



LEVERAGE AI AND DIGITAL TECHNOLOGY TO OPTIMIZE CARE MANAGEMENT DURING A PANDEMIC AND BEYOND



What is Care Management

Care management is a comprehensive suite of services and activities that helps patients in managing the chronic or complex conditions. U.S. spends \$3.5 trillion¹ each year on healthcare which is directed towards treatment and management of chronic physical and mental health conditions. An integrated ecosystem that has a culture of continuous improvement, quality management and supportive technology is required to lower costs, improve care quality and increase efficiency.



Trends in Care Management and Need for Change

Evidence based care, value-based incentives and patient centricity are the 3 most important trends in care management. With the growth of value-based incentives and risk-based contracting, achieving the best possible outcomes with maximum efficiency and minimal costs are critical. The Medicare data suggests that only 5 percent of a healthcare organization's population consumes staggering 50 percent of its resources². In addition to these 5 percent the care management strategies to

help patients beyond that 5 percent are critical in obtaining better outcomes and managing care costs. The implementation of evidence-based care relies on research, clinical expertise and the patient's values and preferences which can improve transparency, accountability, value and quality of care and outcomes.

With the advent of off label drugs, influx of huge number of infected patients being sent home, rise in side effect profiles for various drugs, and increase in care gaps





due to rapid change in scenarios, it has become increasingly important that Care Management programs need to have a solid base of evidence with supporting workflows and AI algorithms to drive meaningful impact. Further, increased focus on patient centered care with primary goal of improving individual health outcomes, the active collaboration and shared decision-making between patients, families and providers, is required to provide personalized and customized care plan.



Infosys Definition of Care Management

Infosys believes care management programs continue to evolve as patients are expecting more relative to the experience, degree of engagement, and ease of access. It should include patient-centric, end-to-end, solution that addresses 4 key elements that can result in improved care, better outcomes, and reduced costs:

- a) **Evidence Generation:** Integrate Data from Multiple sources (patient, consumer, PRO's, devices, etc.)
- b) **Processes/Workflows:** Develop Patient Centric Processes based on Risk Stratification focused on driving patient outcomes
- c) **AI-ML/Analytic:** Develop AIML based proactive interventions to drive value by optimizing costs and outcomes
- d) **Personas:** Integrate with Visualization Tools focused on Personas to enable optimal patient engagement

Evidence Generation	Processes/Workflow	AI-ML/Analytic	Personas
 <p>Real World Patient Data Diagnosis, specialty visits, treatment (drugs/infusions), diagnostics, procedures</p> <p>Device/Sensor Data Monitors, sensors, wristbands, watches, etc.</p> <p>Shipping/Inventory Data Ship to and from, stockouts, supply, Demand, Days on hand by drugs/therapy areas</p> <p>Consumer/PRO Data Ethnicity, Media Data, Search, Digital, Consumer, PRO, Surveys, Behavioral</p>	 <p>Provider Interactions (F2F/Virtual) Use of video consultations, prescription management tools, provider networks and communities, provider</p> <p>Claims Authorization and Refill Prior Authorization process, early medication refills, physician reach out</p> <p>Patient Engagement Patient support programs focused on adherence, education, adverse event management, disease management tools, financial assistance programs, etc.</p>	 <p>AIML based Disease Detection, Therapy transition Predict interventions based on disease detection, progression in a patient journey</p> <p>NLP based Medical Literature/Reports Analytics Extract value-adding outcomes from medical literature and pathology reports to drive care programs and interventions</p> <p>Workflow/Process Automation Leverage AIML and Automation to enhance process efficiency e.g. PA process based on predictive disease detection model</p>	 <p>Care Coordinator/Manager Enroll in care plan, update care plan, goal setting, provider referral, secure messaging, pre-built workflows, task management, next best action, reports</p> <p>Administration User management, login, landing page configuration, password management, data upload, reports</p> <p>Member Information 360-degree view of the Member and family demographics and medical history, reports</p>

Key elements in Care Management

a) Evidence Generation

With the advent of new sources of data such as wearables, sensors and other forms of IoT devices, the healthcare data has been growing at an exponential pace. So, in order to have a good view into the patient's interactions and encounters during the care continuum, we need to have an integrated view of real-world data

that goes beyond the traditional healthcare data from EMR, Claims, Diagnostics. In addition, integrating PROs and other survey data can also help stakeholders get a better view into the patient behaviors which can give deep insights to drive patient outcomes by creating care frameworks and target interventions. The insights can provide opportunities available to improve outcomes to meet

core goals like managing high-cost members, value-based care, patient satisfaction and maximizing provider network performance. The data data-sharing technologies, interoperability between disparate software and systems is improving thereby allowing access to large amount of data that needs to be analyzed to extract insights.



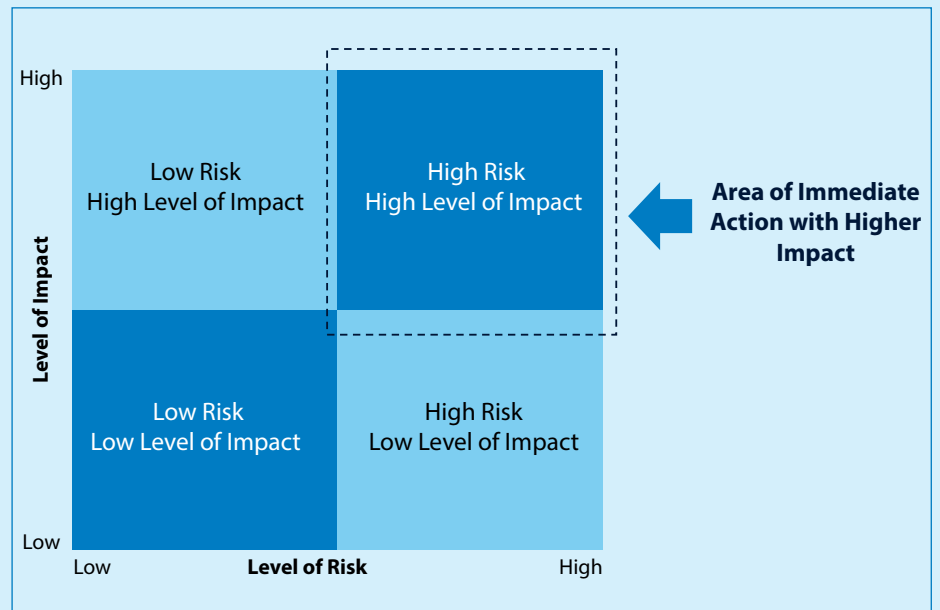
b) Processes/Workflows

Workflows that are based on an integrated evidence can create efficiencies, seamless activities and right interventions across the care continuum. In order to do that, risk stratification of patients based on their clinical and other factors such as age, gender, ethnicity, etc. is important. Although a system of risk stratification like LACE exists but we need to go beyond that to have a real impact. While risk stratification is important, it is also important to identify the level of impact can be delivered to a patient.

All these aspects determine the type of workflows that are required to be developed for care coordination and interventions. Approximately 50 percent of patients do not have clarity about the treatment plans and care management guidelines. Nearly 20 percent of them switch providers due to a lack of trust in their care teams. For patients, evidence

based, patient centric care provides peace of mind that they are receiving the most appropriate treatment, encourages accountability and motivates them

to comply with treatment decisions, ultimately, improving care and outcomes, and reducing costs.



Risk stratification based on level of impact

c) AI-ML/Analytics

The technological advancements, including the evolution of big data, decreased cloud computing costs, and improved machine learning capabilities, have created an opportunity for care management to succeed at levels not previously possible. Advanced analytics with use of AIML and automation has become an integral part for any care management programs. Based on the patient risk stratification and level of impact, there can be AIML based proactive alerts and notification to fulfill the care coordination gaps which could be missed otherwise. Remote monitoring data using device and sensors when integrated together can provide some real alerts for care managers to plan interventions that drive outcomes and manage costs. In addition, PROs and other kinds of behavioral data such as how a patient is feeling, whether he has been adherent, etc.

can also provide a key ingredient to when and where those same interventions could have the most impact thereby making it a two-way communication between care coordinator and patient which is based on empathy as well as the clinical aspects. E.g. the same patient in a good mood might be more open to the intervention from the care coordinator compared to when the same patient is feeling depressed.

In addition, some of the processes that are very much repetitive whereby patient information is entered, processed and then evaluated. Some of these processes could have intelligent automation to help with the overall process which can help in reducing human errors. A case in point is that these kinds of automations can be a pillar of operational efficiency in some of the unprecedented times the world has seen in the COVID Pandemic.

d) Personas

It is important to measure the performance and metrics for personas managing/using the care management system. The analytics employed in the care management system has to be integrated with the visualization tools for the patient and care managers to actively ingest the data, utilize the analytics, report the interventions and document the results to really monitor the overall impact and value being driven by the care management solutions so that the data lakes can be updated, algorithms can be redeveloped and refined to make sure that value based care based on evidence is the fundamental aspect of care management programs.

Infosys views this as an opportunity to change exponentially (e.g. 10x) through leveraging technologies that are enablers, accelerators, and change agents second only to the required business processes and operating model changes. Organizations that will remain competitive will be early adopters of analytics (predictive), blockchain, robotics, and virtual reality to name a few.

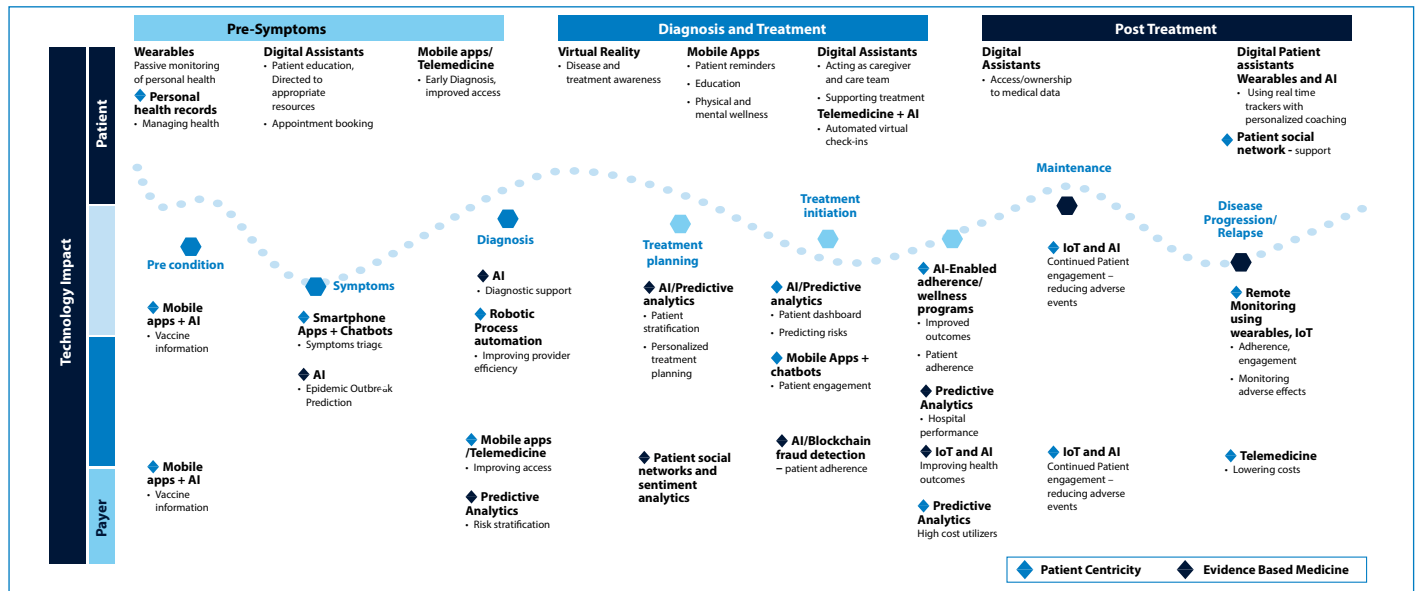


Role of AI and Digital in Care Management

Healthcare is at the cusp of stream of innovations with a major focus on digitization and artificial intelligence (AI). AI will support care plans by creating proactive interventions (care coordination/ care gaps) along a disease continuum. These models will drive care management and while population health management is an early example of leveraging data for actionable insights, AI will continuously

learn, self-heal, interoperate, and leverage complex algorithms to drive better experiences across the care continuum to drive better outcomes and optimize costs. The use of descriptive and predictive analytics helps in spotting patterns associated with poorer outcomes and increased costs by looking at past patient trends and forecast future trends. The care model can be optimized by measuring and

segmenting patients based on previous responses to various methods of delivery—in essence, determining which methods are most likely to prompt behavior change to facilitate better outcomes. All the stakeholders – patient, provider and payer have an important role to play in adoption of innovative approaches and tools from pre-symptoms to diagnosis and treatment to post-treatment.



Integration of technologies in Care Management

Care management is integration of multiple technologies to allow interaction with all stakeholders for a cohesive approach towards providing patient centric, value-based care. Technology enablers include patient and provider focused tools that include:

Active monitoring and management

(requiring end-user involvement and participation) –

- Telehealth applications for home-based disease management (that link patients and care givers to their health care providers)
- Web-based communities for home care patients (that link patients to health care providers, peers, and the community)
- Personal health records

Passive monitoring and management

- Digital Checkups: Digital checkups via text messaging to help patients manage

hypertension, diabetes (to track and identify if patients need to take any action)

- Monitoring Via Wearables: Using Apple Watches and wireless blood pressure cuffs to monitor participating hypertension patients' blood pressure (the data gathered is used to adjust medications, or make recommendations regarding diet and exercise)
- Smartphone Symptom Checkers/ Diagnostics - Mobile apps to help patients understand and evaluate their symptoms to help them decide if they should stay at home, call their family doctor or head to the ER

Tools for providers/payers

- Patient dashboard/scorecard which can help clinicians determine optimal care plans with the available visualization of relevant data, including patient risk

scores, acuity and wellness trends.

- Risk stratification/predictive analytics are important to effectively manage a population by stratifying and identifying those within high risks categories based on co-morbidities, utilization, social determinants
- Patient engagement/analytics is critical in supporting chronic disease management, cutting wait times, keeping patients enthused for better outcomes
- Clinical intelligence/analytics can be done by using Intelligence from evaluation, analysis, and interpretation of clinical data, combined with financial, operational and research data allows informed medical and operational decisions
- Business intelligence/analytics can be used for evaluating benefit plan performance and expected costs for the coming year

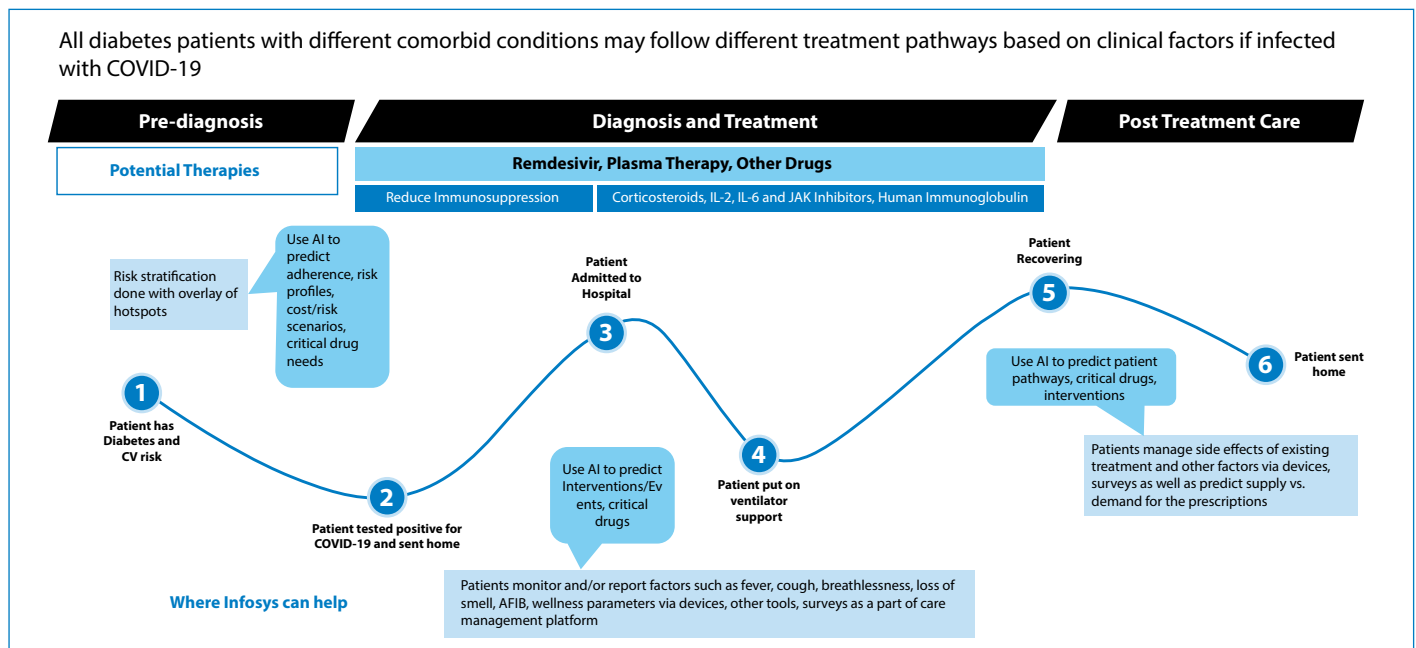
Care Management in Covid-19 Scenario –

Geriatric patients and patients with chronic conditions are some of the most vulnerable populations during the COVID-19 pandemic. The patients most susceptible to serious complications of COVID-19 include: Age over 65 and/or comorbidities like cancer, hypertension, lung disease, diabetes, cardiovascular disease, any disease that compromises the immune

system or medications that suppress the immune system. EHR data has revealed hypertension, diabetes, and obesity are the most common chronic diseases among COVID-19 patients. It is very important that interventions by care manager with the support of the technology and AI at the core of driving outcomes.

In addition to extensive care coordination

between primary care provider and other providers, such as medical specialists, pharmacies, laboratories and others, the care management team can play a significant role in helping the susceptible population across the care continuum – Pre-Diagnosis, Diagnosis and Treatment and Post-Treatment as shown in figure above



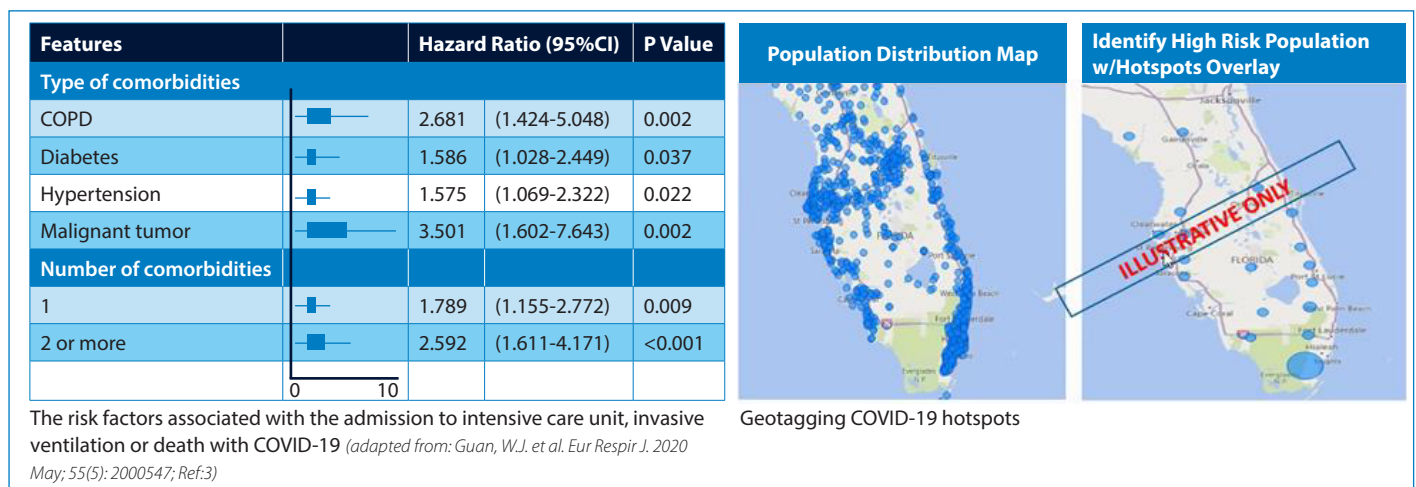
Care Management during COVID-19

Pre-Diagnosis

In this phase it is very important to risk stratify the patients and the level of impact which can be achieved for patients with comorbid condition, lower socio-economic status, difficulty in access to care,

hotspots, etc³. Data and analytics become an important part of risk stratification of high-risk patients whereby we can use automated and CDC guidelines-based self-assessment. Once you have identified the

risk, care managers can help in preventing their exposure to geo-tagged COVID-19 hotspots using digital apps and wearables. It can also help in triaging for test spots, potential impact due to comorbidity, etc.



Diagnosis and Treatment

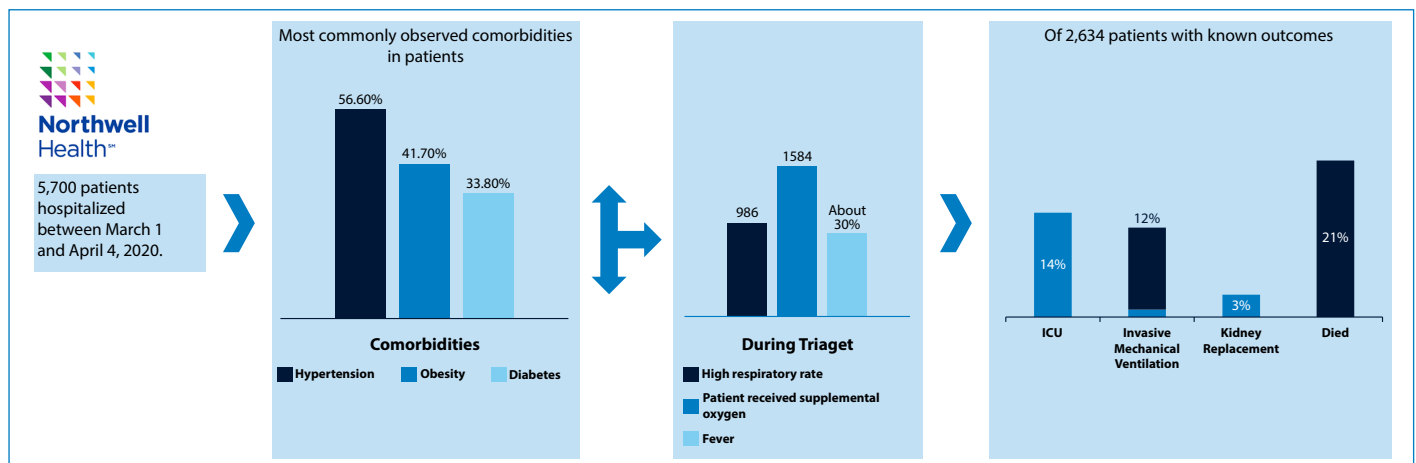
Most of the patients when they are tested are sent back home and asked to monitor the symptoms such as breathlessness, cough, fever, etc. It is very hard sometimes for patients to monitor symptoms accurately. At this stage there is an urgent need to remotely monitor and integrate with other data to driver alerts and notifications for care managers to have the right intervention. Some of the key things that can be done in a disruption like COVID would be the following:

- Provide care virtually or provide one-on-one phone sessions using telehealth in case of lockdown/quarantine to assist with reviewing and understanding

medications and provide individualized education for chronic conditions

- Provide possible assistance to high-need patients in case of joblessness, their inability to access or afford medications, and underlying anxiety by evaluating available socio-economic history. The Kaiser Family Foundation estimates that the average out-of-pocket cost for a hospitalization associated with COVID-19 would be \$1300 for those who receive their health insurance from their employer making it challenging for patients who have lost their jobs and insurance coverage
- Help patients navigate the treatment for COVID-19 as well as guide them about prognosis of any comorbidity

- Manage disruption to care delivery, due to limited supplies and resources for clinicians and limited access for high-need patients in pandemic situation using predictive analytics
- In case of positive COVID-19 test results, plan supportive management depending on observed severity of disease, feasibility of quarantine, and possible need for hospitalization or triaging for treatment in terms of Intravenous Fluid Administration, Oxygen therapy and treatment with corticosteroids to manage viral pneumonia



Evidence based approach for COVID-19 management (Richardson S. et al., JAMA. 2020 Apr 22;323(20):2052)

Use evidence-based approach to manage disease progression from emerging data⁴. Delineate the course of the disease and develop care plans for optimal treatment of critical COVID-19 patients wherein 5% of all COVID-19 cases become seriously or critically unwell and 20-30% of hospitalized patients require intensive care support in the form of Non-invasive ventilation, Endotracheal Intubation, Invasive Mechanical Ventilation or Fluid resuscitation and vasopressors or surgical management. During the treatment, it becomes important to track the use of off-label drugs, adverse events, any other critical events, etc. to make sure evidence is collected and becomes a foundation for driving the outcomes.

Post Treatment

In the post-treatment phase, it becomes very important to monitor the patients as most of the patients may not follow the same pattern of recovery as they are shedding their RNA fragments. It is important to monitor and track the events and have proactive interventions. So, the management of COVID-19 patients post recovery, tracking their wellness through digital or virtual methods and counseling

them against re-exposure to COVID-19. The detection of antibodies to the SARS-CoV-2 virus doesn't provide "immunity passport" or "risk-free certificate" against re-infection as there is currently no evidence that the patients with antibodies are protected from a second infection⁵. Further, these patients can be tracked in the care management system for their availability for plasma therapy for new patients.



Beyond Covid-19

With COVID-19, the pressure on providers as well as patients has increased dramatically. The high prevalence of burnout, complex causes, and critical consequences had been widely reported in physicians and chronic disease patients. Care plan members can benefit digital apps that encourage emotional well-being e.g. Kaiser Permanente is offering its members free access to Livongo's mental health app myStrength.

The business aspect of care management will be drastically impacted as the

employer-based health insurance market undergo a structural change due to massive loss in employment requiring all new business retention strategy.

A focus on strengthening the risk-management-related capabilities would be required as payers and providers and provider-led health plans will be bearing more risk now than they had initially planned and will need better risk management expertise.

Big technology players like Amazon, Google, Facebook and Microsoft utilizing

their core capabilities to disrupt the market (medical data management, care management, payments, etc.) will be a strong threat to payers. Payers and Providers will need to leverage data, advanced analytics, AI and digital technologies to reduce the cost of care. Further it would be necessary to achieve data interoperability for improving patient services and outcomes, develop intelligent network management and reduce physician burnout by leveraging predictive and advanced analytics

Summary

We have experience of working in disruptions, but we need to adapt and adopt and expand the already tried methods and innovation methods to Covid-19 story- e.g. monitoring, transparency, risk stratification, proactive interventions, predictive insights, tracking off-label drug usage, management costs and resources. In summary, we need to

have a rich evidence comprised of clinical data and other datasets from devices, sensors, PROs etc. The evidence needs to be collated to support the workflows that are developed keeping in mind the types of patient, disease areas, level of impact, etc. To drive impact and obtain meaningful outcomes, advanced analytics and use of AI based interventions are important to create

the care plans and provide care managers the tools to intervene at the right time. In addition, the evidence-based analytics, and workflows need to be integrated with visualization tools to make sure the care managers, patients, and administrators have the ability to ingest and consume data to drive value-based care and patient outcomes on a consistent basis.

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