Prof. Rajinder K Dhamija, Director IHBAS, New Delhi (India)

Professional Summary

Prof. Rajinder K Dhamija is an Australian-trained neurologist and the currently Professor of Neurology and Director Institute of Human Behavior and Allied Sciences New Delhi India. He is MD from Medical College Rohtak (Haryana). Thereafter he did his DNB(Neurology) From National Board of Medical Examinations New Delhi and FRACP from Melbourne Australia . He has received CCST (Eqv.) from Specialist Training Authority of Medical Royal Colleges (UK) and FRCP (London). He established Neurology Department at Lady Harding Medical College New Delhi and was Head of the Department till January 2022 before taking over as Director IHBAS. He is also an advisor for Royal College of Physicians (London) and has been invited to present his research and lecture at several international meetings in the USA, Canada, Japan, Australia, Thailand, Morocco, Malaysia, Cameroon and Bhutan.

Dr. Dhamija was awarded Commonwealth academic fellowship in 2000 and 2003 and WHO fellowship in National Stroke Research Institute Melbourne Australia in 2004. He was also WHO fellow at National institute of Epidemiology in 2011. Prof. Dhamija has been an expert /advisory member for several organizations including UPSC, J &K Public Service Commission, ICMR , UGC and Member National Task Force and Co Chair PG expert Group PG National Medical Commission . He has published more than 107 peer review indexed research papers and book chapters including publications in Lancet, Neurology and BMJ. He has been DM Examiner for various universities including AIIMS Rishikesh, Delhi University, IP University , Rajasthan University of Health Sciences , Mahatma Gandhi university and SKIMS Srinagar. He is also Chair of Movement Disorders at World Federation of Neuro-rehabilitation (WFNR).

Prof. Dhamija was Addl. Personal Physician to Hon'ble Prime Minister of India. He has received several awards and honors including 33rd S Radhakrishnan Memorial National Medical Teacher Award in 2017, Dr B C Bansal and Mrs. Uma Devi Oration in Clinical Medicine, Prof. and National Award for Science Communication from Ministry of Science and Technology Govt of India. Prof Dhamija is passionate about public awareness and health education . He has been anchoring monthly radio show on health education and has done more than 400 shows on almost all health topics on All India Radio and national TV Channels. He is a columnist and also writes regularly in National Newspapers on Health related issues.

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Education and Training:

Qualification	School	Year	Comments
M.B.B.S.	Medical College & Hospitals, Rohtak (India)	1985	Medalist in Final M.B.B.S
M.D.	Medical College & Hospitals, Rohtak (India)	1991	
CCST (Equivalent) RCP London	Royal College of Physicians (London)	2005	
FRCP (London)	Royal College of Physicians (London)	2008	
Diplomate of National Board Neurology (India)	National Board of Examination New Delhi INDIA	2009	
FRACP	Royal Australasian College of Physicians (Australia)	2009	

Professional Experience:

- **Professor of Neurology and Director Institute of Human Behavior and Allied Sciences (IHBAS) New Delhi INDIA. (14.01.2022 to till date)**

- My current role is clinical patient care, teaching and research as Professor of Neurology as well as administrative Head of Institution as Director IHBAS.

- Institute of Human Behavior and Allied Sciences (IHBAS) id Autonomous hospital with funding from Govt. of NCT Delhi. It has been established to promote mental health awareness, behavioral and allied sciences, and neurosciences and to produce skilled professionals. It offers various PG courses in multiple specializations such as DM Neurology, M Phil Clinical Psychology, and MD Psychiatry. It has one of the largest Neuro Psychiatric OPD with more than 2000 patients seen daily in Outpatient Clinics. It has more than 300 functional beds in Psychiatry, Neurology and Neurosurgery.

Director Professor (30th August 2009 to 13th July 2015) and Head of Neurology Department (13th July 2015 to 13th January 2022)
Lady Hardinge Medical College & Associated Hospitals, New Delhi 110001 India

My role was to work as Senior Consultant, in providing and responsible for inpatient, outpatient, ED services and Neurology clinics. The role includes participation in on call /recall Consultant roster as well as teaching of Undergraduates and Post Graduate Medical Residents as well as Research and Clinical Governance. Established and developed full department to Neurology at LHMC and Neurology Lab. Providing EEG Neurophysiology services including, NCV, EMG, VEP, BAEP etc.). Providing Neurology referral services and consults to all clinical departments in LHMC & SSK Hospital.

Visiting Consultant Neurologist (Three days a week) (July 2013 to July 2017) PGIMR and DR RML Hospital New Delhi

My role was to participate and responsible as Consultant in Neurology Outpatients as well as Neurology Lab including EEG, EMG, NCV, VEP, and BAEP. Teaching of Basic Physician trainees (MD) and Advance Trainees (DM Neurology).

Fellow Department of Neurology (18th July 2006 to 13th July 2009) Austin Hospital Heidelberg Vic. 3084 Australia

(My role was to participate in General Neurology, Movement Disorders and Stroke Services including two and Half Outpatient Clinics ,Movement Disorder inpatients, Clinical research responsibilities in Movement Disorder service and Stroke Imaging under Prof Geoff Donnan (My Supervisor for RACP) .Also Participated on Call/ Recall roster for Registrars and Fellows in Neurology. Trained in Stroke Thrombolysis, Management of Advance Parkinson's Patients and Stroke Imaging including CT Perfusion. Teaching of Undergraduates students of Melbourne University and Austin Hospital.

Asstt. Professor/Associate Professor/Professor, I/C Neurology Clinics
(8th December 1995 to15th July 2006)

Lady Hardinge Medical college & Associated Hospitals, New Delhi (India)

(My role was to work as Consultant to provide leadership in providing patient are and responsible for inpatient, outpatient, ED services and Neurology clinics. The role included participation in on call /recall Consultant roster as well as teaching of Undergraduates and Post Graduate Medical Residents as well as Research and Clinical Governance and Various other administrative and clinical duties as assigned time to time by Principal. I have been involved in assessment, examiner for MD MBBS and DNB (Medicine) , Delhi University, Rajasthan University, NBE and MD University. I was involved in development of curriculum planning for General Medicine. Member Courses Committee in General Medicine Delhi University).

Senior Registrar
(15th July 1992 to 8th Dec. 1995) Dr. Ram Manohar Lohia Hospital, New Delhi

(My role was to work as Senior Registrar in Medicine Deptt to provide leadership for Interns, Basic Physician Trainees, in providing inpatient, outpatient, and ED services for Acute General Medicine. The role included participation in on call/recall roster as well as teaching of Post Graduate Medical Residents as well as Research).

Registrar Neurology Unit,
(6th Nov. 1989 to 13th July 1992)

Department of Medicine, Medical College Rohtak (India)

(My role was working in Neurology unit under supervision with increasing responsibility to manage Inpatients and Outpatient Neurology patients alongwith Neurology consults and on call roster. Regularly participated in lab roster in providing and trained in Neurophysiology services including EEG, NCV, EMG, VEP, BAER etc.)

Teaching Experience:

1. Undergraduates Teaching – 27 years 1992 to 2018
   MBBS students of Delhi University at LHMC
   MBBS students of Melb. Uni at Austin Health. (2007-2009) Bed side teaching, MCC, PBL and Theory Lectures.
2. Post-Graduate Teaching – 30 years.
   Teaching and Supervision of MBBS ,MD and DM students of Delhi University including Bed side teaching, Seminars, Journal Clubs and case Presentations.
3. Examiner for DM (Neurology).Delhi University, IP University New Delhi, RUHS Jaipur, MG University Jaipur and SKIMS (J&K) .DNB(Neurology) Examiner
4. Examiner for MD, MBBS & BDS Delhi University, Rajasthan University, MD University, Rohtak , Patna University, Gujarat University ,SKIMS Srinagar J &K and National Board of Examination New Delhi.
5. Member Courses Committee (Faculty of Medical Sciences) Delhi University.
6. Member Curriculum Development in General Medicine NBE ministry of Health Govt. of India.
7. Co-Chair PG Committee Medical Council of India
8. Adviser UPSC and J&K Public Service Commission
9. Subject Expert JIPMER Puducherry , NIGREMS Shillong
10. Member Project Review Committee(PRC)ICMR
11. Subject Expert Ministry of HRD Govt. of India
12. Expert University Grants Commission
13. Subject Expert AIIMS Rishikesh
14. Subject Member RIMS Ranchi
15. Chairman Ethics Board RIMS Imphal (Manipur)

List of MD Students Supervised: 20

Publications : 141

Research Experience Investigator Driven Research Projects Researcher/ Associate Researcher:

1. An Epidemiological Study of Stroke in Urban Areas of Rohtak (Haryana): Paper presented at 1st International Neuro-epidemiological Symposium, 22-23rd November, 1991, Bombay
2. Stroke in Rural Communities - An Indian Experience: Paper presented in 4th International Conference on Stroke 4-7th March, 1998, Marrakech, MOROCCO.
3. Prevalence & Outcome of Stroke in Women – Result from a population study. Paper presented at Ist International Conference on Women, Heart Disease and Stroke, May 7-10th, 2000, Victoria B.C.CANADA.
4. Trends in Stroke Prevalence in North Indian Rural population in last15 years – Paper presented at 4th World Stroke Congress, 25-29thNovember, 2000, Melbourne, AUSTRALIA.
5. A Comparative Study of CT & MRI in Indian Epileptics. Paper presented at 4th Asian & Oceanian Epilepsy Congress, 11th-14th Sept. 2002, Nagano,JAPAN.
6. Serum Hc and LP (a) relationship in acute ischemic Stroke. Paper presented at 5th World Stroke Congress , 23rd June –26th June 2004, Vancouver CANADA
7. Pregnancy Related Strokes : Invited Lecture delivered at Asian Pacific Congress against Stroke, 12th Jan. – 14th Jan. 2005, Chiang Mai THAILAND
8. Epidemiological Parameters of Stroke in Indian Women: paper presented at 2nd International conf. on women, Heart Ds. & Stroke, 16th– 19th Feb. 2005, Orlando USA.
9. Current Status of Malaria in India: Invited speaker at Pan-African Malaria Congress (MIMS), 12th-15th Nov. 2005,CAMEROON
10. Seizures associated with Cerebro-vascular diseases: An Indian Experience. Paper presented at 6thAsian Oceana Epilepsy Congress, (16th Nov. 2006 to 19th Nov. 2006) Kuala Lumpur, MALAYSIA
11. Post Seizure Epilepsy an Indian Patients Experience. Paper presented at 8thAsian Oceana Epilepsy Congress, (21st to 24th Oct2010) Melbourne (Australia)
12. Lithium induced Lingual Dystonia. Paper presented at 17th MDS Congress Sydney(16th June to 20th June2013)
13. Role of acute phase reactants in Acute Ischemic Stroke. Paper presented at World stroke Congress Istanbul Turkey (22nd to 25thOct 2014).
14. Australian Database and Audit of Patients with Parkinson's Disease Using Subcutaneous Apomorphine.
15. Prospective Evaluation and Characterization of Penumbral tissuein Acute Ischemic Stroke by Multimodal Stroke CT Imaging..
16. Emergency Recognition and Management of Acute Stroke: H2004/1847

Clinical Trials as Investigator/Sub Investigator

1. A Multi-Centre, Randomized, Double-Blind, Placebo-Controlled, Parallel Group Study of the Efficacy, Safety, and Tolerability of E2007 in Levodopa Treated Parkinson's Disease Patients with Motor Fluctuations.
2. A Double-Blind, Prospective, Randomized Comparison of2 Doses of MitoQ and Placebo for the Treatment of Patients with Parkinson's disease.
3. Open-Label,6-Month Safety and Efficacy Study of Levodopa–Carbidopa Intestinal Gel in Levodopa-Responsive Subjects with Advanced Parkinson's Disease and Severe motor-fluctuations.
4. In Vivo Measurement of Vesicular Monoamine Transporter Type 2 Density in Parkinson's disease with18F-AV-133.

Current Ongoing Projects

1. Mapping Of Cognitive Pathways In Indian Ageing Population- under Department Of Science And Technology, Government Of India, New Delhi.(Co PI)
2. Design And Evaluation Of An EEG Based Deep Learning System For Epilepsy Diagnosis (Co-PI0
3. Global DNA Methylation in Hypertension: A population based nested case-control study from Punjab CO PI DHR ICMR Funded Project
4. Tele Neurorehabilitation versus In-Person Rehabilitation in person with Parkinson's Disease in India during COVID-19PI Non Funded
5. The effect of the COVID-19 Pandemic on seizure status and quality of life of epilepsy patients. PI Non Funded
6. Indian Multiple Sclerosis and Allied Demyelinating Disorders Registry and Research Network. Co PI. ICMR Funded
7. Effect Of Yoga On Motor And Non-Motor Symptoms And Quality Of Life In Persons With Parkinson Disease- A Randomised Clinical Trial (Yoga-Pd)
8. ImpactofCOVID19onthefrequency,spectrumandoutcomesofGullain Bare Syndrome in India: A Multicentre ambispective cohort study" COPI
9. Cognitive & Oral-pharyngeal motor Assessment in Parkinson's Disease and PSP.PI
10. Comparing The Effect Of Statin Use On Neuro-Cognition Between Middle-Aged Adults With And Without Mild Cognitive Impairment - A Longitudinal Pilot Study Co Supervisor
11. Efficacy of Pranayama protocols on Prevention of COVID -19 in Exposed Healthcare professionals: A Randomized Controlled Trial Co PI

Editorial Assignments

1. Member Editorial Board World Journal of Neurology.
2. Member Editorial Board Neuro-rehabilitation.
3. Member Annals of National Academy of Medical Sciences

Fellowship/ Membership :

1. Fellow Royal Australasian college of Physicians.
2. Fellow Royal College of Physicians (London) International Adviser
3. Fellow Indian College of Physicians
4. Fellow Indian Academy of Clinical Medicine.
5. Member, American Academy of Neurology
6. Co chair Post Graduate Committee, Medical Council of India
7. Member Indian Academy of Neurology.
8. Member Indian Epilepsy Society.
9. Member Indian Stroke Association
10. Member International MDS
11. Member Movement Disorders Society of India
12. Member ANZAN
13. Founder Member Functional Neurological Disordersrs

Awards:

1 Medal in Final MBBS.
2 WHO Fellowship in Stroke Epidemiology NSRI , Austin Hospital Heidelberg VIC 2004
3 Commonwealth Staff Academic Fellowship in Neurology
4 WHO Fellowship in Epidemiology National Institute of Epidemiology Chennai India 2011
5 Indian College of Physicians(ICP) STP Award.
6 National Academy of Medical Sciences (NAMS) Medical Scientist Exchange Programme Award (2005-2006) St John Hospital Bangalore.
7 33rd S Radhakrishnan Memorial National Medical Teacher Award 2017.
8 B C Bansal Uma Bansal Oration in Clinical Medicine 2019 Indian Academy of Clinical Medicine.
9 National Award for Science Communication in Electronic Media (2021)by Govt. of India
10 Prof K L wig Oration 2022 Association of Physicians of India(DSC) 23rd Annual Conference -2022 New Delhi

Other Teaching Roles :

1. Member Courses Committee Faculty of Medical Sciences Delhi University (1st January 2013-31st December 2014).
2. Member Institutional Disciplinary Committee for Undergraduates Medical Students and Postgraduates Residents, Lady Hardinge Medical College New Delhi
3. Vice Chairman Scientific Committee Lady Hardinge Medical College and SSK Hospital New Delhi
4. Member Technical Committee CGHS.
5. Member Ethics Committee RIMS
6. Member Ethics committee Deptt of Anthropology University of Delhi.

Conferences Organized

1. Member Organizing committee World Congress of Neuro-Rehabilitation
2. Course Director r Third Lance Goadsby Symposium COVID-19 and the Brain 2020

3. Member Organizing Committee APICON 2001. 56th Joint Annual Conference. New Delhi, India. , 2001
4. Member Organizing Committee AONC and IANCON New Delhi 2022

Public Awareness and Health Education

1. Anchor in All India Radio
2. Anchoring Monthly Health Programme in All India Radio on various aspects of Health Education and Health Promotion since 1990 . Have done more than 400 Programmes , Discussions and talk shows.
3. More than 100 TV discussions on Health Issues on Various TV Channels
4. World Brain Day Celebrations in 2020 and 2019.
5. Organized Walkathon with more than 1000 participants to raise awareness about Brain Health on World Brain Day .
6. Public Lectures in Lady Hardinge on World Brain Day
7. Public Lectures on World Parkinson's Day
8. Public Lectures on World Epilepsy Day
9. Op Ed articles and columns on health related subjects in National Newspapers The Hindustan Times, The Pioneer and Daily World.

Extracurricular Activities :

1. President Rotaract Club Rohtak India (1988-89). Member Rotaract Club Rohtak India.
2. Selected for Rotary Study Exchange member to represent India to Sweden and visited various community organizations, hospitals and medical centers in Sweden and delivered lectures on health scenario in India.
3. Organized Health camps in the community for detection and treatment of Neurological Disorders at Tohana (Haryana) India.

List of PubMed Indexed Publications

1. Handa R, Sood AK, **Dhamija RK,** Malhotra RC : Viral Encephalitis presenting as Myoclonus. Neurology India 1993;167.
2. **Dhamija RK,** R Handa, AK Sood, Yadav S - Recurrent bacterial meningitis. The Journal of the Association of Physicians of India,1994:42;165-166.
3. **Dhamija RK**, Kumar D, Khurana G. Dapsone Syndrome. Tropical Doctor (London) 1995;25:176-177.
4. Chugh S, ChanderSekhran E, **Dhamija RK**, Khurana G. Opsoclonus Myoclonus – An unusual Manifestation of Viral Encephalitis. The Indian Practitioner.1995; 48;775-776.
5. **Dhamija R K** . Comprehensive management of stroke—"the concept of stroke unit" The journal of the association of Physicians of India,1997;45:902.
6. **Dhamija RK** Typhoid Fever. JAPI.1997; 45:148.
7. **Dhamija RK,** Dhamija SB. Prevalence of stroke in rural community— an overview of Indian experience. The Journal of the Association of Physicians of India 1998,46:351-354.
8. **Dhamija RK**. Long term outcome of Stroke in Rural communities,

JAPI.1999; 47:39.
9. Kapoor R, Gandhi A,**Dhamija RK,** Das S, Mondale S & Gupta HL. Pulmonary Functions in Bronchial Asthma patients – Effects of Yoga practices. Indian Journal of Physiology and Pharmacology.1998;42:215.
10. **Dhamija RK**, Sunderka MK, Nagpal VK. Thrombolytic Therapy in Ischaemic Stroke, where are we today? Archives of Critical Care Medicine.1999; 99:1-5.
11. **Dhamija RK** , S Mittal, BC Bansal Trends in clinic-epidemiological correlates of stroke in the community-J Indian Acad Clin Med 2000,5:99- 101.
12. **Dhamija RK** Epidemiological studies in developing countries.-The journal of the Association of Phycians.2000:48;459-460.
13. **Dhamija RK**, TalwarVK, Cisapride Induced Bronchospasm.JAICM.2000; 5:99-101.
14. **Dhamija RK.** Socio economic status and cerebrovascular diseases in rural Haryana. JAPI.2000; 48,104-105.
15. Kapoor R**, Dhamija RK**, Gandhi A, Das S and Mondal S. Effect of Integrated Yoga practice on Bronchial Asthma patients, Indian Journal of Physiology and Pharmacology.2000 S.29; 44.
16. **Dhamija R K,** Bansal B C, Sharma S. Single small enhancing lesions (SSECTL) in epilepsy. Epilepsia; 2002; Spl 20-21.233.
17. **Dhamija RK,** Bansal BC,Sharma S.MRI and CT correlation in patients with epilepsy: an Indian Experience.2002;Spl.20;231.
18. Rohtagi A, **Dhamija RK,** Parekh N, Gupta HL, Gaba P. Demographic profile, Clinical features and Circadian Variations in patients of Stroke. JAPI.2002; 50,1578-79.
19. Gupta S, Gupta V.K., **Dhamija R K,** Kela A.K. Comparison of Platelet Aggregation in Hypertensive and Normotensive subjects. Indian Journal of Physiology& Pharmacology.2002;46:379-382.
20. Jais M, **Dhamija RK**, Aggarwal S, Mehta G,Dutta R, Kumar M. Seroprevalence of Hepatitis B,Hepatitis C and HIV amongst Nursingstaff of a tertiary care Hospital in Delhi. JAPI.2003;51:1259-1260.
21. **Dhamija RK**, Kantura A, TalwarV, Singhal R, Kumar M. Bilateral Sequential Ischemic Optic Neuropathy Secondary to Migraine.JIACM.2004;5,194-201.
22. Sherwal BL,,**Dhamija RK** , Randhawa V S , Jaiswal M A comparative study of Typhidot M and widal test in Patients of Typhoid fever .JAICM 2004;5;244-246.
23. Dhamija R K ,Kaintura A, Talwar V, Kumar M. Bilateral Sequential Ischemic Optic Neuropathy secondary to Migraine. JIACM 2004;5: 194- 201.
24. **Dhamija R K**, Kaintura A ,Singhal, R, Kumar M. Epidemiological Parameters of stroke in India Women.Circulation,2005 Supl.246
25. **Dhamija RK**, Arora S, Gaba P, Bhattacharjee J. Role of Lipoprotein (a)– a genetic risk factor in patients of acute ischemic stroke : a case control study in North Indian urban population. Case Rep.Clin Pract. Rev. 2007;8:112-117.
26. **Dhamija RK**, Donnan G. Time is Brain–Acute Stroke Management .Aust. Family Physician2007;36:892-895.
27. **Dhamija RK,**Arora S,Gaba P,Jais M,,Kaintura A.Study of Genetic,Metabolic,and inflammatory risk factors in patients of Acute ischemic stroke. Indian journal of

Clinical Biochemistry,2008;23:136-143.

28. **Dhamija RK**, Donnan G. The Role of Neuroimaging in Acute Stroke. Annals of Indian Academy of Neurology.2008;11:12-23.

29. **Dhamija RK**, Gaba P, Arora S, Kaintura A, Kumar M, BhattacharjeeJ. Serum Homocystein and Lipoprotein (a) Correlation in Ischemic Stroke. Patients.Journal of NeurologicalSciences.2009;281:64-68.

30. Okamura N, Villemagne VL, Drago J, Pejoska S, **Dhamija RK** , Mulligan RS, Ellis JR, Ackermann U, O'Keefe G, Jones G, Kung HF , Pontecorvo MJ , Skovronsky D, Rowe C C, In Vivo Measurement of Vesicular Monoamine Transporter Type 2 Density in Parkinson Disease with ^{18}F- AV-133.J Nucl Med .2010;51:223-228.
31. Ramawat B, Ranjan P, Arora S, Bhattacharjee J, **Dhamija RK**. Role of Pro inflammatory cytokines in Acute IschaemicStroke.Journal of Assoc. of Physicians of India.2011;1:59
32. **Dhamija R K** A long term follow up study of Post stroke seizures:– Epilepsia;2015: Suppl. 0117.
33. Goyal A ,**Dhamija R K**. Neuroimaging in Parkinson Disease. Journal of International Medical Science Academy .(2016) Vol 29;1:55-58.

34. Anand K S ,Talak M K, Kumar P, Garg J, **Dhamija RK**. Parkinson's Rehabiltation : achieving the goal of Independence in daily activities,. PTHP :2016100;36.

35. Ramaya SG, **Dhamija R K**, Gurtoo A,Singh R.Correlation of ALT/ASTRatio with Insulin Resistance in Metabolic Syndrome. Int. J. Adv. Res. 5(3), 1677-1684.

36. Garg D, Dhamija RK. Rehabilitation in Parkinson's disease : Current status and future directions . Ann Mov Disord 2020;3:79-85.
37. Juneja A, Anand KS, Chandra M, Deshpande S, **Dhamija R K** Kathuria P, Mahajan R. Neuropsychiatric symptoms and care giver burden in Parkinson's disease". Annals of Indian Academy ofNeurology-**DOI**:10.4103/aian.AIAN_91_20
38. Saluja A ,**Dhamija R K**.COVID-19 and Stroke Risk: A Double Whammy. Annals of National academy of Medical Sciences. DOI: 10.1055/s-0040-1712703
39. Gupta R, **Dhamija R K** , Gaur K., Khedar R S . Urban Sprawl of Covid-19 Epidemic in India: Lessons in the First Semester. Med Rxiv August 2020 DOI:10.1101/2020.08.17.20176537
40. Gupta R, **Dhamija R K ,** Gaur K. Epidemiological Transition of Covid-19 in India from Higher to Lower HDI States and Territories: Implicationsfor Prevention and Control. Med Rxiv. May 2020 DOI: 10.1101/2020.05.05.20092593.
41. Gupta A, Saluja A, Gurtoo A, Srivastava a, Bhattacharajee J, **Dhamija RK**. Ischemic Stroke Patients have significantly higher serum levels of Acute Phase Proteins. JAPI Accepted for publication.
42. Garg D**, Dhamija RK**. Opsoclonus-Myoclonus Syndrome as a Heralding Feature of Scrub typhus: An illustrative case with a video vignette. Journal of Movement Disorders . Accepted for Publication.2021.
43. **Dhamija RK**, Saluja A, Miyasaki J. Advancing Neuropalliative care. Lancet Neurol. 2021 Nov;20(11):885-886. doi: 10.1016/S1474-4422(21)00333-1. PMID: 34687624.
44. Aggarwal R, Garg D, **Dhamija RK**. Lithium-Induced Lingual Dystonia. Ann Indian

Acad Neurol. 2020 May-Jun;23(3):383-384. doi: 10.4103/aian.AIAN_369_19. Epub 2020 Jun 10. PMID: 32606545; PMCID: PMC7313558.
45. Garg D, **Dhamija RK**. Opsoclonus in Scrub Typhus. Ann Indian Acad Neurol. 2020 May-Jun;23(3):367. doi: 10.4103/aian.AIAN_230_19. Epub 2020 Jun 10. PMID: 32606536; PMCID: PMC7313607.
46. **Dhamija RK**, Garg D. World Brain Day 2020 - Challenges and Opportunities in India. Ann Indian Acad Neurol. 2021 Jan-Feb;24(1):1-2. doi: 10.4103/aian.AIAN_660_20. Epub 2020 Jul 18. PMID: 33911368; PMCID: PMC8061519.
47. Margekar SL, Meena RK, Kapoor S, **Dhamija RK**. Pancreatic tuberculosis: An unusual presentation. Natl Med J India. 2021 Mar-Apr;34(2):86-87. doi:10.4103/0970-258X.326765. PMID: 34599118.
48. Garg D, Srivastava AK, **Dhamija RK**. Beyond Fever, Cough and Dyspnea: The Neurology of COVID-19. J Assoc Physicians India. 2020 Sep;68(9):62-66. PMID: 32798347.
49. Gupta R, **Dhamija RK**. Covid-19: social distancing or social isolation? BMJ. 2020 Jun 18;369:m2399. doi: 10.1136/bmj.m2399. PMID: 32554394.
50. **Dhamija RK**, Srivastava AK, Garg D. Apomorphine in Parkinson's Disease-The Questions Raised. Ann Indian Acad Neurol. 2020 May-Jun;23(3):377-378. doi:10.4103/aian.AIAN_11_20. Epub 2020 Jun 10. PMID: 32606541; PMCID: PMC7313595.
51. Saluja A, **Dhamija RK,** Solanki RS. Teaching NeuroImage: Fluorosis: A Forgotten Cause of Compressive Myelopathy. Neurology. 2021 Nov 9;97(19):e1973-e1974. doi: 10.1212/WNL.0000000000012389. Epub 2021 Jun 18. PMID: 34145001.
52. Goyal A, Saluja A, Saraswathy KN, Bansal P, **Dhamija RK**. Role of ACE Polymorphism in Acute Ischemic Stroke. Neurol India. 2021 Sep-Oct;69(5):1217-1221. doi: 10.4103/0028-3886.329586. PMID: 34747787.
53. Garg D, Kallur SN, Kumar B, **Dhamija RK**. Haptoglobin gene polymorphism and ischemic stroke: A case control study. Ann Indian Acad Neurol. 2021 May Jun;24(3):447-448. doi: 10.4103/aian.AIAN_336_20. Epub 2020 Jul 22. PMID: 34447022; PMCID: PMC8370169.
54. GUaRDIAN Consortium, Sivasubbu S, Scaria V. Genomics of rare genetic diseases-experiences from India. Hum Genomics. 2019 Sep 25;14(1):52. doi:10.1186/s40246-019-0215-5. PMID: 31554517; PMCID: PMC6760067.
55. **Dhamija RK,** Saluja A. Challenges in estimating the burden of neurological disorders across Indian states. Lancet Glob Health. 2021 Nov;9(11):e1503. doi:10.1016/S2214-109X(21)00413-7. PMID: 34678190.
56. Srivastava A, Avva S, Bansal P, Aggarwal R, Margekar S, **Dhamija RK**. Diffuse alveolar hemorrhage due to Plasmodium vivax malaria. Lung India. 2020 Jul-Aug;37(4):342-344. doi: 10.4103/lungindia.lungindia_389_19. PMID: 32643646; PMCID: PMC7507923.
57. Ramawat B, Saluja A, Bhatacharjee J, Srivastava A, **Dhamija RK**. Acute Ischemic Stroke is Associated with Increased Serum Levels of Pro-inflammatory Cytokines. Indian J ClinBiochem. 2021 Jul;36(3):380-381. doi:10.1007/s12291-020-00892-8. Epub 2020 May 27. PMID: 34220017; PMCID: PMC8215004.
58. Bansal P, Srivastava A, Aggarwal R, Margekar SL, **Dhamija RK**. Measles in immunized medical residents: Case series with brief review. J Family Med Prim Care. 2021 Nov;10(11):4311-4313. doi: 10.4103/jfmpc.jfmpc_714_21. Epub 2021 Nov 29. PMID: 35136809; PMCID: PMC8797093.

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OPINION

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{ OUR TAKE }

The dangers of populism

Haryana's decision to reserve jobs for locals is constitutionally suspect, economically unwise

On Tuesday, the Haryana governor gave his assent to a bill that provides 75% reservation for locals in all private sector jobs that offer a salary of less than ₹50,000 a month. This was an election promise of Dushyant Chautala, the Bharatiya Janata Party's key ally in the state. Under pressure from his largely Jat base, which is currently at the forefront of the farm protests, Mr Chautala is understood to have convinced his senior ally that this was the only way for him to stick to the alliance. The political calculation aside, the law is based on the logic that reservations would boost local employment for the young and discourage migration — which the government claimed was leading to pressure on infrastructure and "proliferation of slums". Reservations have been introduced for 10 years — but as India's experience with reservations shows, once introduced, it is impossible to roll them back.

Haryana's move is constitutionally suspect. A range of fundamental rights enables citizens to move freely, work anywhere in the country, and be entitled to be treated with equality and without discrimination. The trend of promising reservations for locals — this extends beyond Haryana to a range

Refine the Covid-19 vaccination strategy

Research has shown that the pandemic has disproportionately affected regions with a high per capita income and a high burden of NCDs

There have been major state-level differences in the burden and mortality from Covid-19. Deploy vaccines accordingly and prioritise affected areas
SANJEEV VERMA/HT PHOTO

Delhi had its first Covid-19 case this week, last year. Over this period, India has been able to keep the number of new cases, transmission rates and deaths at relatively lower levels, compared to many developed nations with better public health systems. Till recently, we have also seen a dip in infection rates in many parts of the country.

Having said that, the pandemic is not over until it is over. In fact, we need to be extra cautious during the downward trend of number of new cases. Pandemics also behave in set patterns in terms of trajectory. I wrote last June that Covid-19 is no exception and there will be multiple peaks, and that we need to prepare the health care system for surges. Even as the brutal first wave of the pandemic waned, the numbers have begun rising again. With the opening of borders and international travel, it is, also, almost impossible to stop newer variants from entering India.

As we enter into the second year of the pandemic, we do have reasons to be optimistic. The momentous scientific achievements of the past 12 months have been the development, testing, scrutiny, and approval of vaccines in the shortest possible timeline. Vaccination is the single-most important strategy to end Covid-19. Despite the appearance of multiple Sars-CoV-2 variants as well as general vaccine hesitancy, vaccines provide hope. The benefits of vaccination far outweigh the rare but possible risks as per our present understanding.

Rajinder K Dhamija

Though there has been steady progress in the world's largest vaccination campaign in India, which began in mid-January, there is still a long way to go before it achieves targets. Since the vaccination roll-out drive began at a time of falling infection rates, it gave us a crucial window to get the better of the virus quickly. The experience from the West shows that the second, or subsequent, waves are usually more pronounced.

The second phase of the roll-out, which began this week, is a commendable step towards expanding the reach of the vaccine as well as making it available at affordable rates in the private sector. The rationale behind who we vaccinate, and in which order, is crucial to achieving the goal of vaccinating the maximum number of people at risk and towards achieving vaccine-induced herd immunity. Since there is no lack of intent, effort, or resources, an alternative approach should be explored, which may turn out to be complementary to the existing strategy.

One of these is vaccine deployment based on the burden and severity of Covid-19 in different states. There have been major state-level differences in the burden and mortality from Covid-19 owing to the large size and the heterogeneous population of the country. As some of us reported in *Macrolevel association of COVID-19 with non-communicable disease risk factors in India* (published in *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*), the more urbanised states have a greater higher proportionate case burden and mortality from Covid-19 than rural ones. Greater Covid-19-related mortality has also been reported among persons with various non-communicable diseases (NCDs). Our paper was based on an analysis of cumulative and weekly national and state-level data on cases and deaths from a publicly available data. This was correlated with health care-related factors and social variables.

The study covered at least 9.5 million Covid-19 cases and 135,000 deaths reported in India from March 2 till the end of November 2020. While the national burden of cases and deaths is 6900/million and 100.4/million, respectively, there were wide disparities in rates of cases and deaths across states, with reported cases of more than 20,000/million in states of Delhi and Goa and 10,000-20,000/million in a number of states. Similarly, deaths rates of more than 300/million are observed in Delhi (490), Goa (434) and Maharashtra (383). The case-fatality rate also showed significant differences, with less than 0.5% in Mizoram, Arunachal Pradesh, Kerala and Assam to more than 2% in Punjab, Maharashtra and Sikkim.

Data on various state-level demographic indices also showed wide variability. There was significant positive correlation of state-level Covid-19 cases and deaths per million, respectively, with epidemiological transition index (0.59, 0.44), literacy (0.46, 0.46), indices of health care availability (0.23, 0.18), health care accessibility and quality (0.71, 0.61), urbanisation (0.75, 0.73) and human development (0.61, 0.56). These figures reveal that just as our population is ageing and the disease profile is changing from infectious diseases to lifestyle ones (which is the essence of the epidemiological transition index), the pandemic is also showing a similar trend with states with a high per capita income, and a high burden of these NCDs, displaying a high burden of Covid-19.

Our analysis shows that in India, the more urbanised and better-developed states have a greater burden and mortality from Covid-19 and need vaccinations earlier than other states. This study also reaffirms that the pandemic in India is still an urban phenomenon. In countries with a similar profile — a larger proportion of rural population — including China, Brazil, Iran, Mexico and South Africa, reports have highlighted a similar predominantly urban nature of the disease. This has important implications for the implementation of population- and individual-level preventive measures and equitable vaccine deployment.

A judicious strategy targeted at the urban population, especially the vulnerable, could be the most appropriate intervention. My suggestion is that states such as Kerala, Delhi, Maharashtra and Tamil Nadu should get priority in the vaccination drive. This re-prioritisation of vaccine deployment may well be an alternative way out of the pandemic and help us return to a semblance of normalcy across the country soon.

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The views expressed are personal

As COVID cases rise, the next 15 days are crucial

An urgent action plan is mandatory while integrative and coordinated efforts from all stakeholders are required to respond to a looming threat

RAJINDER K. **DHAMIJA**

In spite of global efforts to contain and mitigate the Coronavirus outbreak, the world is still battling the pandemic, with a number of countries facing recurrent peaks. Our own national Capital has been grappling with an upsurge of COVID-19 cases with the start of the winter season, which usually sees the city enveloped in smog.

There has been a sharp rise in the number of COVID-19 patients (7,000 to 8,000 cases daily) in the last three weeks due to the dangerous cocktail of an early winter and Coronavirus fatigue. The last saw huge crowds mill around markets, restaurants and private parties. This is the third surge of cases following the first peak in late June and the second peak in September. This is actually in line with my prediction of multiple waves of COVID-19 happening in India, in these columns in June. This also reflects our understanding of different peaks occurring in various parts of India at different times.

This has been the trend across the globe with the pandemic behaving in a similar way, be it in America where the cases rose sharply in one State and then moved across gradients to affect another State. Many countries in Europe, too, have experienced a similar phenomenon of multiple waves of the pandemic at different times.

It is not just the number of new cases that is worrying. The more devastating factor is the number of daily deaths, almost one hundred in the last week itself in Delhi. So far, the national as well as Delhi's COVID-19 case fatality rate has been reported to be one of the lowest in the world with an improving recovery rate. However, since the cases are surging, the number of daily deaths is bound to rise, too, owing to the fragile healthcare system, which is buckling under the pressure of the rising infections.

It was expected that cases will go up with the double whammy of crowds during the festival season along with the increased infectivity of the Coronavirus due to the surge of influenza like illnesses in the winter months. However, the air pollution has made matters worse.

Pollution not only hampers the capacity of our lungs to clear the Coronavirus infection but particulate matter or pollutants can also facilitate its transmission by acting as a vehicle for large droplets which tend to stay suspended longer and lower down in the environment. These can infect more people.

There is enough evidence now that there is a direct relation between high PM2.5 levels and increased infectivity of the Coronavirus as shown in studies from China, the UK and Italy during this pandemic. It is also pertinent to know that the new positive cases being reported as of now are the reflection of exposure and infections which occurred in the previous weeks. There is a lag between exposure and clinical symptoms due to the incubation period of the viral infection, which is anything between two to 14 days for the SARSCoV2 virus. Therefore, the new positive cases represent the infections occurring five to seven days preceding the reports.

Similarly there is a lag between exposure, clinical symptoms and the need for ICU admissions and assisted ventilation and fatalities in severe cases of COVID-19. This period is usually 10 to 14 days.

It is important to understand this lag period as the number of deaths being reported today is reflective of infections occurring at least two weeks ago, since deaths lag behind infections by weeks.

This is an important implication as the number of new positive cases is bound to increase tremendously in the coming two weeks post-Diwali due to compounded effects of over crowding, air pollution, bursting of crackers and the cold weather. It is also pertinent to know that the new positive cases being reported as of now are the reflection of exposure and infections which occurred in the previous weeks. There is a lag between exposure and clinical symptoms due to the incubation period of the viral infection, which is anything between two to 14 days for the SARSCoV2 virus. Therefore, the new positive cases represent the infections occurring five to seven days preceding the reports.

Similarly there is a lag between exposure, clinical symptoms and the need for ICU admissions and assisted ventilation and fatalities in severe cases of COVID-19. This period is usually 10 to 14 days.

It is important to understand this lag period as the number of deaths being reported today is reflective of infections occurring at least two weeks ago, since deaths lag behind infections by weeks.

This is an important implication as the number of new positive cases is bound to increase tremendously in the coming two weeks post-Diwali due to compounded effects of over crowding, air pollution, bursting of crackers and the cold weather. It is quite predictable that the coming two weeks will be crucial, both in terms of new positive cases, the number of fatalities and the unfolding of a serious situation. Therefore, an urgent action plan is mandatory and integrative and coordinated efforts from all stakeholders are required to respond to this looming scenario.

First, containment and mitigation measures, which slow down the spread, are the only options in the face of the unrelenting infectious phase, while augmentation of infrastructure in terms of ICU beds and trained manpower in critical care, are crucial to prevent deaths. Provision of ICU beds is not the solution unless we have enough trained manpower to manage the severe COVID-19 patients and run these critical care facilities.

Moreover the fundamentals of containment and mitigation remain the same, including sanitising, masking and distancing. We all know the drill but it is crucial to enforce behavioural changes like in the case of driving laws.

Second, since the positivity rate in Delhi (13 per cent) is too high, which is more than three times than the national average, there is no other option but to scale up testing to contain the spread of the infection. This needs to be brought below five per cent consistently to ensure adequate testing is being done.

There has been mass of the rapid antigen testing in Delhi and fewer RT-PCR tests, a formula which needs to be reversed. Ideally all the tests should be RT-PCR tests, which are more sensitive and would pick up more cases. Moreover anyone who undergoes the test should remain in quarantine till they get the results to limit transmission of the infection.

There needs to be a two-stage house-to-house cluster zero surveillance, as is being done in countries with robust healthcare systems. This ensures identification of people with symptoms of COVID-19. The RT-PCR testing for them confirms active infection and measures the quantum of past infection through antibody testing.

This strategy would not only mitigate cases but also help policymakers plan a public health response in the coming months. We need to act aggressively and quickly to save lives and avoid preventable deaths. The time to act proactively is now to save each and every life in the coming weeks. The fact remains that the virus is here to stay and the vaccine is still miles away.

(The writer is Head of Neurology Department, Lady Hardinge Medical College and SSK Hospital)

FOREIGN EYE

CREATE JOBS, NOT ANXIETY

COVID exposes the key Government role in maintaining the total level of spending in the economy at a level that keeps the country as close to full employment as possible In the UK there will be an estimated million under-25s looking for work soon. Rishi Sunak's kickstart job-creation scheme is too small and reliant on private firms to help. Time is running out to act and ensure that a generation is not sacrificed on the altar of ideology

(The Guardian editorial)

The growing burden of neurological disorders in India

The COVID-19 survivors in particular have mental disorders on account of social isolation, anxiety, fear and emotional distress

RAJINDER K **DHAMIJA**

(The writer is Head of Neurology Department, Lady Hardinge Medical College and SSK Hospital, New Delhi. The views expressed are personal.)

India has a huge burden of neurological diseases along with mental health disorders and substance abuse. Neurological diseases alone constitute nearly 10 percent of total diseases in India along with an additional 10.6 percent prevalence of psychiatric disorders, according to the National Mental Health Survey, 2016. With more than 20 crore people affected by these diseases and in need to medical help, it is a serious challenge to India's public health system.

These diseases are on the rise, ironically, because of the increased longevity of the population withmany people now living beyond the seventies and eighties. Strokes, headache disorders, epilepsy, dementia, and Parkinson's disease are the leading contributors to neurological disorders.

A recent Lancet global study said the disability resulting from neurological diseases has doubled from four per cent in 1990 to 8·2 per cent in 2019 and the proportional contribution of mental disorders to the total disease burden in India has also almost doubled since 1990. Indian ethnic factors are notable as most of us are prone to lifestyle related risk factors like diabetes, hypertension, lack of physical exercise, obesity, smoking, and air pollution. Many neurological conditions have a progressive course with limited therapeutic options available and require long-term treatment as well as care.

More than a third of all

suicides globally are committed in India. The suicidal rates rank first among all mortality causes in young women in most states. This causes enormous financial losses as well as societal slurs. The WHO estimated in 2011 that the economic loss due to mental health disorders alone will be in the realm of $1.03 trillion between 2012 to 2030. We also have the peculiar social issue of stigma associated with mental health disorders in our country.

The government has taken steps to make things better for the patients. The Mental Health Care Act, 2017 empowers patients to make choices regarding treatment or nominate someone to take decisions about the course of treatment. It also decriminalises the attempt to die by suicide, thereby reducing further stress on the victim. The Act provides the right to treatment for patients with mental health disorders.

Despite an exponential rise in neurological diseases, the neurology and psychiatric workforce has not grown proportionally. India has inadequate specialist manpower with fewer than 2500 neurologists, 1800 neurosurgeons, 200 palliative care physicians, and around 9000 psychiatrists, as per the Indian Psychiatric Society register.

The majority of the specialists are in urban hospitals and private setups. Very few of these services are available in rural areas. Most of these patients require long-term rehabilitation but neurorehabilitation is still in its infancy in India and practically non-existent in many parts of the country. Neuro-palliative care is still unheard of and leaves many patients with a poor quality of life. Hardly one or two per cent of the patients have access to palliative care or pain management. Hence, there is a dire need to strengthen the neurology and psychiatric workforce and the availability of affordable and accessible management of neurological disorders. Also, stigma and lack of awareness are key issues that need to be addressed not only by state but also by civil society.

World Brain Day is observed on July 22 with the objective of raising awareness about brain diseases and neurological disorders. The theme for this year is Multiple Sclerosis which affects young women resulting in profound physical impairment as well as mental health disabilities. World Brain Day 2021 is alsoimportant in view of the fact that people in general, and COVID-19 survivors in particular, are suffering mental disorders on account of social isolation, anxiety, fear, and emotional distress. It has become widespread after the second wave of the pandemic.

The number of patients reporting mood swings, depression, stress, anxiety, severe post-traumatic stress disorders, or depressive symptoms is increasing and needs counseling and support. We need to plan for the long-term care of these millions of COVID survivors suffering from neurological issues. The time has come to recognize the parallel epidemic of neurological and mental health disorders and plan strategies for an effective public health response to reduce this burden of brain diseases and augment infrastructure and the workforce in addition to creating public awareness and mitigating social stigma attached to these patients.

the pioneer

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| OUR TAKE |

Address inequity and demand

Economic recovery must not bypass the majority. The government must step in

Fiscal year 2020-21 ended on a slightly better note than expected. The Gross Domestic Product (GDP) growth in the quarter ending March 2021 increased to 1.6%. Tailwinds from the last quarter have moderated annual GDP contraction to 7.3%, lower than the earlier projection of 8%. All of this would have been good news and laid the foundations for recovery in 2021-22, if the second wave of Covid-19 infections had not derailed economic activity.

And that is why the economic impact of the second wave, which peaked on May 9, will be key to assessing future prospects. Take some high-frequency indicators. The Manufacturing Purchasing Managers' Index (PMI) did not go below the critical threshold of 50 — values above 50 signify expansion in economic activity — in April and May. This is reassuring news. The Nomura India Business Resumption Index (NIBRI) seems to have bottomed out after a sharp fall. It recovered to 63.6 in the week ending May 30. NIBRI reached 99.3 in the week ending February 23, but then fell continuously in all weeks except one to reach 60.3 in the week ending May 23. This indicates loss of economic momentum (followed by, hopefully, some stabilisation). But the index of eight core sector industries suffered a month-on-month contraction of 15% in April. This is bad news. Clearly, the

Strengthen India's district hospitals

The coronavirus pandemic has brought home the costs of neglecting district hospitals. For the sake of public health, focus on them

The Covid-19 pandemic, especially the vicious second wave, has created an unprecedented burden on an already creaky health system. India needs a responsive and resilient health infrastructure to cope with the challenges posed by the virus.

At present, India has a three-level framework of health care. This comprises the village- or community-level primary health care centres (PHCs/CHCs), district-level secondary health care facilities in the form of district hospitals, and tertiary care premier institutes and centres of excellence with state-of-the-art facilities for specialised treatment.

The pandemic has revealed one of the weakest links in the health system — the poor infrastructure in district hospitals and their institutional neglect. The pressure on these hospitals has thrown up many worrying facts. Just take one example. Many district hospitals did not have ventilators. It was also found that hundreds of ventilators distributed through the PM Cares Fund to several district hospitals across the country were either unused or could not be operated as the facilities lacked trained critical care specialists and technicians.

But things were not always so dire. In 1970s and 1980s, many district hospitals were considered centres of excellence in various surgical and medical specialties. But, predictably, many deteriorated over the years as they were unable to keep pace with the advancement in technologies and owing to lapses in timely upgradation of infrastructure.

Since the mid-1990s, the focus in health care shifted to the private sector and a slew of profit-generating corporate hospitals were set up, largely in big cities. This had a deleterious effect on the public health system and many government and charitable hospitals became unviable and had to shut down.

Many of those who seek treatment at these high-end, tertiary medical facilities do not need to do so at all, as their ailments can easily be tackled at primary and secondary health care centres. In a cross-sectional study conducted by All India Institute of Medical Sciences in 2018 and published in Seizure, it was found that many epilepsy patients seeking tertiary care could have been provided the care they needed at district hospitals if a robust need-based referral system had been in place.

Most of these hospitals are centrally located in each district and could be hubs for referral treatment, training of health workers, supervision of peripheral facilities, as well as public health surveillance. Most of them have 100 to 500 beds that cater to anywhere between 100,000 to a million citizens in each district.

Indian Public Health Standard (IPHS) guidelines for district hospitals, first issued in 2007 by the directorate of general health services, and revised in 2012, focused not only on physical infrastructure, manpower requirements, equipment norms and laboratory services at district hospitals but also emphasised capacity-building, quality assurance, quality control of processes, service delivery and compliance.

Rajinder K Dhamija

The ministry of health and family welfare followed this up in 2017 with technical and operational guidelines for strengthening district hospitals for multi-specialty care and as sites for training. These also mandated that each district hospital should also have a public health unit, an epidemiologist, an entomologist, a microbiologist, a communications officer, a district public health nursing officer and a demographer for handling health emergencies and active disease surveillance.

This provides the framework for the improvement and strengthening of district hospitals. What is now required are five crucial interventions to shore up this system.

Five crucial interventions are required to shore up district hospitals: Upgrade infrastructure; attract and hire well-trained and dedicated staff; provide technological support; improve laboratory services; and gain and sustain public confidence in them AFP

First, the buildings of existing hospitals should be upgraded, focusing on proper design, improved infrastructure and long-lasting and replenishable supply-chain logistics without which dispensing quality care is impossible.

Second, efforts must be made to attract well-trained and dedicated staff to district hospitals by offering them opportunities for quality clinical work with assured career growth prospects. They should also be provided with proper housing and educational facilities for their children, among other incentives.

Third, technological support must be provided in the form of cloud computing, artificial intelligence for hospital information systems and disease surveillance. These will contribute to efficient management and ongoing medical education and training.

Fourth, laboratory services need to be upgraded with the provision of the latest equipment including molecular diagnostics and pathological services and periodic quality-improvement audits.

Finally, it is essential to gain and sustain public confidence in district hospitals. This can be accomplished by engaging professionals with passion and empathy for their jobs, incentivising them with appropriate rewards and utilising emerging technologies.

We are, hopefully, witnessing a declining trend in the second wave of the pandemic in many states. This is the appropriate time to identify and plug existing gaps in our health system. The focal point for this should be strengthening district hospitals as they can form the foundation for a functioning and effective health system. We must act now to shore up our defences in health care, if we are to save people today and protect them in health crises in the future.

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The views expressed are personal

Do not lower your guard against COVID-19

Irrespective of lockdown, aggressive mitigation strategy should continue even as cases decline

RAJINDER K DHAMIJA

Delhi is beginning to open up in a phased manner though technically the on-going lockdown still continues in its seventh week. There are going to be conditional relaxations for construction works and manufacturing units. This planned unlock starts in the city that was battered by a second wave of Covid-19 with 28,000 daily new cases and the highest positivity rate of about 35 per cent on April 26.

Lock-downs along with aggressive testing, tracing, tracking are time-tested suppression strategies which aim to reverse or slow the upward trajectory of pandemic growth. Lockdown helps in reducing case numbers by restricting people's movements and social distancing the entire population thereby decreasing pressure on health-care systems. The lockdown has to be followed by aggressive mitigation strategy with the intent of reducing demand of peak health care infrastructure and reducing fatalities and hospitalizations. Timely lockdown such as this one did achieve its target as numbers have been dropping steadily bringing the positivity rate down to 1.5 per cent and new infections to around 1000.

In ideal conditions public health experts would like to sustain these reduced numbers for longer periods for a gradual relaxation in restrictions.Since we are at the end of the lockdown which is imminent, the question that arises in our minds is what next and how do we go about resuming our personal, professional and every day social life.

Relaxations in restriction of movements will pose challenges as the city heads back to normalcy. We need to be extra careful when the infection rates are low in our regions but are ising in other parts of the country or in other countries. In fact this is the time to intensify preventive strategies.Surely, we can't take being free of Covid-19 for granted after the lockdown ends - especially as newer varients are emerging every now and then. There is no room for complacency as next the few months are going to be a big challenge to maintain low levels of transmission as well as prepare for an imminent risk of impending wave of Covid-9 .Many experts have been writing about multiple waves in coming months including in my own columns in this newspaper since June, 2020.

The well-being of our people and communities should be our highest priority, and in line with public health advisories, we should be taking all necessary steps to ensure ongoing safety as well as protection from virus.This can only be achieved by the following strategies.

First, campaign for masking should not be lost in the noise of virus, variants and vaccination.The mask compliance has to be one hundred percent whether indoors or outdoors. Masking will take care of all variants and is as effective as vaccine.This has assumed greater significance since we now know air borne transmission is the major way of virus spread.

Secondly, to safeguard ourselves and others , we should continue with the stay-at-home advisory even during the phased relaxation and not be part of crowds. The pandemic is not over until it is actually over in all states and majority gets vaccinated and virus does not have adequate number of susceptible individuals to infect and survive.

Thirdly, testing plays a major role in controlling the surge. We need to adopt aggressive testing and maintain daily target of one lakh tests in Delhi inspite of low number of new cases. Delhi has been testing the maximum numbers per million population in the country so far which has helped Delhi in overcoming this wave. We also need to increase genomic sequencing, the single-most important parameter to identify emerging variants and predicting new waves.

Fourthly, There is no option but to vaccinate everyone in the city.No one is safe until every one is safe. This pandemic will end only and only by vaccination. The next few months, during phased unlocking with low new infections, gives us the ideal opportunity to inoculate as many people as we can.

Everyone knows the drill of Covid-appropriate behaviour. The important thing is to adopt and practice it regularly and strictly. There is absolutely no room for complacency as we move out of lockdown in the next few weeks. We need to be proactive and chase the virus aggressively rather than being reactive with the virus chasing us.

(The author is Head of Neurology Department, Lady Hardinge Medical College, New Delhi. The views expressed are personal.)

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FIRST COLUMN

CHALLENGES AND OPPORTUNITIES

We still have a narrow window for vaccinating most people amid the falling number of new infections

RAJINDER **DHAMIJA**

A year ago the Coronavirus made its entry into the country. Since then, we have come a long way from the hard lockdown beginning in March-end to the second phase of the vaccine rollout which started from Monday with Prime Minister Narendra Modi taking a shot. By opting for the ICMR vaccine, he sent a clear signal that our indigenous vaccines are safe. Right now we are at a crucial stage of the pandemic's trajectory as we still have a narrow window for vaccinating the maximum number of people amid the falling number of new infections in most parts of India. This is the time to focus on mitigation with no scope for complacency. The pandemic is not over until it is actually over in all States and the virus does not have an adequate number of susceptible individuals to infect and survive. We need to chase the virus aggressively rather than the contagion chasing us.

It has been a sort of partial success so far as we have managed to keep infections as well as mortality rates low as compared to many countries in the West with a better infrastructure and capacity to contain and mitigate the virus. However, still more needs to be done as we enter into the next stage of the trajectory with an upsurge in cases in Kerala, Maharashtra, Tamil Nadu, Punjab, Gujarat and looming signs of increasing numbers in Delhi. Vaccine hesitancy remains an issue, with half of the eligible people coming forward for the inoculation. This is a universal phenomenon seen across the globe. Much of this is due to misinformation on social media and the tendency of many individuals to wait and watch. This needs to be aggressively countered and the State has made all efforts to quell this phenomenon. This all-out effort by the Government needs to continue in order to accelerate the vaccination drive, which can gain momentum if more vaccines are made available to the public and in the open market so that everyone can get the jab on demand both through the public as well as private healthcare system.

The second strategy should be to continue mass-scale RT-PCR testing. There is no reason to scale down testing as we have seen lately in many States because that can be disastrous, especially with new mutant variants of the virus making entry into our cities. These variants will be seen in India as it is difficult to stop the transmission in view of relaxation of movement in an era of necessary international travel. More genomic sequencing would perhaps help us in early detection of these new variants arriving in the country and within India. We need to prepare for the inevitable and the focus should remain on both COVID-appropriate behaviour as well as vaccinating the masses.

Third, we need to create resilient district health systems. A weak link in most States is the poor status of district hospitals. In contrast to the prevailing political and bureaucratic response with focus on hardware (beds, ventilators, oxygen, and so on) in healthcare facilities, we should also focus on software development (capacity building and better-quality health workers) which is more important. The current pandemic provides us opportunity and finances to influence politicians and bureaucrats to build resilient and responsive health systems at both primary and secondary healthcare centres in States. Since health is a State subject, a collaborative and collective effort both by States and the Centre should be made to augment these district hospitals. Excellence in secondary healthcare is crucial and well-placed, well-funded, well-staffed and well-equipped district hospitals should be developed as the most important component of the healthcare chain to respond to future outbreaks. We have the opportunity to create a resilient secondary district healthcare system that is responsive to the needs of the public with focus on preventive, promotive, curative and restorative patient care.

(The writer is Head of Neurology Department, Lady Hardinge Medical College and SSK Hospital, New Delhi. The views expressed are personal.)

A less
against

Witch-hunting is us
be a new reason to

I can never forget the night when the
lage, including women, armed with
came to attack a helpless woman on
picion of being a witch. I would also h
killed with her had I not called the police
72-year-old Birubala Rabha, a victim-tur
sader from Assam's Goalpara district, rel
a ghastly incident that took place in a
lage on the Assam-Meghalaya border in

This year the primary school-educate
was the recipient of the Padma Shri, Ind
est civilian award for her crusade again
hunting. The award was a much-deser
India recognition of her work. Rabha, o
and branded as a witch, devoted her lif
cause of other women like her, and, thro
organisation, Mission Birubala, has b
force behind the State's law to check the
of witch-hunting in Assam.

There is no dearth of women like
Assam, who came close to death or got
more than two-thirds of its districts repo
dents of witch-hunting. As per t
Government's records, 107 people, mostly
got killed between 2011-2019. Locally, e
lage on the Assam-Meghalaya border,
"dainigaon (village of the witches)", wh
ostracised women live in isolation.

"In rural hinterlands, a *Deodhani, O*
Ojha (people who allegedly specialise in
casting out unclean spirits and telling
wields tremendous influence. They often
widow, a single or a guardian-less woman
little or no formal education ..... and
a witch, when they are clueless about a
Many poor people fall into their clutches,
by out of superstitious belief, but also b
their inability to pay for a qualified doc
a 2014 field report from the districts of
and Sonitpur, conducted by the Partners
in Development (PLD), a Delhi-bas
resource group.

Rightly, Rabha in her *Mawabe Mama*
campaign, cautions gullible villagers
falling prey to such quacks who are not
"money-making racketeers exploiting
ignorance."

The PLD's field study in Assam
Jharkhand and Chattisgarh, also rev
"women are more often targeted for
motives." Dibyajyoti Saikia, a human r
tivist, who leads a Guwahati-based orga
Brothers, feels that "individual factors like
al rivalry, jealousy, conspiracy come int
each targeting in semi-urban and rur
Mamani Saikia, district co-ordinator, C
further explains that "in calculated attac
der relationship determines the selectio
gets, often driven by ulterior interests li
hing a property or for sexual exploitation
as, in surprise attacks, which are more v
nature, the goal is supposedly to eliminat

Dalit and marginalised women are
prone to such attacks because of system
archy and also because of their social
However, Satyabir Das, a medical practiti
a co-ordinator of Mission Birubala, says
women as victims are more in numbe
recent times, men are also facing such acc

Now, as per the National Crime

Don't trust Pradesh cyber

मर जाए

ैल बन रहा है, मानो इतना ज्यादा काम है कि प्रचार
ने की फुरसत ही नहीं। इसलिए मुझे वे लोग ठीक लगते
ो काम भले कम कर रहे हैं, प्रचार में कमी नहीं छोड़
इस तरह वे सकारात्मकता फैला रहे हैं। वे काम
ए नहीं कम रहे कि वे ज्यादा कर ही नहीं सकते,
व में समस्या यह है कि काम इतना कम है और
ना सेवाभावी इतने ज्यादा कि वे सब अधिक काम
नहीं पाते।

एक तस्वीर देख रहा था, जिसमें आठ-दस नेता
र एक गरीब औरत को राशन का थैला थमा रहे हैं।
ने इसकी आलोचना की कि दस लोग मिलकर एक
दे रहे हैं। मैंने कहा- भाई अगर जरूरतमंद एक ही हो,
ज्यादा लोगों की सेवा कैसे करें? क्या किसी खाए-
स आदमी को जबरन राशन पकड़ा दें? यह भी तो
ो कि एक जरूरतमंद को खोजने में इन्होंने कितनी
नत की होगी। इस फोटो का सकारात्मक संदेश देखो।
द करने वाले दस और मदद लेने वाली सिर्फ एक. इससे
ा सुखद क्या हो सकता है?

राजेंद्र घोड़पकर

मनसा वाचा कर्मणा

ज्ञासा जगाएं

आपने गौर किया है कि मछलियां पानी से ऊपर
- फांदती क्यों हैं? क्योंकि उन्हें पानी से बाहर की
को जानने की जिज्ञासा होती है। कुछ जानने की
इच्छा ही जीव को दायरे से बाहर निकलने को प्रेरित
है। इंसानों के साथ भी ऐसा ही है। कमजोर
ा विफलता की बड़ी वजह होती है। अब्राहम
ने एक बार कहा था, 'मेरा सबसे अच्छा मित्र वह
मुझे ऐसी किताब दे, जिसे मैंने पढ़ी न हो।' हमें ऐसे
ा किताबों के साथ रहना चाहिए, जिनसे कुछ
खें और खुद में सुधार ला सकें।

ज्ञासा को इच्छाशक्ति नाम का ब्रह्मास्त्र समझें।
जग्गी वासुदेव कहते हैं, 'अगर आप सोचते हैं कि
जानता, केवल तभी जानने की संभावना आपके
में हकीकत बनेगी।' इंसान एक बूंद के बराबर
है, और जो नहीं जानता, वह महासागर के बराबर
षय का थोड़ा-थोड़ा ज्ञान हासिल कीजिए और
यों का गहन। सच तो यह है कि जो इंसान
अधिक जानता है, उसमें उतनी ही अधिक
होती है। एपीजे अब्दुल कलाम इसे एक मिसाल
झाते थे कि अगर बंदर के सामने केले और पैसे
वह केले की ओर लपकेगा, क्योंकि वह नहीं
क पैसे से केले खरीदे जा सकते हैं। इसी तरह,
न के सामने पैसे और ज्ञान रख दिए जाएं, तो
ठ लेगा, जो इससे बेखबर है कि ज्ञानी इंसान
में ज्यादा पैसे कमा सकता है। महान चित्रकार
द विंची के शब्दों में, 'एक समझदार इंसान
की ख्वाहिश रखता है।' तो जिंदगी के आखिरी
जिज्ञासा जगाए रखें!

अमिताभ स.

नजरिया

जिला अस्पतालों की मजबूती से सुधरेगी हमारी सेहत

महामारी के समय जिला अस्पतालों की खराब बुनियादी व्यवस्था और उनकी संस्थागत उपेक्षा सामने आ गई।

राजिंदर के धमीजा
तंत्रिका विज्ञान विशेषज्ञ

कोविड-19 महामारी की दूसरी लहर ने पहले से ही चरमराती हमारी स्वास्थ्य व्यवस्था पर अभूतपूर्व बोझ डाल दिया। आज भारत को वायरस से पैदा चुनौतियों से निपटने के लिए एक जिम्मेदार व लचीले स्वास्थ्य बुनियादी ढांचे की जरूरत है। अभी भारत में स्वास्थ्य देखभाल का तीन-स्तरीय ढांचा है। इसमें निचले स्तर पर गांव या समुदाय स्तर के प्राथमिक स्वास्थ्य केंद्र (पीएचसी/सीएचसी) हैं, उसके बाद जिला अस्पतालों के रूप में जिला स्तरीय माध्यमिक स्वास्थ्य सुविधाएं हैं, और उसके बाद अत्याधुनिक देखभाल सेवा वाले मुख्य चिकित्सा संस्थानों का स्थान आता है।

महामारी ने स्वास्थ्य प्रणाली की सबसे कमजोर कड़ी में से एक को उजागर कर दिया है, जिला अस्पतालों में खराब बुनियादी ढांचा और उनकी संस्थागत उपेक्षा सामने आ गई है। बस एक उदाहरण ही लें। कई जिला अस्पतालों में वेंटिलेटर नहीं था। पाया गया कि देश भर के कई जिला अस्पतालों में पीएम केयर्स फंड के जरिये वितरित वेंटिलेटर संचालित नहीं किए जा सकते थे, क्योंकि प्रशिक्षित विशेषज्ञों और तकनीशियनों की कमी है।

हालांकि, चीजें हमेशा इतनी खराब नहीं थीं। 1970-80 के दशक में कई जिला अस्पतालों को विशेषज्ञताओं का केंद्र माना जाता था, लेकिन बाद के वर्षों में जिला अस्पतालों की स्थिति बिगड़ी, क्योंकि वे तकनीकी तरक्की के साथ तालमेल बिठाने में नाकाम रहे। बुनियाद ढांचे में समय के साथ सुधार करने में चूक रह गई। 1990 के दशक के मध्य से स्वास्थ्य सेवाओं के मोर्चे पर सबका ध्यान निजी क्षेत्र में लग गया। बड़े शहरों में बड़े पैमाने पर लाभ कमाने वाले कॉरपोरेट अस्पताल स्थापित किए गए। इसका सार्वजनिक स्वास्थ्य व्यवस्था पर हानिकारक प्रभाव पड़ा और कई धर्मार्थ अस्पताल अव्यावहारिक हो गए, उन्हें बंद करना पड़ा।

जिला अस्पतालों में से अधिकांश में 100 से 500 बिस्तर हैं, जो प्रत्येक जिले में एक लाख से दस लाख नागरिकों के बीच सेवा प्रदान करते हैं। जिला अस्पतालों के लिए भारतीय जन- स्वास्थ्य मानक (आईपीएचएस) दिशा-निर्देश पहली बार 2007 में सामान्य स्वास्थ्य सेवाओं के निदेशालय द्वारा जारी किए गए और 2012 में संशोधित किए गए। स्वास्थ्य और परिवार कल्याण मंत्रालय ने 2017 में मल्टी-स्पेशियलिटी देखभाल के लिए जिला अस्पतालों को मजबूत करने की कोशिश शुरू की। मौजूदा स्थिति को देखते हुए अब जिला अस्पतालों की व्यवस्था मजबूत करने के लिए पांच महत्वपूर्ण हस्तक्षेपों की जरूरत है।

सबसे पहले, मौजूदा अस्पतालों की इमारतों को विकसित करना चाहिए। उचित डिजाइन, बेहतर बुनियादी ढांचे और लंबे समय तक चलने वाली सक्षम रसद आपूर्ति शृंखला पर ध्यान केंद्रित किए बिना गुणवत्ता पूर्ण स्वास्थ्य सेवा देना असंभव है। दूसरा, जिला अस्पतालों में अच्छी तरह प्रशिक्षित और समर्पित कर्मचारियों को आकर्षित करने के प्रयास करने चाहिए, ताकि करियर के विकास की सुनिश्चित संभावनाओं के साथ गुणवत्तापूर्ण सेवा कार्य के अवसर उन्हें प्रदान किए जा सकें।

तीसरा, क्लाउड कंप्यूटिंग, अस्पताल सूचना प्रणाली को कृत्रिम बुद्धिमत्ता और रोग निगरानी के मामले पूरी तकनीकी सहायता दी जानी चाहिए। इससे कुशल प्रबंधन और चिकित्सा शिक्षा व प्रशिक्षण में मदद मिलेगी। चौथा,

किसी भी तरह के संकट से उबरना है, तो जिला अस्पतालों की व्यवस्था मजबूत करने के लिए पांच अहम हस्तक्षेपों की जरूरत है।

प्रयोगशाला सेवाओं को उन्नत करने की जरूरत है। नवीनतम उपकरण के साथ ही समय-समय पर गुणवत्तापूर्ण सुधार के लिए ऑडिट व्यवस्था होनी चाहिए। अंत में, जिला अस्पतालों पर जनता का विश्वास बहाल करना और बनाए रखना बहुत जरूरी है। यह काम पेशेवर चिकित्साकर्मियों में सेवा के प्रति जुनून पैदा करके, उन्हें उचित मानदेय-सम्मान से प्रोत्साहित करके और उभरती प्रौद्योगिकियों का उपयोग करके पूरा किया जा सकता है।

उम्मीद है, हम कई राज्यों में महामारी की दूसरी लहर में गिरावट की प्रवृत्ति देख रहे हैं। यह हमारी स्वास्थ्य व्यवस्था में मौजूदा कमियों को पहचानने और दूर करने का माकूल समय है। इसके लिए चिकित्सा सेवा के केंद्र बिंदु जिला अस्पतालों को मजबूत करना होगा। अगर हमें आज लोगों को बचाना है और भविष्य के स्वास्थ्य संकटों से उनकी रक्षा करनी है, तो हमें स्वास्थ्य सेवाओं को मजबूत करने के लिए हर संभव काम करने चाहिए।

(ये लेखक के अपने विचार हैं)

Bird'seye*view*

Mind The Brain: It Is High Time To Act Now

PROF RAJINDER DHAMIJA
NEUROLOGIST

THE COVID-19 pandemic has been an eye opener for the Indian health systems which are already grappling with constrained resources, disease burden , migrant labor populations and the reliance of patients on an overburdened public health care. One of the major fallout of the pandemic has been disruption of medical care for patients without COVID-19, an issue that has not received enough attention amidst the challenge of managing COVID-19 patients, This not only brings out the existing disease burden of communicable diseases but also increasing burden of non communicable diseases including Neurological diseases. Increasing longevity and changing life style habits put Indians at a greater risk of developing neurological diseases some of which are preventable by public health interventions.

According to Lancet Neurology, with 9·0 million deaths and 16·5% of total global deaths, neurological disorders are the second leading cause of death after heart disease as well as the leading cause of disability. In fact neurological diseases along with mental disorders and substance abuse have increased by 44 percent in last 15 years raising alarm bells and call for urgent measures to prevent emerging epidemic of neurological diseases of aging population.it has been estimated that there will be further increase in these diseases by 23 percent in next five years in India which is a cause of concern for the policy makers as well as Neurologists providing the care of these individuals. There are about 40 million patients with Neurological diseases in this country which seems to be under reported given our hetrogenous population and lack of uniform health records and disease specific registries. This necessitates the urgent need to increase the neurology workforce in India. According to Global Burden of Diseases report 2017, Headache Disorders including mainly Migraine is the second leading cause of Disability worldwide now. Migraine is the o of the commonest Diseases affecting one in seven people in our community. This is very disabling disease affecting more women than men consequent loss of productivity. There are about 6 to 8 million people with epilepsy in India with wide treatment gaps. Similarly there are about 10 Lakh patients with Parkinson,s Disease in India and many remain undiagnosed during their life time . Stroke and Dementia are two major diseases which need pressing action. Stroke in young population is unique problem in Indian population apart from being disease of elderly similar to seen in western countries. Another peculiar fact is that occurrence of Stroke has doubled in India in past two decades while it has declined in many western countries in recent years due to aggressive public health campaigns for stroke prevention. Strokes also cause long term disabilities in stroke survivors and there are no organized rehabilitation services in most parts of our country. This leads to loss of their functional capacities and resultant productivity. Dementia is another important neurological disorder affecting rapidly our aging population. The old age population in India is likely to increase to around 17% to 20% of the population in 2050. This will result in more than 30 crore elderly citizens by 2050 and as a consequence of this, the number of patients with dementia will increase by three times. This will require vast resources not only from health care settings but also from social and welfare sectors.

These figures are in addition to existing burden of neuro infections like Neuro tuberculosis and Leprosy. This is crucial for countries like India which has to face double whammy due to its ongoing economic and demographic transition putting at risk of non communicable diseases as well as large population at risk for infections. Presently there are about 2000 Neurologists to in the country to look after these patients as compared to 16000 Neurologists in the US. This makes a abysmally lower ratio of neurologists being 1: 8,00,000 compared to 1:20,000 in the United States. Not only there is a huge gap in the availability of neurologists, there is also regional imbalances and skewed ratio towards the metro cities,District hospitals have been neglected in last few decades in terms of upgradation in spite of technology reaching in far corners of the country.

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principle of leading a simple life.

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FIRST COLUMN

A shot at halting the virus' march

Vaccines take over six weeks to provide immunity. So it will be vital to continue with COVID protocols during the vaccination period and beyond

RAJINDER **DHAMIJA**

India begins its first phase of the COVID-19 vaccination drive from today. History is being created as it marks an important milestone in the pandemic's trajectory which began almost a year ago when three students returning from Wuhan were found to be COVID positive in Kerala. Since then, we have lost more than 1.51 lakh people and over 1.05 crore individuals have tested positive in India. The year 2020 was indeed a long one as lives were lost and livelihoods vanished as business closures, job losses and salary cuts became the norm. Politics overtook science in many countries and they eventually paid the price in terms of preventable deaths and sickness just because of a delay in instituting Corona protocols like masking, social distancing, hand hygiene and restriction of movement. As I had highlighted previously in these columns, the cold and pollution resulted in a surge in Coronavirus cases in India and globally, too. However, many mathematical models have been proved wrong in terms of hypothetical projections of the number of cases as well as the timelines of the pandemic's trajectory. Experimental therapies were tried in order to save lives, some of which failed to generate scientific evidence while others were withdrawn fearing more risk than benefit through their use. The learning curve continues as the contagion rages on and new mutations are being reported from different parts of the globe, keeping science and scientists on their toes. Consequently, physical distancing has led to social isolation for many, especially the elderly and vulnerable populations like people with disabilities and comorbidities. This has resulted in significant mental health issues. Social isolation is indeed a major risk factor not only for the psychological repercussions it has but also for those suffering from ailments. The approval of two Coronavirus vaccines and their rollout from today is a major step towards combating the pandemic in India and may be the beginning of the end of the COVID-19 outbreak. Covaxin and Covishield will be used during the initial phase of the inoculation drive and a priority group of three crore people will get the shots. The vaccination programme will use Co-WIN, an online digital platform developed by the Ministry of Health and Family Welfare, which will facilitate real time information of vaccine stocks, storage temperature and individualised tracking of beneficiaries for the shot. This digital platform will assist programme managers across all levels while conducting inoculation sessions.

This drive is a welcome step in the right direction and the Coronavirus shot is indeed a gift for mankind in the midst of this humanitarian crisis. Vaccines have historically saved lives from many deadly diseases in the past. A vaccine for the Coronavirus becoming available in less than a year seemed impossible at one time. However, it has become possible because of global efforts and collaborations by scientists and nations. Consequently, these shots have been developed in record time and have shown remarkable efficacy with safety. But India's vaccine campaign poses a major challenge in getting a substantial number of the population inoculated in view of scepticism and the undercurrent of vaccine hesitancy. So far these jabs have protected people from getting the virus, thereby preventing morbidity, hospitalisation and subsequent mortality. This is important not only for countries like ours with an inadequate and inequitable public health system but also for nations with a robust health infrastructure.

It is widely understood that a person protected by a vaccine or a natural COVID-19 infection acts as a dead end for the virus' transmission and an unprotected person who has not been inoculated or had the infection becomes a facilitator. We need most of the population to be vaccinated to break the chain of transmission. The shot will prevent the disease for sure in most of the vaccinated people but whether it will prevent the spread of the virus is still unclear. There is evidence, though not strong, that some of these shots do prevent the spread of the virus. Epidemiological methods reveal that we need at least 60 to 70 per cent of the population to be immunised either through jabs or natural infection to halt the transmission of the virus and develop "herd immunity." So how do we tackle these challenges with the vaccine rollout now becoming a reality? First we need to vaccinate as many people as possible by allaying fears and convincing citizens about the benefit of the vaccine not only for them but also for the community. The vaccine needs to be made as easily available as possible, keeping priorities in place. Plus, the importance of concise communication to the masses cannot be underestimated as is highlighting and stressing scientific facts over misinformation and myths prevalent on social media. It must also be anticipated that people may become complacent during the vaccination drive or after getting the shot. All vaccines take at least six weeks to provide immunity. So it will be critical to continue with all COVID protocols like before during the vaccination period and months or years after completing the two dosages of the shot. We will need to continue the new normal with all public health measures in place along with lasting change in our behaviour. The shot is here but we will have to live with the virus even after this. Vaccines will save lives and livelihoods but the virus is here to stay.

(The writer is Head of Neurology Department, Lady Hardinge Medical College and SSK Hospital. The views expressed are personal.)

my study.

That morning there was quite a crowd choreographed ceremony. Each of us was required to kneel in front of the

Around 15 years later, I was part of The Walden Interview team at London

The views expressed are personal

The science behind super-spreader events

Super-spreading not only propels the growth of new infections but can also facilitate genetic drifts in virus genome that might be responsible for some new strains and mutations

AP

Rajinder K Dhamija

Chris Moore, an expert in virus-spread modelling at the Santa Fe Institute, New Mexico, recently wrote that a virus's ability to infect is not entirely a property of that virus or its virulence alone, but of "how the virus and human society interact".

The pandemic is raging in India due to multiple reasons, including changes in the behaviour of people (whether vaccinated or unvaccinated), change in the behaviour of the virus (in terms of new variants), as well as avoidable mass gatherings — where few infected persons can spur a large outbreak among participants, and which increase the risk of contagion.

A super-spreading event, popularly known as SSEV in science, is a physical phenomenon in which communicable diseases spread faster than usual. These situations provide the ideal ground for the virus to propagate among crowds in close-contact settings, further compounded by actions such as singing, shouting and heavy breathing. Many who get infected go back to their cities, towns or villages, carrying the virus with them and putting larger populations at risk.

As clinical and research scientists, we have learnt a lot more about Covid-19 in the past 15 months and the data is unambiguous — super-spreading incidents represent an important engine of transmission. They not only propel the growth of new infections but can also facilitate genetic drifts in virus genome that might be responsible for some new strains and mutations.

Size matters. As the numbers increase, so does the risk of transmitting the virus to a wider cluster. A large assembly size increases the possibility that someone present in the group will be asymptomatic but infectious. Many studies suggest that 10-20% of infected people are responsible for 80% of the spread of Sars-Cov-2. Infected individuals can remain asymptomatic for the first five to six days, and around 40% of transmission occurs during this period. The longer they come into contact with other people (especially if that contact is longer than 15 minutes, which is the case in most of these events), the more ideal it is for the virus to spread quickly and rampantly.

Persons shedding a high volume of virus can cause new infections that are of high viral replication, generating a ripple effect, leading to severe disease with higher morbidity and mortality. A study from South India published in *Science* last year revealed that in case super-spreading events predominate, then as low as 8% of infected people may be responsible for 60-80% of the secondary cases of Covid-19 in the community. This is crucial as it increases the effective R0 of the virus. Cases could, thus, explode in a very short period of time if we continue to have a series of these events, thereby causing what is called a domino effect.

Amid the surge of Covid-19 infections, such events are still taking place. The following steps must be taken immediately.

One, science tells us that if we clamp down on these large mass gatherings of susceptible people, and the virus is denied favourable circumstances for its spread, the rate of infections will slow down.

Second, individuals who head back to their homes after such an event, and may be carrying the virus, should be mandated to be under self-isolation for a week after their return to slow the further spread.

Third, extensive testing should be carried out in as many of these people on their return to their homes. Research shows that if we encourage people to get tested, they become aware of their infection status and the consequent dangers, and are more likely to adhere to non-pharmacological measures and change their behaviour.

Fourth, the concept of backward contact tracing needs to be aggressively pursued, which can help find other infectious people from the same event. This can be quite useful in detecting more chains of transmission and slowing the virus.

The virus is rampant and here to stay. We need to be vigilant, now more than ever.

Rajinder K Dhamija is head of the neurology department, Lady Hardinge Medical College and SSK Hospital, New Delhi. He was formerly a WHO fellow at National Institute of Epidemiology.

The views expressed are personal