focus on disease transmission [44].

Impact of COVID-19 pandemic on the diagnostic process of HBV infection

The COVID-19 pandemic has shifted the global attention and health care plans towards control of the pandemic mainly and sometimes only. This has significantly affected the diagnostic and management strategies for many other serious diseases, including viral hepatitis. It was estimated that only around 1% of cases suffering from viral hepatitis were successfully diagnosed in Africa even before the emergence of the pandemic, though the pandemic has further set boundaries in disease identification [43]. This has directly affected the mechanics of disease control and proper management. Most of the available resources were directed toward controlling the pandemic, which directly jeopardized programs for HBV screening and management [45]. Many countries worldwide have experienced a marked decline in HBV-infected patients who attended outpatient clinics, reaching a 95% decline in some countries due to patients' caution to visit any health care facility [39]. The shortage of supplies, including diagnostic reagents and tests concerned with HBV diagnosis, has directly influenced disease diagnosis [39]. HBV DNA tests to diagnose active viral hepatitis were disrupted because laboratories diverted PCR tests for COVID-19 detection. In addition, the routine laboratory monitoring of chronic HBV patients, including

measurement of liver enzymes, was also affected as laboratories prioritized labs for patients with COVID-19. Some countries also suffered from a shortage in vaccines and diagnostic kit supplies due to the restrictions on shipment and traveling during the pandemic [46].

Impact of COVID-19 pandemic on access to HBV treatment

Despite the clear indication of HBV treatment initiation regardless of pandemic status recommended in most guidelines, the pandemic has markedly affected such a process in many ways [47]. The re-allocation of human resources, redirected finances, shutdown of many healthcare facilities, supply chain limitations, social distancing, and fear of attending any healthcare facility all have contributed to limited access to disease management [43]. Further, in many countries, some hepatology wards were converted to wards for COVID-19 management, disrupting the services delivered for patients with HBV and probably affecting the care of patients with HBV-associated hepatocellular carcinoma (HCC) and decompensated liver disease. In a country like Italy, drug initiation was delayed in 23% of centers [48]. In others, marked affection for patients' access to their medication was reported by more than 50% of health care workers (HCWs) [40]. Again, disrupting the supply chain of antiviral therapies has added difficulties in accessing treatment [43]. All the previous limitations to treatment access had severe complications, including disease flare and the emergence of drug resistance.

Another challenge HBV-infected patients face is the risk of reactivation of dormant infection following initiation of immunosuppressive treatment, including tocilizumab and steroids used in COVID-19 management. Despite short courses of antiviral to lower this risk, the limited availability of these drugs and the affection of health care services during the pandemic made it quite difficult [47].

Impact of COVID-19 on HCV elimination worldwide

HCV infection is considered a global health problem being a direct causative agent of viral hepatitis with complications related to liver fibrosis and cirrhosis [49]. Like HBV infection, the COVID-19 pandemic also resulted in significant disruption in the process concerned with managing the HCV disease burden [50]. It is worth mentioning that some countries, including high-income regions, reported a reduction in HCV treatment initiation even before the emergence of the COVID-19 pandemic. For example, a 35% reduction in the number of patients who started HCV treatment was documented in Italy in 2019 compared to the year before, which put a substantial national burden on the government to enforce specific management strategies [51]. Further,

the emergence of the COVID-19 pandemic has caused a > 80% reduction in treatment initiation compared to 2019, exacerbating the already overwhelmed national efforts for hepatitis elimination. Other countries, including Japan and Singapore, reported a significant reduction in hepatology follow-up visits and HCC surveillance [52]. Hospital admissions to manage HCV liver-related complications were markedly affected and compromised during the pandemic [53]. A study by Blach et al. postulated that the impact of the COVID-19 pandemic on the machinery of care for HCV patients will result in a substantial increase in HCC and death worldwide by 2030. They projected that globally a 1-year delay in the HCV cascade of care programs caused by the COVID-19 pandemic could contribute to 906,000 missed HCV diagnoses and 746,000 patients never receiving HCV treatment by 2030. They also assumed that if actions were not implemented to counter such losses, 623,000 new infections, 44,800 additional HCC cases, and 72,200 deaths due to HCV would occur by 2030 [50].

In countries like China and the USA, a significant decrease in the patient's testing of HCV RNA during and after treatment and a reduction in follow-up visits during the pandemic were reported. A reduction in treatment completion rate from >92 to 75% in the USA was also noted, which reflected non-compliance to treatment due to the pandemic-related stress. Measures related to lockdown and fear of COVID-19 exposure have markedly influenced the evaluation of treatment response [54]. A country like Sweden, where lockdown measures were less conservative in 2020, had experienced a 10–45% reduction in monthly new diagnoses. Impact also affected harm reduction measures and treatment programs, complicating the country's capability to achieve the incidence part of the elimination target [55]. A much more significant impact was observed in Iraq, where the rate of HCV screening dropped from more than 9000 subjects per month to zero during the social distancing and lockdown period caused by the COVID-19 pandemic reflecting the massive impact of the pandemic [56].

On the other hand, the role of telemedicine in enforcing compliance to treatment has been illustrated as it could help patients avoid exposure to COVID-19, reduce the cost of transportation, and limit waiting time, which might in part contribute to the declining number of outpatient visits [57]. However, access to telemedicine may be limited in low socioeconomic countries where access to telemedicine devices is not always readily available [54].

From another perspective, social awareness about viral hepatitis modes of transmission and manifestations, screening and diagnosis, management, and follow-up was dramatically affected by the lockdown and conservative

measures applied to contain the pandemic alleviating its precious role in HCV elimination programs [58].

A program like the NoHep program, which facilitates voluntary activities to combat viral hepatitis, was also affected, resulting in a declined HCV diagnosis rate [59].

According to the pandemic's severity and countries' national response, the pandemic's impact on testing and treatment of HCV may be different across countries [54].

The Egyptian experience

Impact of COVID-19 pandemic on HCV treatment program

Even though the significant and remarkable success accomplished by the Egyptian MOHP by launching the most extensive national mass HCV screening campaign worldwide, the rapid "cross-continental" spread of the COVID-19 pandemic caused a massive burden on healthcare facilities, including facilities concerned with screening and treatment of HCV [60]. The global response to the first waves of the pandemic was non-satisfactory, leading to serious medical, social, and economic constraints. Egypt's first community-based preventive measure was taken on March 14. Scaling up the non-pharmaceutical preventive measures reaching up to partial lockdown was done in correlation with the incidence rate. Egypt made escalated actions starting with health awareness campaigns followed by school closure and ban of social gatherings, then a partial lockdown by the end of March 2020 [61].

As part of the national response to COVID-19, MOHP temporarily held HCV field-work screening programs (adults, adolescents, antenatal) for 1 month (April 2020). Screening programs for in-ward patients and blood donors did not stop during the pandemic. Additionally, NCCVH adopted the governmental reduction of the workforce after taking all needed preventive precautions, including social distancing, wearing masks, and using a scheduled reservation system and phone call consultations whenever possible. During April 2020, the total number of visits dropped from 11926 to 6192, reducing the active workforce from 2553 to 1923, and most treatment centers (73%) worked for only 3 h instead of 9 h at regular times. That ensured the continuity of the HCV treatment process in these challenging times.

The COVID-19 shadow over HCV and HCC-related mortality reduction efforts

In September 2019, MOHP launched a national surveillance program for HCC patients with liver cirrhosis. All patients with a FIB-4 > 3.25 are offered a free visit every 4 months where abdominal ultrasonography (U/S) and alpha-fetoprotein test are used to screen for HCC. If needed, suspected cases are referred to specialized centers for dynamic imaging studies and treatment.

Unfortunately, patients with chronic illnesses who need regular follow-up are highly susceptible to a poor outcome due to the disruption of healthcare facilities due to the COVID-19 crisis. Studies showed higher morbidity rates among patients with liver cirrhosis during the COVID-19 pandemic [62, 63]. Therefore, the position paper made by the European Association for the Study of Liver and the European Society of Clinical Microbiology and Infectious Diseases recommended the delay of HCC surveillance services during the pandemic's peak [64]. In response to the country's action against COVID-19, the surveillance program was temporarily held in April 2020 and resumed with the same precautions done in the HCV treatment program. The patients who did follow-up visits declined significantly by 73.1% compared to the pre-COVID-19 era.

Another factor that may negatively impact the Egyptian efforts towards reducing the liver disease mortality is the closure of some tertiary centers for managing liver diseases and transforming these centers to COVID-19 quarantine hospitals.

HBV vaccine

Following the introduction of the HBV vaccine in the Egyptian compulsory list of vaccinations, HBV incidence has markedly declined [27, 65]. According to WHO/UNICEF coverage estimates, in 2019, 95.2% of Egyptian infants received a three-dose hepatitis B vaccine, and 91.2% of newborns received an additional birth dose. During the COVID-19 pandemic, vaccination services remained operational with infection control precautions.

Blood banks

The Egyptian strategy to control viral hepatitis started at the beginning of the 1990s with the screening of blood donors [66]. During the presidential campaign, MOHP updated the screening program to cover HCV, HBV, HIV, and syphilis. Additionally, an electronic referral system was developed to ensure proper linkage to care, instant response to detected cases, and cost reduction for unnecessary retesting for viral markers in previously tested patients. These efforts remain functional even in the hard times of the COVID-19 pandemic.

Injection safety

Adopting a safe injection strategy was one of the main pillars of infection control strategies during the COVID-19 pandemic. In order to enhance the practices of safe injection, the Council of Ministers issued a decree on December 26, 2019, to obligate all ministries that have health facilities to take the necessary steps to follow the mandatory application of safe injection policies and the replacement of conventional syringes with self-destructing ones.

Additionally, MOHP provides continuous training for HCWs in line with the seven simple vital steps to prevent the risk of unsafe injection: clean workspace, hand hygiene, sterile and new syringe, and needle, with re-use prevention and/or injury protection features whenever possible, sterile vial of medication and diluent, skin disinfection, appropriate collection of sharps, and appropriate waste management.

Harm reduction

Harm reduction refers to interventions aimed at reducing the harmful effects of health behaviors without necessarily extinguishing the problematic health behaviors completely. For that purpose, the expansion of harm reduction policies aids in the reduction of the incidence of viral hepatitis [67]. In Egypt, there is a broad spectrum of harm reduction practices ranging from needle and syringe programs, opioid substitution therapies, and condom programs for people who inject drugs and their sexual partners. Unfortunately, and like many other countries, numerous limiting factors affect the access to harm reduction policies. These factors can be broadly classified as institutional (e.g., government policy), logistic (e.g., few or challenging-to-reach needle and syringe programs), and personal barriers (e.g., different injecting frequencies, different drug preferences). During the COVID-19 pandemic, PWID faced an additional challenge in linkage to standard care for COVID-19 due to stigmatization. However, all harm reduction programs remain functioning during the COVID-19 pandemic.

Future prospectives

It has been well understood how the pandemic had set boundaries and obstacles which significantly affected the global efforts and strategies in most countries, setting them back in their target of viral hepatitis elimination. However, it is never too late; executive and extensive measures must be applied and monitored without delay to catch up with the previously arranged plans. It might be advisable to encourage the utilization of telemedicine aided by patients' electronic records. Infrastructure for telemedicine should be well established and improved. It can be expanded and used to help people catch up with their follow-up visits, screening appointments, and non-emergency consultations. Campaigns can be launched to help people catch their missed vaccinations, especially high-risk groups and infants [68]. National strategies can be re-established, and interventions concerned with HCV and HBV management can be widely enforced. Screening, diagnosis, and treatment should be available through a financially supported compact system providing services through COVID-19 safe facilities enforcing the protective measures.

It is of utmost importance to establish easily manageable and flexible systemic strategies that are readily manipulated to minimize the impact of the pandemic on the machinery of treatment supply. Keeping patients' records is also crucial to ensure medical service supply continuity and facilitate communication and follow-up.

Campaigns addressing public awareness and motivating the population about the value of early diagnosis, treatment, and prevention of viral hepatitis are to be encouraged. Harm reduction practices should be encouraged and enforced. The importance of vaccination in avoiding catching viral infections with its dramatic consequences also should be highlighted.

Addressing patients' anxiety and fear of attending healthcare facilities is crucial. This could be established by communicating with and supplying safe and extra facilities with strict applications of protective measures to avoid contracting infection. Stratifying patients according to their risk of acquiring severe COVID-19 infection might help select appropriate patients for whom delivery of treatments and labs might be offered at home and facilitated by telemedicine to avoid exposure to infection.

Ensuring the proper and readily available supply chains for HCV and HBV diagnostic tests and treatments is recommended to prevent non-compliance with treatment and missing treatment doses with the consequent emergence of resistance. Attention should be paid to providing the proper antenatal care for pregnant females with chronic hepatitis with regular follow-up in safe facilities. The availability of birth vaccine doses and hepatitis B immunoglobulins should be timely supplied.

Hopefully, most of these interventions will help countries get back on track with their elimination processes and get the situation under control once again before facing new generations with new incident infections, requiring much time for management.

Conclusion

Despite the remarkable progress achieved globally in the elimination of viral hepatitis, the emergence of COVID-19 had serious and deleterious implications of the machinery of healthcare management of viral hepatitis worldwide. Further attention and more efforts are required for overcoming those obstacles and resume plans for viral hepatitis elimination.

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MEK and AE conceptualized the idea and put the design. MA, RS, and MH wrote the first draft of the article. All authors reviewed and approved the final version of the manuscript.

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