Summer Internship

At

IIHMR, Delhi

(1st April 20 to 31st May20)

A Report

By

Lt Col Niteesh kumar

PG/19/055

POST- GRADUATE DIPLOMA IN HOSPITAL AND HEALTH MANAGEMENT

2019-2021

IIHMR DELHI

ACKNOWLEDGEMENT

Foremost, I would like to express my sincere gratitude towards **my family& faculty of IIHMR, DELHI** for their kind co-operation and encouragement which help me in completion of this project. I would like to express my special gratitude and thanks to institute persons for giving me such attention and time.

I would like to express my gratitude to my mentor **Ms. Divya Aggarwal** for the continuous support on my summer internship study and research, for her patience, motivation, enthusiasm, and immense knowledge. Her guidance helped me in all the time of research and writing of this report. I could not have imagined having a better advisor and mentor for my summer internship.

My thanks and appreciations also go to **my batch mates** in developing the project and people who have willingly helped me out with their abilities.

DECLARATION

I, **Lt Col Niteesh Kumar** hereby declare that this Internship Assignments entitled **"Summer Internship Report"**, comprising of following tasks:

A. Case Study on Action Balaji Hospital

B. Role of Action Balaji in treatment of NCDs

C. Impact of COVID-19 on Global Economy and

 D. Can Artificial Intelligence solve the health workforce crisis

is the outcome of my own study undertaken under the guidance of Ms. Divya Aggarwal, IIHMR- Delhi. It has not previously formed the basis for the award of any degree, diploma, or certificate of this Institute or of any other institute or university. I have duly acknowledged all the sources used by me in the preparation of this field internship report.

Date: 3 July, 2020

Sign: Niteesh Kumar

Postgraduate Diploma in Hospital and Health Management

International Institute of Health Management Research

New Delhi

CERTIFICATE OF COMPLETION

This is to certify that **Lt Col Niteesh Kumar** (PG/19/055) student of Post Graduate Diploma in Hospital and Healthcare Management (PGDHM) from International Institute of Health Management Research, New Delhi has undergone the summer internship assignments at IIHMR, Delhi from 1st April to 31st May 2020. The Candidate has successfully carried out the study designated to her during internship training and her approach to study has found to be a committed, sincere and diligent student who has a strong drive & zeal for learning. The Internship is in fulfillment of the course requirements. We wish her all the best for future endeavors.

Dr Pradeep K Panda   **Ms.Divya Agarwal**

Dean- Academics & Student Affairs   Associate Professor

IIHMR, Delhi   IIHMR, Delhi

<u>CERTIFICATE OF APPROVAL</u>

The following Summer Internship Project titled **"Summer Internship Report"** at **" IIHMR DELHI"** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the report only for the purpose it is submitted.

Name of the Mentor- Ms. Divya Agarwal

Assistant Professor

IIHMR, Delhi

FEEDBACK FORM

Name of the Student   **:** **Lt Col Niteesh Kumar**

Summer Internship Institution **:** IIHMR, Delhi

Area of Summer Internship:

Attendance:

Objectives met:

Deliverables:

Strengths:

Suggestions for Improvement:

PLAGIARISM REPORT

Task1

ORIGINALITY REPORT

13%	12%	0%	2%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	accessh.org Internet Source	10%
2	modernaging.org Internet Source	1%
3	Submitted to INDIAN SCHOOL OF PUBLIC POLICY Student Paper	1%
4	S. Ray, D. Dogra, S. Bhattacharya, B. Saha et al. "A Web Enabled Health Information System for the Neonatal Intensive Care Unit (NICU)", 2011 IEEE World Congress on Services, 2011 Publication	<1%
5	Submitted to Manipal University Student Paper	<1%

Niteesh task 4

ORIGINALITY REPORT

17%	13%	7%	17%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	bmchealthservres.biomedcentral.com Internet Source	6%
2	www2.deloitte.com Internet Source	3%
3	Submitted to University of Maryland, University College Student Paper	2%
4	en.wikipedia.org Internet Source	2%
5	Submitted to Cypress College Student Paper	1%
6	Submitted to McNeese State University Student Paper	1%
7	Submitted to Southern New Hampshire University - Continuing Education Student Paper	1%
8	Submitted to Pasadena City College Student Paper	1%
9	Submitted to King's College Student Paper	<1%
10	Submitted to Central Florida Community College Student Paper	<1%
11	Bertalan Meskó, Gergely Hetényi, Zsuzsanna Győrffy. "Will artificial intelligence solve the human resource crisis in healthcare?", BMC Health Services Research, 2018 Publication	<1%

TABLE OF CONTENTS

ACRONYMS

NCD	**Non Communicable Disease**
NABH	**National Accreditation Board of Health**
NABL	**National Accreditation Board for Testing and Calibration Laboratories**
NLP	**National Language Processing**
AI	**Artificial lntelligence**
ML	**Machine Learning**
EHR	**Electronic Health Record**
MERS	**Middle East Respiratory Syndrome**
SARS	**Severe Acute Respiratory Syndrome**

INTRODUCTION

TO

SRI ACTION BALAJI MEDICAL INSTITUTE

The institute has been promoted by Lala Munni Lal Mange Ram Charitable Trust of Action Group and Companies. The chairman of the trust Lala Mange Ram Aggarwal, a great philanthropist had a strong desire to build a hospital for the service of mankind .The infrastructure and the healthcare staff at the institute have been designed keeping patients welfare as the ultimate goal .They have encapsulated their work ethics in their motto "**healing with human touch**" and strive to always uphold it .

The logo of the institute portrays its philosophy ;it consistes of a hand embracing the flame of life with a sphere in the background .The Human Hand represents the healing touch and health care of their dedicated teams of professionals available to brighten up the lives of the patients coming to them. The flame denotes the traditional values of honesty and selfless service towards their patients .The sphere in the background reflects their commitment to maintain international standards of excellence .

ASSOCIATED HOSPITALS AND CLINICS

- Action Cancer Hospital, Paschim Vihar, New Delhi
- Ginni Devi Action School of Nursing ,Paschim Vihar ,New Delhi
- Sri Balaji Hospital 150 Bedded, Hissar, Haryana
- Balaji Ashram at Vrindavan

VISION

To become the largest healthcare provider NGO in the country with a human touch.

MISSION

To provide world-class affordable health care facilities to all the sections of the society with a humanitarian touch, whilst maintaining high standards of ethical practices and professional competency with emphasis on education leading to research.

ACCREDITATION

 NABH and NABL

QUALITY

The Medical Institute is committed to improve the health and satisfaction level of their patients by ensuring continual improvement by:

- Providing high quality of care according to health needs of the patients.
- Facilitating patient satisfaction by service and ensuring the dignity and rights of the patients.
- Providing safe and conducive environment for staff.
- Ensuring accountable, consultative and transparent management process.

SPECIALITIES

Sri Balaji Action Medical Institute is a multi-specialty hospital with over 40 medical specialties and 10 special clinics. Orthopedics, Cardiology, Cardiac Surgery, Neurology, Neurosurgery, Nephrology, Gastroenterology, GI Surgery and so on are some of the specialized areas in which the hospital excels. It is equipped with the latest state-of-the-art equipments like Rapid Arc Radiation Machine, 16 Slice PET.CT & Gamma Camera, 1.5 Tesla MRI and 64 Slice CT Angio among others:

• Aneasthesiology	• Neurology
• Breast Speciality Clinic	• Obstetric
• Cardiology	• Opthalmology
• Cardiothoracic &Vascular Surgery	• Orthopedic
• Critical Care	• Pain Clinic
• Dentistry	• Pediatric Medicine
• ENT	• Pediatric Nephrology
• Gastroentrology	• Physiotherapy and Rehabilitation
• General Surgery	• Plastic Surgery
• Height Gain Clinic	• Psychiatry
• Internal Medicine	• Respiratory
• Joint Replacement	• Nephrology
• Medical Oncology	• Speech Therapy
• Urology	• Transfusion Medicine(Blood Bank)
• Vascular Surgery	

SERVICES AND FACILITIES

• Operation Theatre • Ambulance Services • Support services • Accident and Emergency • Contemporary Cardiac Centre	• Mother Child complex • Radiology and Imaging Debuting • Laboratory Services • Blood Bank • DNB Programs /Academics

Latest News

- **State-of-the-art Action Kidney Transplant and Dialysis Centre now operational-**Equipped with all the modern day technologies and facilities, this centre offers specialised and cost effective treatment to patients suffering from renal diseases. The centre comprises of 36 dialysis machines out of which 9 are reserved for HIV and Hepatitis positive patients

- **Action Knee Clinic gets introduced at Sri Balaji Action Medical Institute-**Action Knee Clinic is a specialised unit where patients can get expert treatment for Arthritis and Sports Injuries.

- **Action Diabetic Center Gets A Modern Facelift**- Sri Balaji Action Medical Institute's Action Diabetic Centre is a specialized centre catering exclusively to all types of diabetes cases. Action Diabetic Centre is one of the few centers in Delhi that provides tailor-made diabetic health packages. These packages are specially designed keeping in mind individual needs and requirements of the patients

- **Action Joint Replacement and Sports Medicine Centre**- Action Joint Replacement and Sports Medicine Centre is a specialized clinic catering exclusively to cases of joint replacement and sports injury

- **Action Holistic Naturopathy Clinic**-Action Holistic Naturopathy Clinic is a specialized unit which treats patients using the drugless system of medicine. The consultation at the clinic includes recommendation of proper diet and nutrition, yoga-pranayama, psycho-spiritual counseling, relaxation and meditation. Set up in February 2012, it is managed and headed by Dr. Anjali Sharma, a renowned naturopathic

- **Breast Specialty Clinic inaugurated at Sri Balaji Action Medical Institute -**.New Delhi, March 2, 2012: Sri Balaji Action Medical Institute recently launched a breast specialty clinic that caters exclusively to all breast related problems in both men and women of different age groups

- **Home blood sample collection facility-** Sample Blood collection facility available at your door step and for more details call at 42 888 888

EXPANSION OF THE EXISTING PROJECT

The expansion of the existing operational 250 + bedded hospital to 500 bedded hospital is under process for environmental clearance and likely be implemented in near future.

SUCCESS STORIES

- **Unique case of Surgical Endoscopic Closure successfully accomplished at Sri Balaji Action Medical Institute-** The faculty of Gastroenterology under the leadership of Dr. GS Lamba, Dr. Monica Jain & Dr. Pradeep Kr. Siddappa, have performed a very unique case of Surgical Endoscopic Closure of Colon on a young patient, Mr. Ashok 35/M presented with lower GI Bleed due to colonic fistula. The closure was performed using a new device called 'Over the Scope Clip' OTSC(Ovesco,USA). This is only the second such procedure in Delhi & NCR. Patient currently in follow-up has had no repeat episode of GI Bleed.
- **Kidney stone weighing 700 grams,successfully removed**
- **Miracle Baby survives at Sri Balaji Action Medical Institute-** Doctors of the hospital recently brought to this world Delhi's tiniest baby. Born 3½ months (24 weeks) premature and weighing only 550 grams, the delivery was a complicated procedure.But baby Pinky showed exemplary courage in fighting all odds and emerging as a winner. Doctors say that she maybe India's first baby who has survived after being delivered in the 24th week of pregnancy.
- **Doctors at Sri Balaji Action Medical Institute successfully conducted a rare surgery of right sided cardiac tumour-** New Delhi, December 20, 2011: Doctors at Paschim Vihar based Sri Balaji Action Medical Institute successfully handled a rare case of right sided heart tumor and gave a new lease of life to 70 year old Anita Sen (name changed). The case was also a diagnostic challenge for the doctors as the only symptom that the patient showed was syncope (sudden or temporary loss of consciousness). Mrs. Sen has now been discharged and has had no episode of fainting during the follow up period.

FEEDBACK FROM THE CLIENT

After trying out hospitals all around the globe,I finally found relief here……Lady Chritina Nwamgbede Nledum- In her own words the client **says "**This hospital made me feel like home. The Doctors and Staff here are very friendly & this encouraged me to recover quicker. This has persuaded me to recommend my nationals to come here for treatment

Sri Balaji Action Hospital is a world class hospital. I have been to hospitals overseas for medical treatment & I have never received the type of healing & attention I received here. Nigerians who have been here have testified like I have. The staff is caring & thorough in the use of their equipment & the analysis of their results.

I won't hesitate in recommending this hospital to anyone in need. The Doctors are exceptional. I'd offer my heart to Dr. Ashok who is very caring & concerned.

I didn't feel like leaving the hospital when I realized I was being cared for as one of their family members. My deepest regard goes to Dr. Ashok Goel, the kindest of all the doctors I have come across in my life. God will continue to bless all of them & their families."
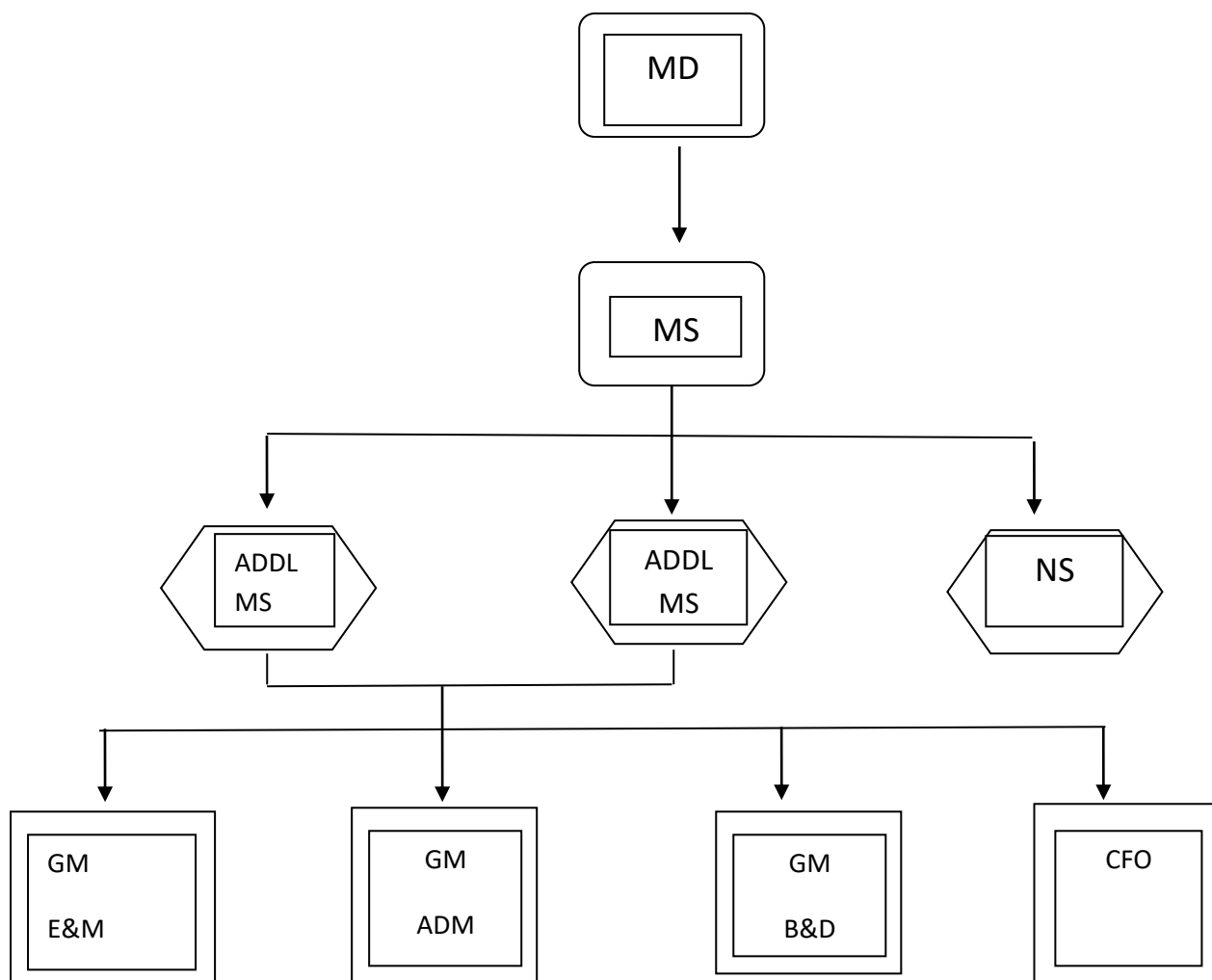
Amen
Lady.Christiana Nwamgbede Nledum

REPORTS AND STORIES PUBLISHED

All the activities pertaining to the treatment of the patients coming Sri Balaji Action Medical Institute and Action Cancer Hospital and their promotional programs in preventive healthcare are published in monthly newspaper ,Action Times. The newspaper is published by Ms. Shalu Agarwal on behalf of the Institute, Corporate Office ,Paschim Vihar,New Delhi.

ORGANOGRAM

```
                    ┌─────────┐
                    │   MD    │
                    └─────────┘
                         │
                         ▼
                    ┌─────────┐
                    │   MS    │
                    └─────────┘
           ┌─────────────┼─────────────┐
           ▼             ▼             ▼
       ╱ ADDL ╲      ╱ ADDL ╲      ╱  NS  ╲
       ╲  MS  ╱      ╲  MS  ╱      ╲      ╱
           │             │
    ┌──────┴──────┬──────┴──────┬──────────────┐
    ▼             ▼             ▼              ▼
┌───────┐    ┌───────┐    ┌───────┐      ┌───────┐
│  GM   │    │  GM   │    │  GM   │      │  CFO  │
│  E&M  │    │  ADM  │    │  B&D  │      │       │
└───────┘    └───────┘    └───────┘      └───────┘
```

LEGEND

MD	Managing Director	**DR ANAND BANSAL**
MS	Medical Superintendant	**DR SUNIL SOMLI**
ADDL MS	Additional Medical Superintendant	**DR RITA VARSHNEY**
ADDL MS	do	**Dr**
GM(E&M)	GM Electricity and Maintenance	**MR SATYAPAL**
GM(B&D)	GM Business & Development	**MR GAGAN NAGPAL**
GM(ADM)	GM Administration	**MR KN GULATI**
CFO	Chief Financial Officer	**MR UMAKANT**
NS	Nursing Superintendant	**LT COL SARITA**

<u>REFERENCES</u>

https://www.actionhospital.in/about-us

https://www.actionhospital.in/success-stories

https://www.actionhospital.in/

https://www.actionhospital.in/latest-news

https://www.actionhospital.in/healthcare#

file:///C:/Users/LALIT/Downloads/action%20times%20edition%20month%20of%20jan_compressed.pdf

ROLE OF SRI ACTION BALAJI MEDICAL INSTITUTE

IN THE TREATMENT OF NCDs

The Sri Action Balaji Medical Institute is one of the finest Multispeciality Hospital in India. The infrastructure and the healthcare staff at the institute have been designed keeping patients welfare as the ultimate goal .They have encapsulated their work ethics in their motto ”**healing with human touch**” and strive to always uphold it .

The logo of the institute portrays its philosophy ;it consists of a hand embracing the flame of life with a sphere in the background .The Human Hand represents the healing touch and health care of their dedicated teams of professionals available to brighten up the lives of the patients coming to them. The flame denotes the traditional values of honesty and selfless service towards their patients .The sphere in the background reflects their commitment to maintain international standards of excellence .

The institute is primarily extending the healthcare facilities to the patients suffering from non communication diseases (NCDs) like cancer, diabetes and chronic cardiovascular ailments and using latest technology with state of art equipments in order to treat them. One of its major associate in this field is Action Cancer Hospital ,Paschim Vihar ,Delhi

Action Cancer Hospital

Action Cancer Hospital (ACH) was promoted by the Manav Sevarth Trust of the Action Group and has been established with a mission to deliver world class affordable health care facilities to all the sections of the society with its healing and humanitarian touch,while upholding its high standards of ethical principles and professional competence with insistence on training and education leading to research.

ACH has come of age in offering world class comprehensive solutions in the departments of medical oncology ,surgical oncology ,radiation oncology,uro oncology,GI –surgery ,gyanae oncology, pediatric hematology ,pathology oncology and nuclear medicines .As early detection and the timely treatment substantially improve one's chances against cancer ,endeavor at ACH is to combat cancer with world class detection techniques, treatment and care givingits patients a better chance and better life. The infrastructure ,equipments and technology available at ACH matches with the best global standards .The various departments of oncology at ACH are as under:

FACILITIES AVAILABLE AT ACH

Medical Oncology

The Department of Medical Oncology deals with the systematic therapy of cancer including different solid tumors, hormonal therapy, targeted therapies, supportive care and bone marrow transplantation. A team of well qualified and trained oncologists with rich experience of managing all types of chemo therapy handle its side effects , ranging from common to rare. Action Cancer Hospital has a 46 bed day-care facility along with pain management and supportive care clinics.

Surgical Oncology

A team of highly qualified and experienced surgeons at ACH perform extensive radical surgeries in the most advanced sterile environment with the support of state-of-the-art OTs & ICUs, anesthesiologists , intensivists and post-operative care wards. The Surgical Oncology teams have extensive experience in performing surgeries of head and neck, breast, thoracic, upper and lower GI, hepatobillary, pancreatic, urology, gynecology, bone and soft tissue and skin tumors. Modular Operation Theaters at ACH meet the latest technologies & international standards. Central supplies & laminar air flow, seamless cladding on the walls and epoxy coating on the floor help maintain an electrostatic and infection-free environment.

Gynae Oncology

The Department of Gynae Oncology deals with female genital cancers. The department provides both preventive and curative treatments for cancers of uterus, cervix, ovary, vulva & vagina and gestational tumors. Special emphasis is given to preventive measures so that cancers can be detected and treated in pre-cancer or early stage. A team of well qualified and experienced doctors provide comprehensive care for gynecological cancers which includes both radical and ultra-radical surgical treatment, medical management and radiotherapy. Excellent facilities available for terminal care of patientsl with all supportive modalities. The following services are offered:

•   Radical surgery (Wertheim's hysterectomy) for Cancer Cervix stage I and II using latest

technology.

•   Fertility sparing surgery during early stages of cervix cancer patients who are keen to preserve their fertility.

•   Radiotherapy for advanced stage cervix cancer using latest radiation techniques like IGRT, IMRT, SRT and 3DCRT and Brachytherapy.
•   Radical surgeries for uterus and ovary cancers.

Neo-adjuvant   and adjuvant chemotherapy are performed for cancers of cervix, ovary and uterus using following latest techniques .

Radiation Oncology

The Department of Radiation Oncology at Action Cancer Hospital provides specialized therapies to all types of cancer patients using the latest technologies. Radio therapy is the most effective and important part of management of cancer patients. Radiation Oncology team consists of specialists in cutting-edge technology, carrying out research and continuously introducing new techniques to ensure that the patients benefit from advances in the field. The oncology department is at the forefront of cancer care.

This departmentt is equipped with dual photon energy Linear Accelerator (6 MV and 15 MV) to deliver both photons and electrons. The variety of energies facilitates in generating a tailor made plan for each types of patient. Extremely advanced treatment planning system (ECLIPSE), which includes CT simulator, advanced software technologies and medical imaging technologies (CT scan, PET CT, MRI). ECLIPSE integrated with ARIA helps in seamless data transfer and communication between all machines and systems. The various techniques used in department are:

- 3D Conformal Radiotherapy (3DCRT) . It helps in creation of individual , 3D digital data sets of patient tumors and normal adjacent anatomy .
- Intensity Modulated Radiotherapy (IMRT) .It helps in preparing highly precise radiation dose plan using latest imaging and computing facilities.
- Image Guided Radiotherapy (IGRT) .It helps in incorporating imaging techniques during each treatment session.
- Rapid Arc (VMAT) .This technique helps in completing the treatment in much lesser time duration (within 2-3 minutes) with better dose distribution in the tumor and minimum dose to the normal organs .
- Electron Beam Radiotherapy .This is used in treatment of skin tumors or very superficial tumors. It does not affect the normal tissue below.
- Stereotactic Radiotherapy (SRT, SBRT) SBRT (also known as SABR) uses advanced linear accelerators with specialized imaging technologies, including CyberKnife , TrueBeam , and Versa HD to treat selected tumors in much shorter time frame.
- Brachytherapy (HDR & LDR) .It reduces the radiation exposure in the surrounding healthy tissues, ensuring no radioactive seeds are left in the body after the treatment.. It is most commonly used in gynecological malignancies.

Gi Surgery

Action Cancer Hospital ensures expertise and experience to provide a comprehensive treatment center for patients with cancer and other chronic diseases. It has treated variety of gastrointestinal cancers including esophagus, gastric (stomach), bowel, colorectal, liver, bile duct, gall bladder and pancreatic cancers. A multidisciplinary team provides best treatment and care for GI cancer patients and also taking into account the individual patient's preferences and circumstances using the following methodologies :

- A gastrointestinal multi-disciplinary cancer team comprising of surgeons, medical and radiation oncologists, gastroenterologists, radiologists and pathologists
- On-site radiation oncology provides radiation therapy to both inpatients and outpatients
- HIPEC treatment for advance colorectal cancers.
- Palliative care under the patient's usual specialist and/or a palliative care specialist
- Cancer Support Centre with educational information, support and counselling
- An extensive range of diagnostic and allied health services

Uro Oncology

In Uro Oncology department multidisciplinary diagnosis and genitourinary cancers, including prostate, testis, and penis in men and kidney and bladder cancers in both, men and women are treated . A team of highly skilled doctors specialising in surgical techniques including open,laparoscopic and robotic surgery are providing treatment for all types of urologic cancers. The following services are offered:

- Cancer detection, screening, and diagnosis.
- Highest level of treament and care to patients with oncological disorders.
- The Pediatric Oncology department offers treatment to children below the age of 18 years.
- Surgical, medical, and radiation oncology consultations
- Chemotherapy
- Hormone therapy
- Focal therapy
- Targeted therapies
- Immunotherapy
- Radiation treatment
- Supportive services, including counseling, nutrition, and sexual health

Pediatric Haematology – Oncology

Providing cancer treatments and care of the highest level to patients with oncological disorders, the Pediatric Oncology department at Action offers treatments to children below the age of 18 years. The Pediatric Oncology department diagnoses and treats the following conditions:

- Leukemia
- Lymphoma
- Brain Tumor
- Wilms' Tumor
- Neuoblastoma
- Retinoblastoma
- Rare Tumors
- Osteosarcoma

20

- Ewing's Sarcoma
- Sarcomas
- Thalassemia
- Anemia - All types
- Immunothrombocytopenia (ITP)
- Coagulation Disorders

Pain And Palliative Clinic.

Cancer and its treatment often resulted in developing side effects in patients. Relieving patients from symptoms and side effects is an important aspect of cancer care. This approach is known as symptom management, supportive care, or palliative care. Palliative care is any treatment that focuses on reducing symptoms, improving quality of life and supporting patients and their families. Any person, regardless of age or type and stage of cancer, may receive palliative care. More than 50% of patients suffer from severe pains during advanced stage of cancer. Approximately 30% of patients with advanced cancer will not suffer due to severe pain, 80% of those who do, can achieve substantial pain relief by the systematic use of oral analgesia, appropriate adjuvant therapies and multi-faceted supportive strategies.

These treatments can be taken along with all other ongoing cancer treatments. Radio frequency Ablation, Neurolysis, Cementoplasy, PRF Ablation are some of the examples of MIPI. State-of-the-art Pain Relief Implants are utilized to alleviate the pains of some of the patients facing acute pains. . Comprehensive pain assessment and management are foundational goals within the scope of palliative care at Action Cancer Hospital. Palliative care and pain management often includes medication, nutritional support, relaxation techniques, spiritual support, emotional support, and other therapies.

Pathology Oncology

Oncology Services

- Surgical pathology (histopathology, cytopathology and immunohistochemistry)
- Hematopathology
- Cytogenetic laboratory (F.I.S.H and Karyotyping)
- Molecular laboratory

The department of surgical pathology includes the sections of Histopathology, Cytopathology and Immunohistochemistry. The department's biggest strength is its highly experienced team of Oncopathologists. The laboratory has the best and the latest

equipments with backups to ensure fastest TAT at all times. To keep the analytical process of the department quality at par with recommended international benchmarks, the lab regularly participates in proficiency testing (UKNEQAS ,AIIMS.)

The Immunohistochemistry section, has more than 120 theranostic and diagnostic markers. The department has FDA approved tests like ALK-1 and PDL-1 on fully automated immunostainer. The cytopathology section receives body fluids, FNAC material, and exfoliative cytology, including gynecological smears. The department uses liquid based cytology and cell block preparation.

The Hematopathology Section Lab has fully automated 5-part differential cell counters, fully automated coagulation analyzers with ultra-modern 3-lasers, 8-colour flow cytometer. The reports carry comprehensive interpretation after integration of tissue morphology along with ancillary testing such as flow cytometric analysis, molecular diagnostic testing and cytogenetic results. The institute faculty has expertise in reporting minimal residual disease assay (MRD) by flow cytometry (ALL, AML and myeloma).

The Cytogenetic laboratory and Molecular laboratory at ACH will soon be fully functional with state of art facility catering to the highest quality diagnostic testing for cancer patients.

Nuclear Medicine: Diagnostic and Therapeutics PET.CT & Gamma Camera Nuclear

Nuclear Medicine or Department of Radio-isotope Imaging is equipped with a state-of-the-art PET.CT and Dual head Gamma Camera by GE. The dual-head gamma camera is used for the whole body and SPECT imaging. It detects the disease at functional level. The functional changes always precede the structural changes and therefore, the isotope imaging helps in detecting the disease much earlier than it manifests itself with structural changes to be detected with USG or CT imaging. The imaging is used for a wide array of diseases involving almost every organ system of the body. Bone-scan has been the main stay for bone metastases detection for a long time. Stress myocardial perfusion imaging is used for assessment of ischemia in cardiac patients and also for assessing treatment benefit in known coronary heart disease patients. PET.CT imaging brings the molecular imaging for disease detection. , PET study also helps in assessing treatment response during chemotherapy. PET also finds its use in cardiology and neurology cases. PET.CT can help in early detection of dementia and can be helpful in preventing unnecessary bypass surgeries in heart patients by detecting the viable myocardium.

MISCELLANEOUS ASPECTS

Patient Care for Economic Weaker Section at ACH

Action Care Hospital also cater for the requirements of economic weaker section(EWS) by providing free medical treatment to patients whose income is less than Rs. 8554/ on production of BPL card or income proof certificate. Out of 100 bedded 10 beds are allotted for free treatment for EWS category.

Free Cancer And General Health Checkup Camps

ACH also organizes free cancer screening and general health check up camps and various events on regular basis as under:

Cancer awareness talks

Free screening of cancer

Cancer awareness and multispeciality health checkup camps

Talks on innovations in radiotherapy

Medical tourism

ACH also promotes medical tourism by providing treatment to overseas patients coming to India .

National best cancer hospital 2020

ACH has been nominated as the best cancer hospital in Feb 2020 and received the coveted award from honorable minister of state for health and family welfare of India ,Sh Ashwini Chobey

REFERENCES

https://www.actionhospital.in/about-us

https://www.actionhospital.in/healthcare#

https://www.actioncancerhospital.com/

file:///C:/Users/LALIT/Downloads/feb-action1(1).pdf

https://www.actioncancerhospital.com/#modal-one

Abstract

This report discusses about the unique nature of prevailing COVID-19 pandemic and its probable impact on global economy. As the number of infected cases increasing at an alarming rate daily, clouds of uncertainty looming large the world over. The novel Corona virus considered to be emerged from Wuhan province of China has spread its tentacles to the better parts of the world and wreak havoc on mighty G7 countries resulting in WHO declaring it an International Emergency .As the world at present is interconnected and is much more integrated , the impact of this deadly virus certainly goes beyond the burden of mortality.The government of various affected countries are busy in preparing acontingency plans and aid packages to sustain their respective economies. The report also tries to highlight the pandemic has disrupted the global supply chains across the globe ,how the consumption pattern of consumers have changed and resulted in creating demand and supply shock, how more and more companies shutting down their operations ,revising their production estimates or announcing lay offs and how global markets have registered sharp downfalls and thus ensuring to push the entire world into global recession. The report also endeavors to bring out certain positive outcomes, lessons learnt and recommend certain measures to take on pandemic of such a magnitude in future if it does.

Background

The world has witnessed many pandemics in last 100 years or so , **Spanish Flu(or Global influenza) in 1918 ,Asian Flu(H2N2) in 1957,Hong Kong Flu(H3N2) in 1968 Avian Flu (N1H1) in 2009,Severe Acute Resiratory Syndrome (SARS) in 2002 , Middle East Respiratory Syndrome (MERS) in 2012 and Ebola Virus Disease(EVD)in 2014.** The available evidence from prior infectious diseases can only give us certain idea about the economic shocks that can be posed by the current outbreak of COVID-19 pandemic. According to experts and the evidences suggest no correlation between economic impact and mortality rates. Some of the worst case scenarios, for current pandemic are based on the Spanish Pandemic of 1918 which killed over 40 million people worldwide after infecting more than one-third of the world population .If a similar contagion of similar virulence occurred today,when world population is much larger and quick travel time around the globe ,it could lead to more than 80 million deaths. In addition to the tragic levels of mortality and pandemic pains ,the global economy and trade are likely to be paralyzed extensively which will take long time to recover from.

Review Of The Literature

S. no	Study name	Author and publication	Methodology	Remarks
1	Economic effects of coronavirus outbreak (COVID-19) on the world economy	Nuno Fernandes,University of Navarra ,IESE business school		
2	The Global Economic Impact of COVID-19: A Summary of Research	Prof. Shlomo Maital Ella Barzani,,Samuel Neaman Institute for National Policy Reasearch		
3	Economics in the Time of COVID-19	Edited by Richard Baldwin and Beatrice Weder di Mauro CEPR Press,London		
4	What Will Be The Economic Impact Of Covid-19 In The Us? Rough Estimates Of Disease Scenarios	Andrew Atkeson, National Bureau Of Economic Research		
5	What Coronavirus could mean to the Global Economy	Harward Business Review		

Unique Nature Of Current Pandemic

It is very difficult to compare existing crisis of COVID-19 with the other global crisis ,the world has faced in the past due to the changing dynamics of the world in last decade or so. This time we are experiencing number of new challenges which prevent us from simple comparison. The COVID-19 pandemic is very different in flowing aspects:-

a) It is a pandemic of higher magnitude as other pandemics were relatively smaller
b) It is more contagious than SARS and other viruses.
c) It is not restricted to economically less dominant countries only but elite G7 nations plus China are hit hardest by the cantagion.
d) The world at present is much more integrated and interconnected.
e) The current crisis has generated spillover effects by disrupting the supply chains.
f) It has led to simultaneous destruction of demand and supply .

Current Global Pandemic Scenario

Over the past couple of months many countries have followed the examples of China's lockdown and have started to put restrictions on public life resulting in mobility restrictions and confinement , organizing massive quarantine hospitals ,increase in public health measures ,protection of elderly and promoting social distancing. There are also limitations on travel, companies sending their employees home , airplanes grounded etc. Most of the western countries are 1.5 to 2.5 months behind in terms of the implementation of corrective measures and it is not sure that lockdown efforts to control the pandemic will be as successful as in China. The harsh reality is that we don't have any 21st century tool to fight COVID-19 and all we have the methods that were used in early 20th century to control the epidemic and tend to be economically disruptive. In economic perspective all the adopted measures reduce productivity which is akin to temporary drop in employment.

Effects Of Past Pandemics On World Economy

The past pandemics revealed that even if the health impact of an outbreak is relatively limited, its consequences on economic front can be devastating as well as long lasting.For e.g:-

a) EBOLA outbreak in West Africa in 2013-16 led to 11,300 deaths and resulted in loss of US $ 53 Billion and 20 % drop in Sierra Lone GDP in 2015.
b) Liberia GDP declined 8% from 2013 to 2014 even the country death rate fell during this period

Role Of G7 Plus China In World Economy:Supply Chain

G7 plus China economies saw an exponential growth of cases in recent days.They account for :-

a) 60% of world supply and demand.
b) 65% of world manufacturing.
c) 41% of world exports

These economies constitute key global   chains, so their woes will initiate **supply chain contagion** in virtually all the countries. The situation can be described aptly in a quip: "**when these economies sneeze ,the rest of the world catch cold".**

The US, China and Germany form three interconnected hubs in the world's supply chain for Information and Communication Technology (ICT) goods and control the world economy in following fashion:-

a) China is central to the entire global network and is infact the workshop of the world. So manufacturing disruption here will result in secondary supply shocks in manufacturing sectors in almost all the nations.China is currently world's largest exporter and importer. China represented approximately 40% of the world growth in 2019. China's GDP has decreased in the first quarter. Since China is approximately 16% of the global economy, that is bad news for the whole world.
b) There is strong regional dimension in supply chains. The fact that China ,Japan and Korea are among the hardest hit means supply chain shock will specially strongly felt in Asia
c)   Similarly Germany is network hub in Europe and is likely to major source of economic contagion in Europe.
d) Similar point apply to US.

India being the world seventh largest economy is not very involved in supply chains may be shielded somewhat from this type of economic contagion

Likely World's Economy Response To Post-Pandemic Scenario

In the current scenario, world economy likely to respond to the outbreak in a very asymmetric manner because it gets influenced through many channels . Globally, economies are connected by cross-border flows of:

a) Goods
b) Services
c) Knowhow
d) People
e) Financial Capital
f) Foreign Direct Investment
g) International Banking
h) Exchange Rates

Although, all the sectors of economy are going to be affected but in an uneven manner, as the same is dictated by the economic structure of any country which varies from one another, thus some will be more effected than the others. **For example**, countries like Greece,Portugal or Spain with more service oriented economies (reliant on tourism) will be affected more and will have more jobs at risk. The traditional measures of evaluating the economic damages like mortality and illness ,loss of time ,income ,direct and indirect expenditure on medical care in all probability will underestimate the true cost of current crisis. Therefore , accurate forecast or estimate of economic damages can be made only if we have the reliable data which is difficult since the pandemic is still in growing phase and its even more difficult to predict what proportion it is going to assume in near future. There is too much of uncertainity to be certain about outcomes but it is clear this pandemic will cause economic shock which will cause deep scars and lingering pain . The best estimate to measure global economic losses can be made by predicting the various scenarios which might be realized in coming time. However, in response to the current pandemic situation as on date following effects having strong economic repercussions have already been witnessed:-

a) In US ,which is facing the maximum brunt ,more than 10 million jobs were lost within two weeks of March.
b) 6.7 million US workers filed for unemployment benefits.
c) In industrial sector car companies shutting operations for lack of parts
d) Majority of nations including China, GDP decreased in first quarter of the year .
e) Stock markets around the world significantly down.

f) Supply chains and global trade getting disrupted in every region of the world.
g) Substantial drop in travel and leisure.
h) Car manufacturers suspend production
i) Tokyo Olympics postponed to 2021
j) Various sectors affected by lockdown-transport, hotel ,retail ,entertainment and restaurants
k) All sporting events including NBA,IPL,football leagues and formula 1 susppended till further notice

Key Assumptions In Economic Forecasts

As discussed   earlier it is difficult to forecast the economic impact of the COVID-19 crisis in the prevailing   uncertain circumstances as there is no historical benchmark which can be used directly.Infact no pandemic had started the way COVID-19 did and influence supply and demand simultaneously,in a period when central bank has no fire power left (due to zero or negative interest rates already in place).Therefore ,we   need to use available data in best possible manner to formulate key assumptions in the economic forecasting model.

The yearly GDP of the country is split into months ignoring seasonality.On basis of the duration of the current shutdown of economic activity and probable recovery period for the   different sectors,it is assumed COVID-19 crisis can be categarised into three scenarios:-

a) Base or mild scenario of 1.5 months
b) Shutdown for 3 months
c) Shutdown for 4.5 months

Probable impact on the GDP of various countries under various scenarios are at appendices .

Conclusion

With rapid spread of COVID-19 we are facing a totally new type of crisis. According to expert epidemiologists , COVID-19 is here to stay and not likely to disappear in near future. It may take an year or so before vaccines are commercially available.Until then,we have to resort to conventional means of 19 century like quarantine,social distancing,limited social contacts and closure of public places and transportation. The resilience of an individual ,family ,neighbourhood,community,region ,nation and our economic ,social and healthcare systems will be tested severly in the months to follow.

There is no correlation between mortality rate and risk to global economy. A global recession seems to be inevitable and how deep and long the downturn will depend on the success o measures adopted to prevent the spread of the contagion, the affect of government policies to alleviate liquidity problems in SMEs and to support families under financial distress. As the duration of lockdown and how the recovery will take place is still not known ,several scenarios are used . In the base scenario of 1.5 months GDP growth would take a hit ,ranging from 3-6 % depending on the country .In other scenarios ,GDP can fall more than 10% and in some countries more than 15 %.

References

https://scholar.google.com/scholar?q=Economic+effects+of+coronavirus+outbreak+%28COVID-19%29+on+the+world+economy+&btnG.x=0&btnG.y=0&hl=en

https://scholar.google.com/scholar?q=The+Global+Economic+Impact+of+COVID-19%3A+A+Summary+of+Research&btnG.x=0&btnG.y=0&hl=en

https://scholar.google.com/scholar?q=ThEconomics+in+the++Time+of+COVID-19&btnG.x=0&btnG.y=0&hl=en

https://scholar.google.com/scholar?q=What+Will+Be+The+Economic+Impact+Of+Covid-19+In+The+Us%3F+Rough+Estimates+Of+Disease+Scenarios&btnG.x=0&btnG.y=0&hl=en

https://hbsp.harvard.edu/product/H05GO5-PDF-ENG?itemFindingMethod=Featured+Collection

Table 1: Economic impact (% of GDP) – 1.5 months scenario

	Economic Impact	confidence margin
Argentina	-4.3%	[from -5.7% to -3.0%]
Australia	-4.4%	[from -5.8% to -3.1%]
Austria	-5.5%	[from -7.1% to -3.9%]
Belgium	-4.3%	[from -6.0% to -2.6%]
Brazil	-3.9%	[from -5.3% to -2.7%]
Canada	-3.9%	[from -5.3% to -2.5%]
China	-4.3%	[from -5.6% to -2.9%]
Czech Republic	-4.6%	[from -6.3% to -2.9%]
France	-4.3%	[from -5.7% to -2.9%]
Germany	-4.8%	[from -6.3% to -3.2%]
Greece	-6.2%	[from -7.7% to -4.7%]
India	-4.0%	[from -5.3% to -2.7%]
Ireland	-4.8%	[from -6.8% to -2.8%]
Italy	-5.0%	[from -6.4% to -3.5%]
Japan	-3.6%	[from -4.9% to -2.3%]
Mexico	-5.4%	[from -6.9% to -3.9%]
Netherlands	-4.2%	[from -6.0% to -2.5%]
Norway	-4.4%	[from -5.9% to -3.0%]
Poland	-3.9%	[from -5.4% to -2.3%]
Portugal	-5.9%	[from -7.5% to -4.4%]
Russian Federation	-3.6%	[from -5.0% to -2.2%]
Saudi Arabia	-4.4%	[from -5.8% to -2.9%]
South Africa	-4.3%	[from -5.7% to -2.9%]
South Korea	-3.8%	[from -5.3% to -2.3%]
Spain	-5.2%	[from -6.7% to -3.7%]
Sweden	-4.5%	[from -6.1% to -3.0%]
Switzerland	-4.6%	[from -6.2% to -3.0%]
Turkey	-4.6%	[from -6.1% to -3.2%]
United Kingdom	-4.5%	[from -6.0% to -3.1%]
United States	-3.8%	[from -5.1% to -2.5%]

In this section, we compute the expected GDP growth for each country under the base scenario. Table 2Table 2: shows the results.

Table 2: Estimated GDP growth in 2020 (and confidence margin) - 1.5 months scenario

	Growth in GDP	confidence margin
Argentina	-5.0%	[from -6.4% to -3.7%]
Australia	-2.2%	[from -3.6% to -0.8%]
Austria	-3.8%	[from -5.4% to -2.2%]
Belgium	-3.0%	[from -4.7% to -1.3%]
Brazil	-1.9%	[from -3.2% to -0.6%]
Canada	-2.1%	[from -3.5% to -0.7%]
China	1.6%	[from 0.2% to 2.9%]
Czech Republic	-2.0%	[from -3.7% to -0.3%]
France	-3.0%	[from -4.5% to -1.6%]
Germany	-3.5%	[from -5.1% to -2.0%]
Greece	-3.9%	[from -5.5% to -2.4%]
India	3.1%	[from 1.7% to 4.3%]
Ireland	-1.3%	[from -3.3% to 0.7%]
Italy	-4.5%	[from -5.9% to -3.0%]
Japan	-3.1%	[from -4.5% to -1.9%]
Mexico	-4.1%	[from -5.6% to -2.6%]
Netherlands	-2.6%	[from -4.3% to -0.9%]
Norway	-2.0%	[from -3.5% to -0.5%]
Poland	-0.8%	[from -2.3% to 0.7%]
Portugal	-4.3%	[from -5.9% to -2.8%]
Russian Federation	-1.7%	[from -3.1% to -0.4%]
Saudi Arabia	-2.2%	[from -3.7% to -0.8%]
South Africa	-3.2%	[from -4.6% to -1.8%]
South Korea	-1.6%	[from -3.0% to -0.1%]
Spain	-3.4%	[from -4.9% to -1.9%]
Sweden	-3.1%	[from -4.6% to -1.6%]
Switzerland	-3.3%	[from -5.0% to -1.7%]
Turkey	-1.7%	[from -3.1% to -0.3%]
United Kingdom	-3.1%	[from -4.5% to -1.7%]
United States	-1.7%	[from -3.0% to -0.4%]

Table 3: Estimated GDP growth in 2020, assuming shutdown lasts 3 months

	Growth in GDP	confidence margin
Argentina	-8.5%	[from -10.8% to -6.3%]
Australia	-5.8%	[from -8.1% to -3.5%]
Austria	-8.1%	[from -10.8% to -5.4%]
Belgium	-6.8%	[from -9.7% to -3.9%]
Brazil	-5.2%	[from -7.4% to -3.0%]
Canada	-5.5%	[from -7.9% to -3.1%]
China	-1.9%	[from -4.2% to 0.3%]
Czech Republic	-5.9%	[from -8.8% to -3.1%]
France	-6.6%	[from -9.0% to -4.2%]
Germany	-7.4%	[from -10.0% to -4.9%]
Greece	-8.6%	[from -11.1% to -6.1%]
India	-0.2%	[from -2.5% to 2.0%]
Ireland	-5.5%	[from -8.8% to -2.2%]
Italy	-8.4%	[from -10.9% to -6.0%]
Japan	-6.3%	[from -8.5% to -4.1%]
Mexico	-8.3%	[from -10.8% to -5.8%]
Netherlands	-6.3%	[from -9.3% to -3.4%]
Norway	-5.7%	[from -8.2% to -3.2%]
Poland	-4.2%	[from -6.9% to -1.6%]
Portugal	-8.8%	[from -11.4% to -6.3%]
Russian Federation	-4.9%	[from -7.3% to -2.6%]
Saudi Arabia	-5.9%	[from -8.4% to -3.4%]
South Africa	-6.8%	[from -9.2% to -4.4%]
South Korea	-4.9%	[from -7.4% to -2.4%]
Spain	-7.5%	[from -10.0% to -5.0%]
Sweden	-6.8%	[from -9.4% to -4.3%]
Switzerland	-7.2%	[from -10.0% to -4.5%]
Turkey	-5.4%	[from -7.8% to -3.0%]
United Kingdom	-6.8%	[from -9.2% to -4.4%]
United States	-5.0%	[from -7.2% to -2.8%]

Table 4: Estimated GDP growth in 2020, assuming shutdown lasts 4.5 months

	Growth in GDP	confidence margin
Argentina	-12.4%	[from -16.6% to -9.1%]
Australia	-9.8%	[from -14.1% to -6.3%]
Austria	-13.1%	[from -18.0% to -8.9%]
Belgium	-11.3%	[from -16.4% to -6.5%]
Brazil	-8.8%	[from -13.0% to -5.5%]
Canada	-9.2%	[from -13.6% to -5.5%]
China	-5.8%	[from -10.0% to -2.4%]
Czech Republic	-10.6%	[from -15.6% to -5.8%]
France	-10.6%	[from -15.0% to -6.9%]
Germany	-11.9%	[from -16.6% to -7.9%]
Greece	-13.8%	[from -18.6% to -10.0%]
India	-3.8%	[from -8.0% to -0.5%]
Ireland	-10.8%	[from -16.3% to -5.0%]
Italy	-12.9%	[from -17.4% to -9.2%]
Japan	-9.7%	[from -13.8% to -6.4%]
Mexico	-13.0%	[from -17.7% to -9.2%]
Netherlands	-10.8%	[from -15.9% to -6.0%]
Norway	-9.9%	[from -14.4% to -6.0%]
Poland	-8.2%	[from -12.9% to -4.0%]
Portugal	-14.0%	[from -18.8% to -10.0%]
Russian Federation	-8.5%	[from -12.8% to -4.9%]
Saudi Arabia	-10.0%	[from -14.5% to -6.1%]
South Africa	-10.8%	[from -15.2% to -7.2%]
South Korea	-8.7%	[from -13.2% to -4.8%]
Spain	-12.1%	[from -16.7% to -8.3%]
Sweden	-11.2%	[from -15.8% to -7.1%]
Switzerland	-11.8%	[from -16.6% to -7.3%]
Turkey	-9.6%	[from -14.0% to -6.0%]
United Kingdom	-11.0%	[from -15.4% to -7.3%]
United States	-8.5%	[from -12.6% to -5.3%]

CAN ARTIFICIAL INTELLIGENCE(AI) SOLVE THE HEALTH WORKFORCE CRISIS

Healthcare sector is under a considerable pressure to meet the requirements of patients not only in India but the world over . Patients are no longer passive but have become active participants . There is a worldwide shortage of doctors and nursing staff who are struggling to meet the needs of the patients due to ageing and exhausted physicians and rapidly increasing demand for persistent healthcare. The effective functioning of healthcare system depends on availability , acceptability, accessibility, and efficiency of its health workforce. Globally ,there is shortage of about 17.4 million health workforce and with increase of life expectancy (likely to result in doubling of population above 65 years in next 10 years) and number of cases in chronic illness ,the demand is constantly growing. (Meskó, 2018)[i]

  Artificial intelligence (AI) has an innate ability to counter the problems posed by human resources crisis as far as health sector is concerned by facilitating decision-making, big data analytics, diagnostics and administrative fields . First and foremost there is a need to tackle obstacles posed by the legal, technological and ethical development. This crisis is widening worldwide, and it is obvious that it is not possible to provide universal health coverage without adequate and well qualified workforce. Mesko has posed few relevant questions inorder to address the crisis. How effectively disruptive technologies can solve the variety of human workforce problems in health sector ? Can technological developments result in empowerment of physicians or substitute them? How can the medical curriculum, including post-graduate education prepare professionals for the meaningful use of technology? These questions have been coming up for last 10-15 years , and disruptive technologies look promising to answer them with digital health burgeoning. While there are even more questions to address, author's stand is that AI is not meant to replace caregivers, but those who use AI will probably replace those who don't. (Meskó, 2018)

(**Keywords :** Artificial intelligence, Digital health ,Healthcare workforce, Healthcare, Physicians, Medicine,.)

LITERATURE REVIEW

MAIN POINTS

ARTIFICIAL INTELLIGENCE(AI) AND ITS ADVANCEMENT

 AI is the natural progression of latest technology and has made significant advancement in the field of Deep Learning ,Biometrics, Semantic Technology, Image and Video Analysis, Text Analytics and Natural Language Processing(NLP). Artificial intelligence appears to be promising to fill these gaps which have been cause of concern for decades with digital

health taking over the health sector by storm. AI has great potential due to the fact that it has easy integration capabilities in the healthcare space .Infact ,many health care organizations have entered this space with AI based EMR because of which large amount of data have been generated , analysed and interpreted to offer accurate insights . For example Android and ioS device based application apps allow patients to manage their health more proactively and track their fitness details.

AI in varying forms and degrees has begun to appear in a wide spectrum of technologies from the phones we used to communicate to the supply chains that bring goods to market .It is transforming the way we interact, consume information and obtain goods and services.In healthcare sector ,the impact of AI, through Natural Language Processing (NLP) and Machine Learning (ML) is transforming healthcare delivery.

AI is broadly categorised into three stages: artificial narrow intelligence (ANI), artificial general intelligence (AGI) and artificial superintelligence (ASI) . In the coming decade, ANI has potential of being used in the health sector for analyzing large data, establishing new correlations and generally supporting healthcare providers jobs. (bostrom)

HOW IS AI USED IN HEALTHCARE

Artificial Intelligence (AI) in healthcare is the use of complex algorithms and software to emulate human cognition in the analysis,interpretations and comprehension of complicated medical and healthcare data. Applications of AI in healthcare falls mainly into three categories:-
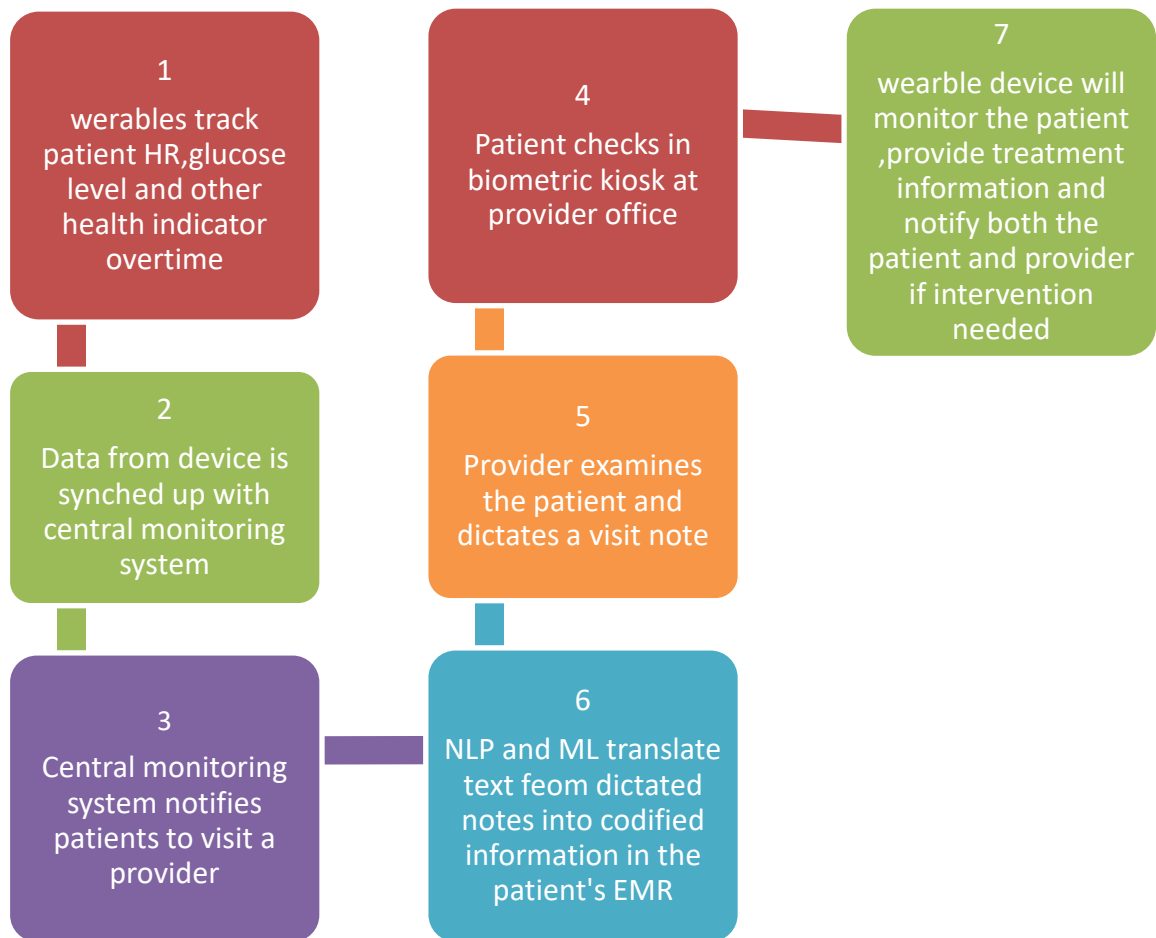
- Clinician-oriented AI
- Patient-oriented AI.
- Administrative and operational oriented AI.

The advancement of Artificial Intelligence(AI) usage have been witnessed in following fields :-

- AI assisted Robotic surgery
- Virtual nursing assistants
- Aid clinical judgement diagnosis
- Work flow and Administrative Tasks
- Image Analysis

The future of healthcare could include tasks that range from simple to complex, everything from answering the phone(e-consult or telemedicine) to medical record review ,population health trending and analytics ,therapeutic drug and device design ,reading radiology images, making clinical and treatment plans and even talking to patients. This future journey of patient under AI environment can be understood with the help of following sequence:

PATIENT'S JOURNEY IN AI ENVIRONMENT

1

werables track patient HR,glucose level and other health indicator overtime

2

Data from device is synched up with central monitoring system

3

Central monitoring system notifies patients to visit a provider

4

Patient checks in biometric kiosk at provider office

5

Provider examines the patient and dictates a visit note

6

NLP and ML translate text feom dictated notes into codified information in the patient's EMR

7

wearble device will monitor the patient ,provide treatment information and notify both the patient and provider if intervention needed

HOW HUMAN RESOURCE CRISIS LIKELY TO SHAPE UP IN FUTURE

Healthcare system is constantly growing and as a result the requirement of healthcare work force is likely to expand in differing quality worldwide. Almost half a billion people lack access to one or more essential health services, and five billion people do not have access to healthcare services at all . One-third of physicians are over 55 years of age, and same number of them are expected to retire in the next 10 years . As the new generation of medical professionals looking for a limited number of working hours to strike a balance in work –life relationship, this may further increase shortages. In short, healthcare workforce crisis is imminent owing to following reasons:-

- Worldwide shortages of doctors
- Ageing and burnout of physicians
- Increase demand for chronic care.

It may result in development of substance abuse, somatic symptoms, psychological and sleep disorders ; as well as maladaptive coping strategies among the healthcare workforce . As physicians' wellbeing is related to the quality and the safety of outcome, this further pose challenges. The health workforce crisis is increasing across the globe, and it is obvious that without adequate and capable workforce there is no way to provide quality healthcare. (Meskó, 2018)

OPPORTUNITY WITH ARTIFICIAL INTELLIGENCE

AI has range of applications across the healthcare sector. It can perform descriptive ,predictive and prescriptive functions . In countries like India , as far as health care sector is concerned AI is currently augmenting human capacity rather than to replacing human labor altogether.There is a tremendous opportunity of growth in machine learning and artificial intelligence through the creation of high resolution clinical data sets and installing necessary mechanisms for sharing of data and collaborative investigation to establish both efficacy and safety as far as health sector is concerned,Machine learning based diagnosis, care management and monitoring are needed to be adopted in practice.

There is a need to convince clinicians and policy makers, machine learning enabled systems to deliver outcomes of interest in practice through experimental trials or through real world observations of performance. Machine learning, however, is a moving target, and such initiatives may need to be repeated as algorithms improve with greater availability of data and better techniques.

CHALLENGES ENROUTE

AI powered applications are accompanied by certain challenges. In order to ensure widespread adoption and implementation there is a requirement of effective framework of laws to govern privacy and data integrity ,while dealing with the issues of cultural acceptance ,informed consent,liability and explainability

The leadership needed to embrace artificial intelligence and machine learning is currently lacking in healthcare sector . The issues pertaining to the implementation are being raised and actively discussed among the experts of academic AI community .However, academic AI community efforts will not suffice to overcome these challenges but will require a concerted efforts from all the stakeholders like policy makers citizens, patients and clinicians. The apprehensions regarding wholesale displacement of health workforce by AI is accentuated, but the opportunity cost of not embracing AI is fearsome for sure as continuing business as usual with piecemeal implementation of AI will not realize its potential for transformation of health systems.

There is an air of uncertainty how Artificial Intelligence and machine learning going to impact the healthcare workforce . Broadly ,it is policy makers concern that in all probability , the impact of above mentioned 'displacement effect' will be felt most severlyy by lower skilled manual and non-manual occupations (West, 2015). In health systems with currently sufficient numbers of health workforce, this displacement may generate a larger pool of workers seeking employment, particularly those involving psychological and emotional well-being and caring for the elderly and disabled – typically occupations that are considered skilled and non-automatable. (West, 2015)

With latest machine learning systems and a greater supply of front line care workers, there is an opportunity for better chronic disease management and community based care for ageing people. However, this may not be suffice to counteract the increasing effects of automation on labor markets, and governments will need to consider proactive measures in terms of investments and retraining workers displaced to equip them for alternative opportunities, including new roles in creating and harnessing of data sets and machine learning algorithms.

Conversely, in low- and middle-income countries where there is a severe shortage of health workforce, machine learning offers the great opportunity for expanding health care service coverage and increase the chances of achieving universal health coverage

This may incur a significant cost to health systems, which will be needed to offset by improvements in performance and health workforce efficiency.

CONCLUSION

AI will eventually be evidence- based ,widespread and affordable .New technology will reduce costs in providing care ,making it faster and more efficient leading to change in the medical profession that will involve more tasks related to creativity and critical thinking than time –consuming repetitions .In about 20 years ,50 % of jobs will be outdated or not needed anymore ,and healthcare will not be an exception. (Frey CB, 2013)

While AI demonstrates significant potentials in improving diagnostics it will probably not solve the HR crisis in healthcare or at least will not start with that .The chances for improving the job environment and conditions of physicians is higher ,which can eventually lead to general improvement in quality of healthcare.

If it is able to take over important tasks from medical professionals, it might even bring forward the renaissance era in the doctor-patient relationship. Therefore our stand is AI is not meant to replace medical professionals but the one with AI will probably replace those who don't.

REFERENCES

bostrom, n. *superintelligence.*

Frey CB, O. M. (2013).

Meskó, B. (2018). *Will artificial intelligence solve the human resource crisis in healthcare?*

West, D. M. (2015). *What happens if robots take the jobs? The impact of emerging technologies on employment and public policy .*

https://www.infosys.com/industries/healthcare/features-opinions/Documents/reimagining-healthcare-opportunities.pdf
https://www.researchgate.net/publication/326379376_Will_artificial_intelligence_solve_the_human_resource_crisis_in_healthcare
https://cis-india.org/internet-governance/ai-and-healthcare-report