A Review on Current Challenges In Covid - 19

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Abstract- *Background The novel corona virus disease 2019 (COVID-19) was characterized as a global pandemic by the WHO on March 11th, 2020. This pandemic had major effects on the health market, the pharmaceutical sector, and was associated with considerable impacts; which may appear in short and long-term time-horizon and need identification and appropriate planning to reduce their socio-economic burden. A novel corona virus, which has been designated as severe acute respiratory syndrome corona virus 2 (SARS-CoV-2), was first detected in December 2019 in Wuhan China and causes the highly infectious disease referred to as COVID-19. COVID-19 has now spread worldwide to become a global pandemic affecting over 24 million people as of August 26th, 2020.Objectives Current short communication study assessed pharmaceutical market crisis during the COVID-19 era; discussing short- and long-term impacts of the pandemic on the pharmaceutical sector.*

This commentary aims to elaborate challenges in the regulatory approaches for accessing and investigating COVID19 potential therapies with off-label use, compassionate use, and emergency use or for clinical trials. Since no therapies have been formally approved and completely effective and safe to date, the best clinical choice is acquired only after consistent and fair communication and collaboration between licensed clinicians, researchers, regulatory authorities, manufacturers and patients. The pandemic of COVID-19 poses considerable crisis on the health markets, including the pharmaceutical sector; and identification of these effects, may guide policy-makers towards more evidence-informed planning to overcome accompanying challenges.

Keywords- COVID, Virus, Health, Challenges, pandemic

I. INTRODUCTION

The COVID-19 outbreak was characterized as a global pandemic by the world health organization (WHO) in the following months; COVID-19 rapidly spread around the globe and infected about 2.5 million people by April 23, 2020. The COVID-19 pandemic affected world economics, including the pharmaceutical sector.

While currently there is no definitive treatment for this novel infectious disease, pharmaceutical industry is assisting governments to address the COVID-19 unmet needs, from research and development actions on potential treatment strategies to balancing medicines supply chain in the time of crisis.

Along this, pharmaceutical sectors are struggling to maintain natural market flow; as the recent pandemic affects access to essential medicines at an affordable price, which is the main goal of every pharmaceutical system. Alongside of evaluation the pharmaceutical system challenges in global level, the situation analysis of this industry in developing country with premiering market, because of diversities, could highlight more impacts.

Assessment of Iran as a developing country that was extremely affected by COVID-19 disease could be a good example for demons. The rapid evolution of the COVID-19 pandemic situation initially outpaced the public and regulatory guidance response. In tandem with the much-publicised early stockpiling of household provisions, prescription renewal requests were surging early in the crisis. The other immediate challenge for community pharmacists was protecting their staff and patients from the spread of infection within the pharmacy.

Pharmacies adapted their premises to try and achieve ‘social-distancing’, installing Perspex barriers or doorway booths, restricting ration patient numbers for access and implementing delivery services for those ‘cocooning’ at home. Alongside premises changes, work practice changes also occurred, for example, closing for lunch breaks, and breaking staff into teams to avoid cross-infection and subsequent pharmacy closures.

These measures have resulted in longer wait time for patients, contributing to patient anxiety and aggression. Insufficient workplace social distancing, patient aggression and financial implications of the pandemic. Outside of their professional roles, pharmacy staff faces the same stressors as the general public during the pandemic.

Mechanism of regulatory flexibility and covid -19 guidance:

FDA and OHRP are tasked with interpreting and enforcing statutory and regulatory requirements, but they also possess substantial leeway in doing so. First, regulators sometimes may exercise enforcement discretion, deciding not to strictly enforce particular requirements, either as a general matter or on a case-by-case basis. Second, regulatory requirements may sometimes be waived.

FDA is permitted, under certain conditions, to waive investigational new drug (IND) and investigational device exemption (IDE) requirements, as well as specific IRB oversight requirements.[5]Common Rule department and agency heads also may waive some or all regulatory provisions, so long as alternative procedures are consistent with ethical principles.Third, in the face of ambiguity, both regulators and IRBs generally have interpretive flexibility, meaning they can adopt either more or less restrictive interpretation of particular requirements so long as those interpretations are reasonable.Thus far, FDA and OHRP have offered only interpretive flexibility for human subject's protection issues relevant to COVID-19 research. As discussed below, one of FDA's most helpful points of guidance in this realm addresses how to conduct the research consent process for COVID-19 patients given infection-control concerns.

In addition to guidance to assist sponsors in the clinical development of COVID-19 drugs, other components of FDA's pandemic research guidance address issues that may arise when using remote methods to monitor participants, collect data, and deliver and administer interventions

FDA has also issued guidance permitting certain modified uses of non-invasive remote monitoring devices for clinical management of patients whose care is affected by the public health response to COVID-19, which may have additional relevance for research. HHS's decision to exercise enforcement discretion for certain restrictions on tele health also may facilitate remote study activities.

OHRP has endorsed FDA's COVID-19 guidance as consistent with Common Rule requirements and drawn attention to prior guidance indicating OHRP's flexibility in disaster circumstances. OHRP's own COVID-19 guidance offers little specific detail, however, beyond clarifying which public health and clinical activities do not require IRB review.

In several key domains, regulators should offer further clarification to facilitate COVID-19 research while maintaining adequate participant protections. If they are not already doing so, IRBs should also exercise the regulatory flexibility currently.

Although the pandemic is changing rapidly, the virus remains a substantial public health threat without adequate therapeutic or prophylactic interventions, suggesting that our recommendations for flexibility will remain relevant for some time. They will also be useful in the face of future pandemics and should be considered for research more broadly.

Ethical and legal Challenges in covid-19:

Creating an ethics team with all voices at the table to develop a scarce resource allocation protocol is challenging, especially in geographically diverse health care systems, where the needs and perspectives of large urban hospitals and small rural hospitals may be very different.

During these times of great demands on health care, diverse leadership is required to provide coordination of care throughout the health care delivery system. Hospital-based clinicians working in large and small hospitals should take this opportunity to stand together for the good of all of our patients and communities, and begin immediately to work closely with ethics specialists and administration to provide this leadership. Shifting the mindset of frontline providers and the general population from a focus on the individual patient to a focus on the greater good for the larger community is the essence of this process.

If US health systems are required to grapple with rationing, as Italian hospitals and doctors have been forced to do, is societal backlash inevitable?Only time will tell, but questions will certainly arise about appropriate allocation of limited lifesaving equipment, fluctuating evidence about disease-modifying medications, off-license medication use, postponement of semi-elective surgeries (e.g., cancer surgery), patient movement limitations, restricted visitor policies, and lack of clarity about use, supply, and effectiveness of PPE. All of that complexity should not stop us from planning.

The AMA code of ethics advises, "Because of their commitment to care for the sick and injured, individual physicians have an obligation to provide urgent medical care during disasters. This obligation holds even in the face of greater than usual risks to physicians' own safety health, or life.

The ability of health systems to support providers with practical tools such as clinical education, specialist consultation, and adequate PPE will be part of this story. Ethical support, with fair allocation of scarce resources and support for frontline staff experiencing moral distress as a result of the crisis, will also contribute. In the end, if history is any guide, most clinicians will choose to stay following the heroic example established through history and today.

Regulatory challenges in Pharmacy profession in India during covid-19:

Regulatory challenges this segment suffers from the problem of information asymmetry across the different layers of regulatory and enforcement mechanisms. There is a large variance in the quality of drug regulation across states in the country, since each state having their own regulations.

Drug inspectors of India who are the key players in drug regulations should be made highly qualified and be well paid to bring about the dignity associated with the huge responsibility. There is a budget constraint with the department for implementation of advanced methods of monitoring the regulations.

Pharma industry-future challenges:

There is a huge expectation, price pressure and carefulness in monitoring of vaccine development, especially (COVAX in) for treatment of COVID-19, which are still under the Phase I and II clinical trials in India. There may be a chance of unsatisfactory results occur in Phase III trial, whereas many countries faced the issue on Phase III trial, which resulted failure in vaccine development and outcome .

Nowadays there are emerging challenges in the management of process controls during a formulation of pharmaceuticals is the formation of impurities, which are in the form of geno-toxic and carcinogenic that are highly toxic and harmful for the patients who were taking medication for the management of diabetes, gastric ulcer and psychosis .

There is also a compensation challenge for the loss of Fixed Dose Combination (FDC) drugs in India, since many of the drugs around 344 under this category were banned and withdrawn due to, they are therapeutically irrational and produced toxicity to the patients for treatment of chronic diseases like tuberculosis and HIV. So there are still expectations of producing FDCs, into the market for patient beneficence with assurance in the safety and efficacy .

The quality of research, drug discovery and development are suboptimal if the money investment is not strengthened.

Initiative by the government:

PLI Scheme is open for four months from June 2, 2020 will allow investors to propose the establishment of Greenfield facilities for any of the 53 key drug intermediates and bulk drugs that are hardly manufactured in India today . The list like paracetamol, aspirin, metformin

Current regulatory approaches for accessing COVID-19 therapies:

There are several regulatory approaches for accessing potential therapies in COVID-19 and they can be classified as clinical trials, compassionate use, emergency use and off-label use The European Medicines Agency (EMA), even in this pandemic crisis, remained neutral by leaving within the remit of national regulatory authorities to launch their pragmatic regulatory pathways. Even though the EMA provided scientific advice for national regulatory agencies and manufacturers many countries in Europe launched different regulatory approaches and protocols for accessing potential medicines. Moreover, the dosing regimen in the protocols even for off-label use is not the same between countries, not to mention other programs.

Under ideal conditions, the off-label program would constitute in the creation of a target patient population, informed consent and track and follow-up reports. Still, prescribing an already approved medicine either for an indication, a dose or a way that is not approved for COVID-19 seems to be very challenging for clinicians. Therefore, under the COVID-19 emergency conditions, it is hard to believe that the off-label use.

Would result to be the best approach for accessing potential medicines, considering the ongoing regulatory debates and the difficulties in assessing risk benefit for each patient due to the pressurized and stressful situation.

On the other hand, the idea for approving the emergency use relies not just in the emergency circumstances but also in providing legal protection for healthcare professionals and manufacturers for eventual adverse events and medication errors that the potential medicine may cause, as well as prescribing and dispensing a donated medicine free of charge within the framework of the hospital, and not obtaining informed consent for patients while tracking and reporting the treatment's outcomes. Having regard to the fact that the manufacturer Gilead was called from the licensed clinicians to provide Remdesivir to hospitalized COVID-19 patients under the compassionate use, since 25th January 2020, and based on the methodological issues found at Grain et al.'s paper , it remains doubtful whether Gilead or regulatory authorities were not vulnerable toward this program.

Even though the regulatory authorities usually approve most of the compassionate use requests when meeting the criteria, the key player in this program is the manufacturer, who is not legally obliged to provide the medicine to patients and is usually reluctant due to several factors:

(1) the outcomes of the compassionate program are not considered as an evidence for approval;
(2) they may have limited quantities of the potential medicine already involved in clinical trials
(3) they may think they will be prejudiced if the medicine is proven to be ineffective and unsafe;
(4) they want to bypass the regulatory requirements to provide follow-up information;

And the reimbursements issues in some countries.

According to regulatory authorities, the golden criterion for accessing and investigating potential medicines are clinical trials.

The speed and volume of various clinical trials like Discovery, Recovery, Anger, Solidarity, New York Trial, characterized with different study designs, experimental arms, outcome measures, eligibility criteria and hypothesis emphasize the urge to produce significant safety and efficacy data in the middle of this pandemic crisis .

The golden criterion for the elucidation of the safety and efficacy profile of the potential therapies in COVID-19 do not rely just on the pursuit of randomized clinical studies under an ideal sample size and power, but one should analyse carefully and considerate the other aspects of the study design (e.g., study duration and masking), eligibility criteria (enrolling participants with similar characteristics) and clinically meaningful end point.

The challenges of COVID-19 for community pharmacists and opportunities for the future:

The COVID-19 pandemic is placing extraordinary and sustained demands on health systems and providers of essential community services.

The media focus on the number of cases, intensive care unit capacity and ventilator numbers reflect the national single-issue public health response warranted by the coronavirus threat. However, pre-existing community care needs persist, and medical and pharmacy practitioners have had to adapt and adopt professional role changes amidst dynamic healthcare system architecture, all on top of already scarce resources.

Community pharmacists have been designated an essential service and must, where possible; remain open during the pandemic to provide for the pharmaceutical care needs of the population. Their practice has had to adapt significantly, but the pandemic has also focused attention on the case for long-awaited professional role evolution. The rapid evolution of the COVID-19 pandemic situation initially outpaced the public and regulatory guidance response.

In tandem with the much-publicised early stockpiling of household provisions, prescription renewal requests were surging early in the crisis. The other immediate challenge for community pharmacists was protecting their staff and patients from the spread of infection within the pharmacy.Pharmacies adapted their premises to try and achieve ‘social-distancing’, installing Perspex barriers or doorway booths, restricting patient numbers for access and implementing delivery services for those ‘cocooning’ at home.

Alongside premises changes, work practice changes also occurred, for example, closing for lunch breaks, and breaking staff into teams to avoid cross-infection and subsequent pharmacy closures. These measures have resulted in longer wait time for patients, contributing to patient anxiety and aggression. Heightened anxiety and stress levels among pharmacists have also been highlighted recently by the pharmacy regulator due to increased workloads, the threat of infection due to insufficient workplace social distancing, patient aggression and financial implications of the pandemic. Outside of their professional roles, pharmacy staff faces the same stressors as the general public during the pandemic.
Lack of childcare, risk of infecting loved ones and other personal worries persist.

Normal adaptive coping strategies such as social connections, exercises and leisure time are severely restricted during the pandemic. There is a consequent risk of increased workplace-related stress and burnout under this perfect storm for healthcare workers. Additional to pharmacy staff, several of their vulnerable patient groups, those most in need of continuity of care, are facing additional risk associated with the COVID-19 pandemic.

Older people, under instruction to ‘cocoon’, are reliant on delivery services and may lose out on opportunities to discuss medication-related problems. Pharmacists must also now balance the risks of increasing supply to monthly amounts with the need to avoid non-essential pharmacy visits. The crisis has also created unique challenges for all patients.
Such as social distancing and self-isolation requirements, loss of employment and decreased access to healthcare services act as barriers to medication adherence. Workarounds have,

however, been created to address these service-level challenges.

Virtual and telephone consultations have become commonplace, particularly to vulnerable patients. Pharmacists have implemented systems to dispense medications in advance of need to minimise wait times and duplicate visits. In case-by-case examples such as in palliative care, and for vulnerable patients, there has been anticipatory management of medication-related needs.

All of these actions have the intention of reducing non-essential medical and pharmacy visits, maintaining continuity of care and facilitating social distancing where possible.

Dissecting the impact of COVID19 on pharmaceutical regulatory practices:

The pharmaceutical industry and regulatory agencies have collaborated closely during the pandemic to rapidly develop and deliver diagnostic tests, treatments and vaccines at breakneck speeds.

The industry has proven its capacity to deliver during crises, as newly adopted processes have resulted in the upending of the traditional clinical trials process. While vaccines continue to roll out, the pharmaceutical industry and regulators will react on what will realistically return to the status quo post-pandemic and what will be ripe for long-term change regarding regulatory compliance activities – particularly in three key areas: clinical trial study design, clinical trial study development and post-clinical trial regulatory submissions.

Designing clinical trials in a pandemic-impacted world

COVID-19 was a catalyst for digital transformation initiatives throughout many areas of the pharmaceutical industry, but most undeniably within the clinical development realm. As COVID19 and non-COVID-19 related drugs and treatments continue to be developed amidst the pandemic and the demand for faster clinical development increases, there have been many traditional practices that have had to be adapted, such as adoption of a more decentralised approach to collecting patient information and rapid access to regulators to assess development plans and changes to ongoing studies.

One example of this is that pre-investigational new drug (IND) meetings with the US Food and Drug Administration (FDA) have been granted in less than 30 days, with some edibility around the non-clinical information to be included to accelerate their view and start of studies.

In addition, the industry saw a move from local to centralised site approvals. Previously, a species proposed clinical trial site would have to receive a local.

A new frontier of post-clinical trial regulatory submissions:

As the need for accelerated development of COVID-19 treatments became increasingly dire, the FDA began granting Emergency Use Authorizations (EUAs) for COVID-19 treatments. As a result, regulators were tasked with the challenge of implementing more efficient processes to speed up the overall drug development cycle.

Pharmaceutical companies are keen to and ways to maintain new synergies with regulators fostered during the pandemic in the long term. Moreover, the FDA has issued 74 new COVID-species guidance documents since March 2020 and is expected to issue more as the pandemic continues to unfold.

To keep up with new and changing regulations as well as maintain new efficiencies, they are doubling down on digital transformation begun before the pandemic.

Companies are looking to regulatory information management (RIM) technology to help expedite the more tedious, repetitive regulatory reporting tasks with automation enabling tools using critical intelligence (AI) and machine learning (ML). Increased cross functional integration is also becoming more oaf focal point.

Traditionally, expert regulatory groups within pharmaceutical companies have been deeply internalised and soloed from other functional areas in the company; however, the past 12 months have put a palpable amount of pressure on them to integrate operations and collaborate more with other teams.

On the road ahead, regulatory teams will embrace increased outsourcing and leverage external resources to drive efficiencies in regulatory information management. This will help teams handle diverse and complex sets of country-specie regulations.

Adopting more cloud-based technology also allows teams to work remotely with greater connectivity, collaboration and edibility, thus minimising the impact on operations ofCOVID-19-related restrictions, such as

workplace capacity restrictions. These kinds of approaches will allow regulatory teams to reduce time spent on.

Challenges facing the pharmaceutical industry in 2021:

The pharmaceutical industry has certainly had its challenges in the past year. The global pandemic created an unprecedented demand for vaccines, shut down many clinical trials and resulted in a global PPE shortage. And now, almost midway through 2021, the industry is still scrambling to catch up.

Although pharmaceutical companies have developed and begun to roll out a range of vaccines, this new phase doesn't mean anything is settling down in the industry. Rather, 2021 has delivered its own set of challenges

Challenge 1 – Limited clinical trials during the pandemic:

For pharmaceutical companies running clinical trials for anything other than COVID-19 vaccines, the pandemic caused huge interruptions. For some more fortunate businesses, the impact was only temporary, and trials have since restarted. Unfortunately, however, thousands of trials worldwide have had to be postponed or discontinued altogether.

Because new drug approvals depend on successful trials, this has meant the loss of a staggering amount of research, drug development and money. As a result, both the industry and those who fund it have suffered financially. Companies in the pharmaceutical industry are now looking to either restart or recreate trials with less face-to-face interaction. Virtual technology that will enable study completion is available, but it comes with a cost – significantly lowering or even erasing profit margins.

Challenge 2 – The cost of innovation and fast evolution:

The demand for innovation spiked intensely in 2020, creating a huge financial impact across the entire industry. Healthcare providers and pharmaceutical developers who didn't deal directly with COVID-19 found securing government or philanthropic funding difficult. And even organisations that focused on more directly dealing with the pandemic will feel the financial strain of innovation well into 2021 and beyond.

The need to throw everything available at the crisis led to vaccines being developed much quicker than usual, but that speed came with a cost. Many pharmaceutical companies now find themselves dangerously low on working capital due to necessary spending on innovation and fast evolution.

Challenge 3 – Supply chain disruptions:

Just as with all industries, supply chain disruptions have emerged as one of the pharmaceutical industry's biggest challenges in 2021. With a heavy reliance on China for raw materials, and on India for generic drug production, the industry is now experiencing huge supply shortages. According to the US Food and Drug Administration's centre for Drug Evaluation and Research, China and India, combined account for 31% of FDA-registered facilities around the globe. And with both countries having been hit so hard by COVID-19, the supply chain worldwide is struggling.

Additionally, pharmaceutical production overall has been affected by resource issues. More specifically, however, over 50+ countries have limited or embargoed PPE exports, which has deeply impacted those companies that rely on offshore products.

Challenge 4 – Cultural focus on prevention, rather than treatment

Generally speaking, the cultural shift towards a focus on preventing, rather than curing, many diseases is great news. However, for the pharmaceutical industry, it means a serious drop in funding, both government and otherwise.

As new developments in 'lifestyle cures' such as elimination diets and increasing physical activity become commonplace, consumers are moving away from medication as the primary treatment for disease. With this trend come lower medication turnover and more roadblocks to securing desperately needed funding.

Challenge 5 – Developing new cures for presently incurable diseases

Identifying cures for presently incurable diseases such as cancer, Alzheimer's and epilepsy is a challenge that the pharmaceutical industry has always faced. Quick solutions are extremely rare, and research and development are a long game.

Here in Australia, the Morrison Government pledged $5.9 million to fund stem cell research last year. This was part of a $150 million commitment over nine years, showing just how big a drive is needed in this area. But developing new and innovative treatments requires continuous – and substantial – investment. Without it, the goal of discovering cures that work well enough to earn strict regulatory approvals will be difficult to achieve.

COVID-19 short and long-term impacts on pharmaceutical sector:

COVID-19 may be seen as a century's opportunity for pharmaceutical industry; as it increases the demand for prescription medicines, vaccines and medical devices. This can be seen as one of the main short-term effects of COVID-19 epidemic; however, there are more short and long-term implications to it; which will be discussed below.

Short term impact:

1. **Demand change,**

Which leads to shortage, in the case of induced demand and panic-buying of oral home medications especially for chronic disease may be due to the pandemic (COVID-19-related), and also shortages due to supply-chain inconsistencies.

2. **Shift of communication and promotions to remote interactions through tale-communication and tale-health:**

In both global and local levels, due to the social distancing precautions, marketing and promotions of health-care products to providers are being shifted from face-to-face towards remote interactions and tale-communications; for both promotional and patient-support acts. In USA, the number of patients who have visited physician offices or clinics reduced by 70 to 80% .

In Iran insurance coverage for tale-medicine is legislated for the first time by high council of insurance on May 2020. This may lead to long-term behavioural changes in the health market

3. Research and development changes:

In global levels, at least 113 medicines or regimens and 53 vaccines are in research and development pipelines or active clinical trials, as therapeutics for patients diagnosed with COVID-19 [12]. As of April 23, 2020, there are about 924 ongoing trials in the world for the treatment of COVID-19. Only 15% of these studies are based on conventional RCT methods, double-blind and multi centre randomized with comparator arm, but about 40% are not even randomized.

In addition, multiple clinical trials are being conducted to test non-IML-included medications; naming favipiravir and remdesivir. Favipiravir is currently being tested through three MOH-supervised clinical trials in Iran and three local manufacturers are conducting pharmacokinetic and stability analysis on aforementioned pharmaceutical strategy. Also, Remdesivir which is an antiviral in first steps of drug development is being under clinical investigation through Iran MOH-registered clinical trials.

Long-term impacts:

Approval delays, moving towards self-sufficiency in pharm-production supply chain, industry growth slow-down and possible trend changes in consumption could be seen as long-term impacts of COVID-19 on the health and pharmaceutical market.

1. **Delayed approvals for non-COVID-related pharmaceutical products;**

As all countries, including Iran, are being under pressure of the crisis and their priority is COVID19 management, approval delays may be seen due to several months of application review postponements. In Iran, due to economic crisis, IML inclusion, registrations and reimbursement decisions was being made with a considerable delay; and this situation may maximize it. It also is affected by about one-month semi-closure of regulatory agencies.

2. **Moving towards self-sufficiency in pharma industry;**

Potential shortages due to export bans in India and China, who are main suppliers of API and generics, made governments of many countries to consider self-sufficiency in supply chain and they have announced regulations to avoid shortages in such crisis.

In this regards, on March 2020 the European commission has published a new guideline concerning foreign direct investment and free movement of capital from third countries; stating that foreign investments, especially those which affect the health market, in European Union (EU), must be subjected to risk-assessments to avoid any harmful impact on the EU's capacity to cover the health needs of its citizens .

In Iran, due to sanctions and difficulties in importation, Iran's pharmaceutical industry was going towards self-sufficiency prior to this crisis; however, COVID-19 pandemic may lead to more importation restrictions and further regulation incentives for local manufacturing.

3. **Pharmaceutical industry growth slow-down**;

Corona virus pandemic resulted in economic slowdowns for many countries and this will possibly lead to pharma industry growth slow-down, which are sensitive to country economic growth; especially, in countries with hammering markets, like Iran. This slowdown in market growth is more due to the entry of newer medications. Because the priorities of pharmaceutical companies change in their portfolio.

4 Ethical considerations:

One of the long-term effects of growing clinical research related to the current pandemic is the use of poorly evidence cantered therapies. Ethical issues should be considered in the use of these medicines as off-label. In confirming the proposed therapies, the long-term clinical effects of the use of these strategies in the coming years should be examined and healthcare providers should make informed decisions on using off-label therapies in clinical practice.

5 Consumption trend changes in health-related products:

Changing habits related to consumption and refilling prescriptions, especially in chronic disease therapeutic areas, might happen; and may also be further affected by the emerging tele-medicine.

Currently, public is concerned with personal hygiene maintenance; using mainly nose/mouth protection, an infection material for environment and clothing and hand sanitizers. Due to extended period of pandemic, this consumption may remain in behavioural acts of the public, globally and locally.

The short-term and long-term effects discussed in this paper can be seen in many reported trends around the world, and in countries in other regions, such as Africa, these effects will be predictable with increasing the COVID-19 prevalence.

Regulatory Yearly Wrap 2020: Pharmaceuticals in India: Drug regulatory provides are laxation on regulatory compliance in light covid-19 pandemic

The Central Drugs Standard Control Organisation– India's apex drug regulator – issued the following public notices relaxing compliance requirements under the D&C Act.

- Public notice on April 23, 2020 exempting applicants for medical device import license from submitting notarized/apostil led documents
- Public Notice dated May 01, 2020 extending the validity of the Good Manufacturing Practice Certificate expiring between March 2020 and August 2020 by another six months
- Notification dated July 27, 2020 under Section 26B of the D&C Act extending the validity of the registration certificate granted to foreign drug manufacturers seeking to export drugs into India for the purposes of sale for a period of six months and
- Notification dated November 26, 2020 under Section 26B of the D&C Act extending the validity of the import license granted to importers of drugs for the purposes of sale for a period of six months

We have covered the background and rationale behind each relaxation below.

Import Relaxation:

Under the Medical Device Rules, 2017– a set of rules framed under the D&C Act to regulate the clinical investigation, manufacture, import and sale of medical devices – importers of medical devices are required to make an application to the CDSCO to obtain an import license prior to importing medical devices into India.

As part of the application for the import license, the applicant is required to notarize and apostle certain documents. The Import Relaxation gives applicants the option of submitting these documents after self-attestation along with an undertaking that the applicant will provide the notarized/apostil led documents within four months or after the 'normalisation of the situation', whichever is earlier. The CDSCO may grant an import license on a provisional basis based on the self-attested documents if the application as a whole is in order.

A subsequent public notice on August 31, 2020 extended the duration of the Import Relaxation by another four months until the end of 2020.

GMP Relaxation;

The CDSCO issues a Certificate of Pharmaceutical Product under the WHO-GMP certification scheme for the purpose of registration of Indian pharmaceutical products in foreign countries so that Indian companies can export their drugs. The Cop certificates granted are valid for a period of three years. The GMP Relaxation extends this period by six more months from the date of expiry for Cops expiring between March 2020 and August 2020 to maintain continuity of essential activities in the pharmaceutical industry.

RC Notification:

The RC Notification was issued in response to representations made by pharmaceutical companies whose registration certificates were set to expire soon. The RC Notification aims to prevent adverse impact on the supply of drugs in light of the COVID-19 pandemic.

To avail the exemption granted by the RC Notification, registration certificate holders would be required to apply for a fresh registration certificate prior to the expiry of the existing one. Once the application has been made, the existing registration certificate will be valid either until the expiry of six months from July 27, 2020 or until a decision is made on the application for grant of a fresh registration certificate.

To import a drug for the purposes of sale/distribution, the CDSCO grants a registration certificate to the foreign manufacturer of the drug and a corresponding import license to the India-based importer. Both a valid registration certificate and an import license are pre-requisites for importing drugs into India.

Drug Import Notification:

The Drug Import Notification was issued in response to representations made by pharmaceutical companies whose import licenses were set to expire soon. The Drug Import Notification aims to prevent adverse impact on the supply of drugs in light of the COVID-19 pandemic.

To avail the exemption granted by the Drug Import Notification, import license holders would be required to apply for an import license prior to the expiry of the existing one. Once the application has been made, the existing import license will be valid either until the expiry of six months from November 26, 2020 or until a decision is made on the application for grant of a fresh import license.

The relaxations provide a welcome measure to ensure the continuity of business in these tough times

Understanding the command challenges to India pharmacy sector:

By the end of January 2020, the world slowly began to accept that COVID-19 is a reality that each country would have to learn to live with. With the alarming speed with which it consumed the lives of its patients, COVID-19 engulfed one country after another without providing any opportunities for production of a vaccine or medicine to treat it. Most countries were then limited to adopting a lockdown of their economies and societies, to counter the spread of the novel corona virus. Moreover, every country is now in a race to find a durable cure for COVID-19 (in the run-up to a vaccine) that would permit them to restart economic activity. Economies like India, which are driven by the service sector, are particularly hit because the preventive measure of physical distancing runs contrary to the demands of this sector. Such countries would want to revive and restore the economic cycle as well as livelihoods of its citizens at the earliest.

Besides, every country developing medicines would want to be in a position to introduce solutions into the world market, as there would be no dearth of buyers for methods to combat COVID-19. They will be in a position to benefit not only monetarily with its export, but also emerge as a key determinant towards the future of global governance in face of health crises

The scale of India's pharma space:

Even before the COVID–19 outbreak, India was the largest producer of vaccines in the world. India's global export of essential medicines took a leap when Cipla — a noted Indian pharmaceutical firm — sold HIV medicines in sub-Saharan Africa at one–twenty–fifth the cost of medicines sold by other manufacturers.

Building on this precedent, the Indian government had begun "Pharma Vision 2020" with the goal of systematising processes, so that India could become the world leader in end-to-end production of pharmaceutical products. Its gains have manifested itself in the current pandemic, with countries such as the United States requesting India to export the anti-malarial medicine Hydroxychloroquine which is believed to have some success in combating COVID-19. This had made many countries recognise the power and relevance of India as a leading medicines producer in the world.

India's stature as the "pharmacy of the world" primarily stems from the range and volume of medicines it is able to produce as well as the low prices it is able to offer. Indian pharmaceutical firms are the largest among Asian countries in their capacity to produce generic medicines.

India, however, lags a bit in developing new medicines. Also, Indian pharma companies face stiff competition from firms in China, Japan and Israel, and experience hostile behaviour and intense negative lobbying from 'Big Pharma' groups which routinely accuse Indian companies of violating patent laws.

API dependence on China:

Active Pharmaceutical Ingredients (APIs), or bulk drugs, are raw materials used in the manufacture of medicines or formulations. China was one of the leading countries to produce and sell APIs to the rest of the world until recently. However, with the outbreak of COVID-19 and its origin traced to China, the production of APIs took a hit. This may affect the price and sale of medicines in countries to which Beijing exports the important ingredients.

Moreover, the impact is set to be grave, as most of those materials are largely manufactured in the Hubei province. Its capital, Wuhan has been reported as the initial epicentre of the COVID-19 outbreak, and neighbouring areas of Zhejiang and Jiangsu are the other two major Chinese centres of medicinal raw material production.

While the decrease in exports of APIs by China exposed the world's reliance on it, India's dependence has particularly been brought to light as it uses Chinese ingredients to produce one-fifth of the world's supply of medicines. Indian antibiotic manufacturers rely heavily — close to about 90% — on Chinese imports of raw materials. A number of Indian pharmaceutical companies are dependent on Chinese APIs for manufacturing medicines. Granules India and Aurobindo Pharma has among the highest exposure to imports of APIs from China, with the latter mainly for antiretroviral and antibiotic drugs.

The global pharmaceutical industry is inter-twined in a complex manner and will gradually unravel, but shortages in production of APIs in China — happening already and likely to increase — would fast affect the production of formulations across the world.

Already, inventory levels of APIs in India are decreasing. This along with reduced production of APIs in China will mean that prices of medicines in India could dramatically increase.

India's medical diplomacy at risk:

The outbreak of the COVID-19 pandemic has renewed a branch of diplomacy that is gaining recognition. 'Medical diplomacy', wherein a state's international relations encompass the trade of much-needed medicines and dispatch of medical personnel to affected countries, has begun to gain prominence in the last few months.

India's medical diplomacy has, so far, entailed giving quick clearances for export of Hydroxychloroquine to countries that requested it, and sending Indian military doctors to neighbouring countries such as Bhutan and Nepal to help local administrations there to tackle the spread of COVID-19.

India would want to continue supply of generic medicines to the world using its inventory of APIs even though it may not be able to match the rising global demand in the near future. If India is unable to fulfil the global demand for generic medicines due to the APIs shortage, its influence and power as one of the leading suppliers of generic medicines could be affected.

Going further, countries that depend on India may refuse to co-operate with it or engage with its medical diplomacy. These countries will look to secure their supply chain elsewhere or even invest in the production of generic medicines on their own soil if possible.

Hence, many industry experts are now asking India to use this situation of a possible shortage in Chinese medicinal raw materials to its advantage. According to some, the Indian government has begun to materialise a policy to increase production of raw materials in the country itself. This could eventually also enable India to become an alternative to China in the world market. The plans include identifying important ingredients used in medicines, giving incentives to local producers, and helping neglected state-run producers to regain lost ground in the industry.

Pharma leaders believe that the Indian government should provide credit and support to one section of the industry, for instance those who manufacture one type of medicine, then replicate it with firms that produce other medicines. Boosting the production of medicinal raw materials and medicines could counter China's dominance in the global market.

Hence, the coming challenge to India's pharma production might also bear opportunities for India in terms of emerging as a self-reliant API exporting nation.

II. CONCLUSIONS

In a matter of weeks, the role of the community pharmacist has evolved considerably. Although it has been a very challenging and stressful l period, community pharmacy services have been recognised as front-line and essential. The necessity of crisis has led to the expansion of professional roles, responsibilities and significant adaptation to models of care. People health conditions are at uniquely high risk during this period. Careful consideration of their pharmaceutical care

needs will be essential for minimising adverse outcomes of this pandemic for this vulnerable population. The impact of the pandemic on the psychological health of pharmacy staff must also be evaluated and supports initiated. There is further scope to expand the oleo the community pharmacist through continued legislative changes, research studies and collaboration with other healthcare professionals.

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