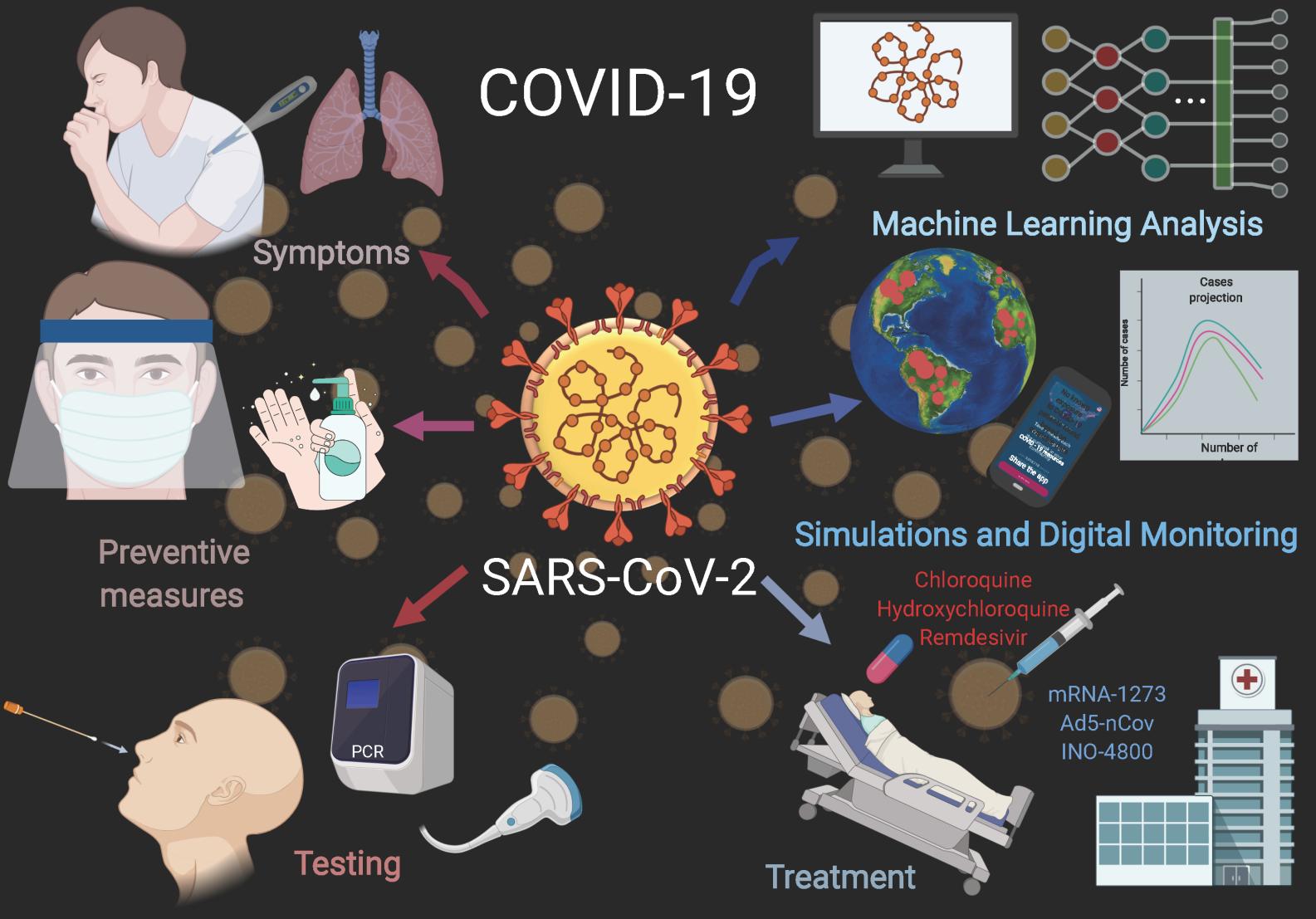


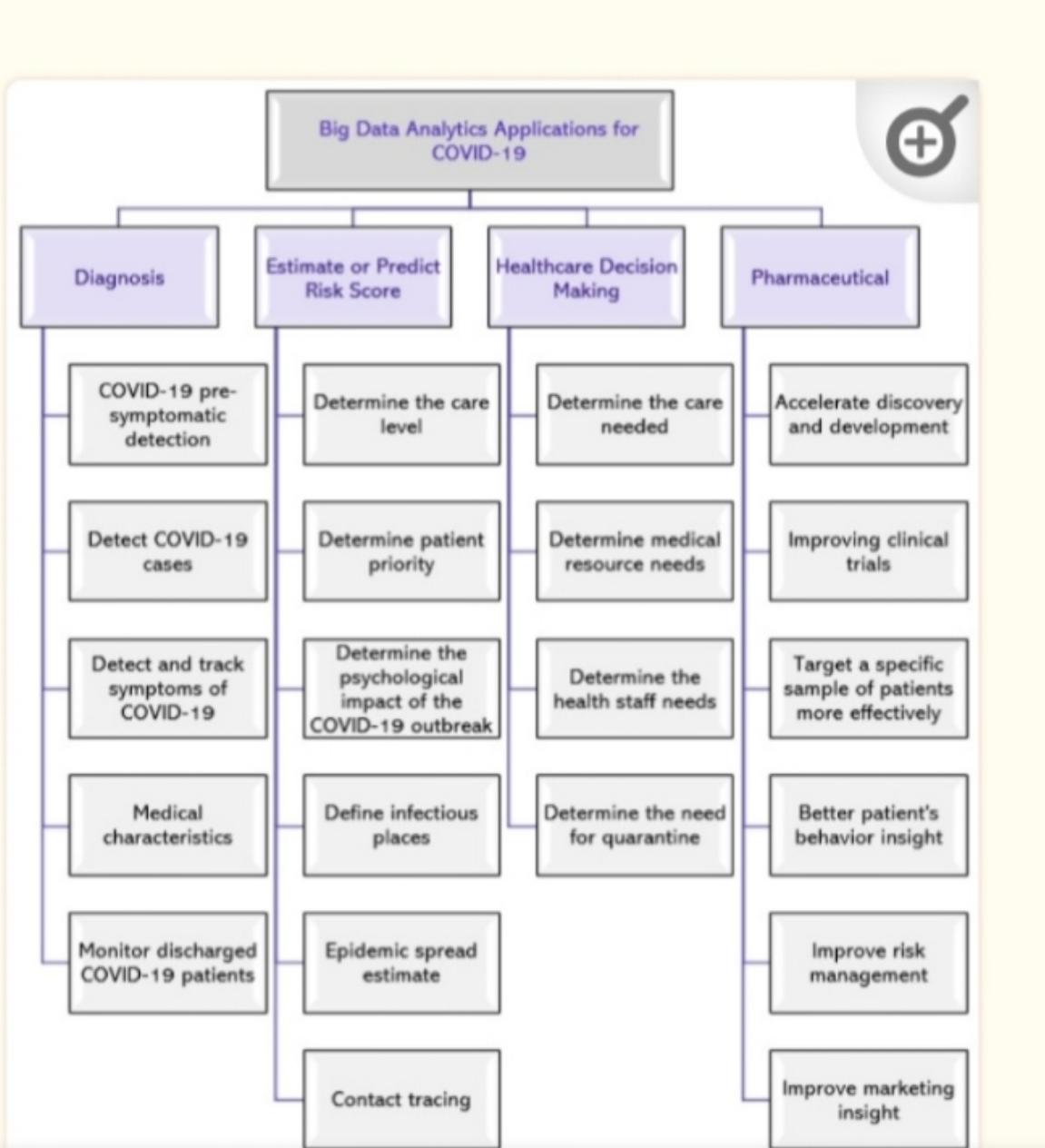
COVID-19



1. Introduction

On 30 January 2020, the World Health Organization (WHO) declared the spread of the COVID-19 pandemic as a cause of concern and called for raising the level of health emergencies. Afterward, the government of the Kingdom of Saudi Arabia urgently took several strict measures to limit the spread of the pandemic within the regions of Saudi Arabia [1,2]. The Saudi Ministry of Health (MoH) and many other countries have implemented WHO recommendations related to the identification and isolation of suspected COVID-19 cases.

The spread of the global pandemic, COVID-19, has generated a huge and varied amount of data, which is increasing rapidly. This data can be used by applying big data analytics techniques in multiple areas, including diagnosis, estimate or predict risk score, healthcare decision-making, and pharmaceutical industry . [Figure 1](#) shows examples of potential application areas.



2.1. Diagnosis

Suspected COVID-19 cases are diagnosed using the Reverse Transcription-Polymerase Chain Reaction (RT-PCR) test. This test takes around 24 h to several days, depending on the multiple conditions. Many countries experienced increased demand for diagnosing suspected COVID-19 cases, which exceeded the available local testing capacity. Therefore, several researchers have proposed alternative solutions for the COVID-19 RT-PCR diagnosis test, including the following.

The authors in Reference [39] have proposed a model to differentiate between COVID-19 and four other viral chest diseases. The model utilizes several body sensors to collect information and monitor the patient's health condition, including temperature, blood pressure, heart rate, respiratory monitoring, glucose detection, and others. The collected data is stored on a cloud database containing AI-enabled expert systems that help diagnose symptoms of patients infected or suspected of having COVID-19 to determine the appropriate procedure to deal with them.

In Reference [40], the authors provided a flexible and low-cost design of a medical device that can be used to detect and track symptoms of COVID-19. It utilizes headphones and a mobile phone to detect breathing problems. The signals are collected and saved in an audio file format through the mobile app, after which the signals are analyzed using the MATLAB program to identify the respiratory symptoms associated with COVID-19.

Researchers [41] also developed a program to remotely monitor discharged COVID-19 patients. Each patient registered to the app is provided with a pulse oximeter and thermometer to self-report daily symptoms, O₂ saturation, and temperature. The abnormal vital signs and symptoms are flagged to be assessed by a group of nurses. Depending on the evaluation outcome, the patient might be readmitted to the Emergency Department (ED). The program helps reduce ED utilization and provides scalable remote monitoring capabilities when a patient is discharged from the hospital.

