

THE SYNAPSES

ISVS NEWSLETTER



Editor: Ashok Kumar

Associate Editor: Deepak Kumar Tiwari

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From the Desk of President

The Corona terror is not over yet. Many families have been ruined and many lives lost due to Corona. I pay my homage to all those friends and colleagues who have lost battle fighting Corona. The academic and research activities continued at a slower pace. The veterinary professionals in general and surgeons in particular are no exception. It is difficult to imagine, even for a graduate student, on being promoted to next session without handling, touching or even seeing an animal. However, it is heartening to know that veterinary institutions are discharging emergency services for treatment and surgery of sick animals. But training of students has been hit massively. One can only hope and pray for better tomorrow. As responsible professionals it is our duty to think about way out from this medical disaster. The only answer to Corona variants which are emerging fast is by adopting vaccination. The only way veterinary institutions can get back to normalcy is by adopting en-mass vaccination of staff and students. However this is good time to indulge in professional activities including seminars, writing articles, books and above all clearing backlog. The Indian Society for Veterinary Surgery and learned surgeons have immensely contributed to building professional knowledge. The society will also soon take up issues related to recognition of professional contributions made by our friends in veterinary surgery, imaging and anaesthesia. I look forward to input from all members of the society. I convey my best wishes to all members of the society and their families. Lest us pray for better future.



S.S. Singh

From Executive Secretary Pen

Dear Surgeons, We all are working in a challenging environment, wherein maintaining and sustaining team work is stretched. Surgical learning is one area which needs to be revisited. From March, 2020, ISVS has organised number of Webinars on varied topics and as the attendees tapered, we stopped. At this juncture, ISVS invites ideation of surgical learning modalities for the benefit of members, practitioners. One such example is conducting a surgical quiz on Apps and suitably rewarding the winners. Another can be virtual assessment of radiological images, clinical case records etc., for specified 2-3 days. ISVS contemplates to organize the first ever virtual ISVS Conference. All members of ISVS are requested to ponder over the above and give suggestions and also the willingness to organise quiz etc. Our prayers go out to all those who are fighting the virus. Wishing everyone the strength to overcome it. Stay safe and healthy!



D. B. Patil

From the Editor

The COVID-19 pandemic has led to an exceptional health crisis unlike any in the past 100-year history of the country. It has not only killed people but escalated human sufferings, distresses also. It is a matter of great sorrow, agony and distress that we have lost some of our young and passionate surgeons or their family members. I pay my homage to all the departed soul and pray to almighty God to bear this unprecedented loss. But even in this very frightening and dreadful situation, I acclaim and applaud the efforts and hard work of all the CORONA Warriors of our fraternity. The pandemic not only have killed people but has triggered economic and social crisis also. People are feeling unsafe, loneliness and socially isolated and fear to interact with people. This is exerting a detrimental effect on health and is associated with various physical, physiological, psychological and mental repercussions. Now is the time for solidarity and support, especially with the most vulnerable in our society. We can use this moment to commit ourselves for addressing these unfortunate aspects of life. We need to develop long-term sustainable strategies to address the challenges facing the human and animal health and life. Only then, we can protect the health, livelihoods of all people, and ensure our 'new normal' is a better one.



Ashok Kumar

FEATURE

Camel Surgery: An overview of current and futuristic approaches and challenges

Camels are primarily used as a draft animal followed by its use as a pack and breeding animal. A frequent trauma to its musculoskeletal system and injuries to other body parts leads to lots of production losses and surgery plays a pivotal role here to restore the production, hence camel surgeons are important in this region. Surgical disorders of camels are reported by Gahlot (1992), Ramadan (1994) and Gahlot (2000). Present paper would stress on important surgical disorders of dromedary camels. These disorders are categorized as soft tissue surgery and orthopaedic surgery. Restraint, anaesthesia and surgeries of camelids are described in few books (Miller and Fowler, 2014; Ramadan, 1994; Gahlot, 2000). Camel Surgery started developing in 1980s onwards and later adopted latest trends in soft tissue and orthopedic surgery. It got new dimensions through use of cryo surgery, laser surgery, arthroscopic surgery and minimum invasive surgery. Dromedary camel suffers from a wide variety of surgical affections which needs a variety of soft tissue and orthopedic surgery to restore the production. Affections of head and neck are important and these include mandibular fractures and soft palate injuries in addition to the salivary fistula, ophthalmic affections and lacerated nostril skin. Several techniques are developed to repair the mandibular fracture and resection of soft palate. Suppurative wounds at saddle region and chest pad need special debridement techniques. Abscesses at sheath and foot region needs appropriate drainage and management. Imaging diagnosis helps in diagnosis of fractures and injuries to ligaments and tendons. A variety of internal and external fixation techniques are used to immobilized fractured long and digital bones. Surgery of urogenital system needs special attention because camel is a breeding animal and these surgical affections might affect production. Sand masturbation often leads to phimosis, paraphimosis, preputial prolapse and obstruction in urine flow and needs surgical attention. Surgeries of oesophagus and compartment are needed to remove foreign bodies. The diverse surgical affections and associated surgical techniques will be discussed. Using the integrating surgical systems for autonomy of the



operating room (personnel) will be futuristic trend of camel surgery. Other futuristic trends include use of harmonic scalpel, cyber knife, endoscopic surgery, oto-endoscopy, rhinoscopy, interventional radiology and robotic surgery using Da Vinci system.

Soft tissue surgery

Ocular disorders: Camels frequently suffer from eyelid lacerations, corneal injuries, third eyelid prolapsed, panophthalmia, corneal opacities, ulcers, keratoconjunctivitis etc. Treatment is done similar to those done for the bovines.

Lacerated nostril: Nostrils often get lacerated to a variable length and in different directions due to violent pulling of nose-strings by the attendants/owners in a bid to control vicious animals. These injuries may be fresh or old. Sometimes these are partially healed and are presented for cosmetic repair. It is repaired under infraorbital nerve block and applied vertical mattress suture pattern.

Salivary fistula: It occurs due to lodgment of feed straw through the opening of salivary duct into the oral cavity. An increased interdental space between two upper cheek tooth at this region facilitates entry of feed straw, during mastication, into the opening of parotid salivary duct. Hard fibers of feed straw repeatedly traumatize the inner lining of the duct and penetrate out through the wall of the duct and skin. Initially a small swelling appears on the skin just below the lower eyelid with a central opening. Saliva escapes out through this opening leading to wetting of hairs down below. Ligation of salivary duct can easily be carried out under local anaesthesia.

Soft palate injuries: These injuries are seen only in adult male camels, particularly during breeding season when camel often balloons it. It gets injured either with its own teeth, or by biting of offender camel or external trauma. Dulla is resected from the base under mild sedation with xylazine.

Wound at chest pad, Rope gall, Saddle Gall: These may be punctured, ulcerative or purulent wounds and sometimes enlarged chest pad is also found which is resected.

Scrotal Bite Wounds: As the testes are located high in the perineal region between the thighs and also become enlarged and protrude caudally in the rutting season, they become more accessible to the other male camels and hence, are prone to bite injuries.

Hydrocele: Sometimes unilateral or bilateral accumulation of the serous fluid is noticed between the visceral and parietal layers of the tunica vaginalis resulting in scrotal enlargement. The condition is generally believed to be the result of mild trauma to the tunic. It manifests as a soft, fluctuating, painless swelling with a normal size and contour of the testicle which helps the clinician to differentiate this condition from orchitis and scrotal hematoma.

Orchitis: Orchitis is not common in the camel. However, the condition may occur following trauma or scrotal skin injuries during fighting between the male animals in the rutting season. Although rare in the camel, the condition can also arise from a primary infection or by hematogenous spread of bacteria into the testes superinfecting the pre-existing traumatic, viral or parasitic damage. Orchitis is more commonly unilateral and may also involve epididymis.

Scirrhus cord: Chronic inflammation of the spermatic cord is always a sequel to either pyocele or ascending infection following open castration.

Rupture of urethra and subcutaneous infiltration of urine: Is mostly due to complete obstruction of urethra with calculi and at times complete occlusion of the urethra caused by mechanical compression with a tight strap taken around the sheath and abdomen while carting a camel. Urethrostomy is done as a treatment of this disorder.

Phimosis: It may be congenital or acquired due to localized trauma, hemorrhage and/or abscessation in and around the prepuce.

Paraphimosis: It may be due to congenital or acquired strictures of the prepuce, paralysis of the penis, balanoposthitis or injury to the penis during copulation or sand masturbation.

Foot affections: Some common foot affections are dermatitis, exuberant granulation, oedema of foot, burn, wounds, abscess, digital cushion hernia, cracked sole, punctured foot, elongated nail etc.

Orthopedic Surgery

Mandibular fracture: Fracture of the mandible is one of the most common fractures in the camel, particularly in the rutting or breeding season and external trauma is also an etiology. The fracture usually occurs across the tushes (first premolar); however, it may also occur cranial or caudal to this site. Most of the fractures are transverse, but oblique and multiple fractures may also be

encountered. We use the technique of interdental wiring for transverse fractures. It is simple, convenient and economical and can be easily performed in the field conditions (Gahlot et al, 1984).

Fracture of cervical vertebrae: The presence of long neck predisposes camel to fracture of vertebra causing torticollis. The fracture of transverse process is managed by external support with coaptation splint over the neck and stall rest for 8-10 weeks is sufficient for a clinical union.

Fracture of the long bones has poor prognosis in camels because of lack of proper implants and devices which can be used for massive bones of this animal. However, cannon bone fractures are manageable with transfixation technique.

Upward Fixation of Patella: It is commonest in occurrence among the dislocations in camels. The medial patellar ligament in camels is ill developed. During walk jerks are observed in hind limb and sometimes it remains straight with extension of stifle and hock and flexion of digital joints. After taking a few steps with a click sound the normal gait is resumed. The treatment includes injection of irritant drugs at the site of ligament.

Future vision: It involves use of laser surgery, endoscopic surgery, minimum invasive surgery, cryo surgery, robotic surgery together with stem cell therapy to treat many surgical affections including neoplastic conditions, arthritis and tenosynovitis.

Dr. T.K. Gahlot

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All the JSVS Life members are requested to update their corresponding address with pin code, mobile number and e-mail ID for compilation of JSVS directory through e-mail:

dr.deepaktiwari@rediffmail.com

AWARDS/HONOURS/RECOGNITIONS

DR. V. KURIEN LIFETIME ACHIEVEMENT AWARD 2021

Dr. Indermani Nath, Professor and Head, Department of Surgery and Radiology, College of Veterinary Science and Animal Husbandry, Odisha University of Agriculture and Technology, Bhubaneswar was bestowed with **DR. V. KURIEN LIFETIME ACHIEVEMENT AWARD 2021** by Pashudhanpraharee for his significant contribution to the society and upliftment of Dairy Sector, on the occasion of World Milk Day i.e. 1st June 2021. Professor Nath has credit of conducting more than 500 health camps for treatment of various surgical ailments of dairy cattle owned by different milk producers' cooperative societies of Odisha. He has delivered expert lecture in local language (Odia) to the rural dairy farmers regarding healthy maintenance of their cows against development of bloat, acidosis, traumatic reticulitis, traumatic pericarditis. Foreignbody impaction, teat fissures, fistula etc. The field deliberations had great impact on preventing the surgical conditions. In addition, Dr Indramani always involves him in hands on training on field demonstration of passing probang in bloat, emergency trocarization in acute cases, healthy feeding practice avoiding metallic foreign bodies has improved health practice in rural OMFED (Odisha Milk Producers Fedration) has conferred several appreciation certificates to Dr Nath for his expertise service to poor dairy farmers of Odisha.



NVF-PROFESSIONAL EXCELLENCE AWARD

Dr. S.P. Tyagi, Professor and Head of the Department of Veterinary Surgery and Radiology, DGCNCOVAS, CSKHPKV, Palampur was honoured with **PROFESSIONAL EXCELLENCE AWARD** by the National Veterinary Foundation (NVF) in appreciation of his contribution to the profession. The award was presented in 5th CPD workshop of NVF, the “India-VETopia-2021” held at Jaipur, Rajasthan from 26 to 28 March 2021 which was attended by Vets from all over India and where, Dr Tyagi delivered lectures on different aspects of Veterinary Radiology.



Dr. Gaurav Kumar, Ph.D. Scholar, Department of Veterinary Surgery and Radiology, College of Veterinary Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana was awarded with **Young Scientist Award** for the research article entitled “An Integral Diagnostic Approach for Cardiac Affection in Dogs” presented in the technical session during The Indian VETEXPO-2021 organized by PAWS Learning and Research Council (PLRC) at New Delhi from 20 to 21 March, 2021. The VET EXPO was attended by 250 scientists, field veterinarians, private practitioners and research scholars. Also, the online live streaming of the symposium enriched about 5000 veterinary students and research scholar connected from different parts of the country.



Dr. T.M. Rajasekaran, an MVSc Scholar at of the Department of Veterinary Surgery & Radiology, Guru Angad Dev Veterinary and Animal Sciences University (GADVASU), Ludhiana participated in the National level canine conference “Indian VETexpo-2021” organized by Paws Learning and Research Council (PLRC) India. He won “**Young Scientist Award**” for a research paper entitled “Surgical Management of Pigmentary Keratitis in Pugs” authored by Drs. TM Rajasekaran, S K Mahajan, and N Umeshwori Devi.



Dr. Prem Sairam, PhD scholar of Department of Veterinary Surgery & Radiology, GADVASU participated in the National level canine conference “Indian VETopia - 2021” organized by National Veterinary Foundation, India. During this conference, he presented a research paper on “Surgical Management of Humeral Condylar Fractures in Dogs” authored by Drs. Prem Sairam, C., Tarunbir Singh and S K Mahajan and won the “**Young Scientist Award**”. The conference was organized in association with Vetstream Educational partner at Jaipur, India.



Dr. Ravneet Kaur, an MVSc scholar won **First Prize for Poster Presented** for the paper entitled “Endoscopic Resection of a tracheal tumour in a dog” authored by Drs. Ravneet Kaur, J. Mohindroo, T. Singh and K. Gupta during e-Canvas spills IDP-NAHEP sponsored National e-Conference on ‘Igniting Young Minds for sustainable growth through entrepreneurship and skill development: A vets vision’ organized by IDP cell GADVASU, Ludhiana from 1-5 March, 2021.

Dr. Randhir Singh, Associate Professor, received **Appreciation Certificate** from NCC, Directorate of M.P. and CG for his exceptional services to cadets training and developmental activity.



Dr. Reshma Jain Assistant Professor, Department of Veterinary Surgery and Radiology, College of Veterinary Science & A.H. Mhow, received **Inspiring Lady Veterinarian Award 2021** for contribution to the society and upliftment of Veterinary Profession on occasion of Women’s day by Pashudhan Committee.



Dr. Babita Das, Assistant Professor, Department of Veterinary Surgery and Radiology, College of Veterinary Science & A.H. Jabalpur, conferred with **Pashudhan Praharee Award 2021**, for her contribution as lady veterinarian, specifically in the veterinary ophthalmology.



Dr. Nutan Panchkhade, Teaching Associate in Veterinary Surgery and Radiology, Jabalpur received **Young Scientist Award in Animal Science**, Agro Environmental Development Society, Rampur, Uttar Pradesh in March 2021.



Dr. Devendra Yadav, Veterinary Surgery and Radiology, Anjora, Durg (Chhattisgarh) received **Best MVSc Thesis Award**, Agro Environmental Development Society, Rampur, Uttar Pradesh in March 2021.



APPOINTMENTS/PROMOTIONS

Dr. Mozammel Hoque has joined as Head, Division of Surgery, ICAR- Indian Veterinary Research Institute, Izatnagar on 30.4.2021. Dr Hoque was born on 12 March 1961. He did his B. V. Sc & A.H. degree in 1983 from Bidhan



Chandra Krishi Viswavidyalaya, West Bengal and awarded Vice Chancellor's Gold Medal for securing first position. He then completed M.V.Sc (Surgery) in 1987 and Ph. D. in 1996 from Indian Veterinary Research Institute, Izatnagar. He joined Agricultural Research Service (ICAR, New Delhi) as Scientist and presently occupying the position of Principal Scientist, Division of Surgery, I.V.R.I, Izatnagar, Bareilly UP.

He is having 31 years of experiences in research, teaching and extension and consultancy services. He has worked as Principal Investigator and Associate in various Institute and out funded projects, taught courses in BVSc AH, MVSc, Ph D, Diploma and training programmes and provided veterinary clinical and consultancy services. He received FAO Fellowship in 1998 and underwent advanced training in Diagnostic Imaging at Colorado State University, USA. He was also offered the Visiting Faculty position at CSU, USA. He received Ramani Ramachandran Award in 1998 for the paper on oncology published in Indian Vet J.; Award of Merit in 2001 for meritorious contribution in the area of veterinary and animal sciences; IAAVR Fellow in 2009, Professor A.K. Bhargava Memorial Award-2015 for best paper publication in Indian J. Veterinary Surgery. He also received several Best paper presentation awards in various conferences. He published more than 200 papers in national and international journals. He authored 1 textbook, 2 manuals, contributed 8 book chapters, 20 technical notes/ popular articles and more than 100 invited lectures. He guided 6 Ph D and 12 MVSc students and delivered seven television/ radio talks. He worked as Editor ISVS Newsletter and Associate Editor, Indian J Vet Surgery and Wildlife Bulletin. He is working as Treasurer, Indian Academy of Veterinary Nutrition and Animal Welfare (Pashu Poshan Kalyan Samiti). He is working as Treasurer, Agricultural Research Service Scientists Forum, IVRI, Izatnagar Unit. He has been working as referee for various national and international journals, examiner in colleges/universities and expert of various selection committees. He is actively involved in the activities of the Association of Indian Zoo and Wildlife Veterinarians since its inception and organized annual conferences. He worked as Treasurer cum

Joint Secretary and presently working as General Secretary of the Association and Executive Editor, Indian Wildlife Year Book. He was awarded with Wild Animal Health Management Award in 2007 for the outstanding contributions in Application of sonography in wildlife disease diagnosis, received Best paper presentation award in AIZWV Conference in GBPUAT, Pantnagar in 2018. Contact No. 9412605854/7017544028

mhoq61@yahoo.com/drmozammelhoque@gmail.com

Dr. S.P. Tyagi has joined as Head of the Department of Veterinary Surgery and Radiology, DGCNCOVAS, CSKHPKV, Palampur on 19.05.2021. Dr. Tyagi graduated from GBPUA&T in the year 1993 and did his post-graduation from IVRI, Izatnagar in 1997. He joined the department of Veterinary Surgery and Radiology, Palampur, CSKHPKV, Palampuras an Assistant. Professor in 1998 and obtained his PhD degree in 2006 as an In-service candidate from there. He was later promoted as Professor in the year 2013. He has a distinguished record as an academican, clinician and researcher. He has a special interest in Veterinary Ophthalmology, Orthopaedics and Diagnostic imaging and contributed significantly in developing one of the best requisite infrastructure in India pertaining to these fields in his department. His clinical expertise in these fields is widely known and recognized by animal owners and veterinary professionals alike. He regularly delivers lectures, conduct and actively participate in Continuing Education (CE) workshops on these topics nationally and internationally for field vets as well as for Veterinary faculty. So far, he has 56 CE programmes to his credit as an expert. He is also a dedicated researcher and handled 17 research projects so far either as PI or Co-PI. He has either guided or guiding 29 PG/PhD students as a major advisor; he has 75 research and clinical publications to his credit besides contributing in 23 professional books / manual / compendium or bulletins.



Dr. Apra Shahi joined as Professor and Head, Department of Surgery and Radiology, College of Veterinary Science and Animal Husbandry, NDVSU, Jabalpur, M.P. on 25.03.2021. She has obtained her B.V.Sc. & A.H. from College of Veterinary Science and A. H., GBPUAT, Pantnagar in 1994 and M.V.Sc. and Ph.D. from Division of Surgery and Radiology, Indian Veterinary Research Institute, Izatnagar in the year 1996 and 2001, respectively. She joined as Assistant Professor, Department of



of

Veterinary Surgery and Radiology, College of Veterinary Science and Animal Husbandry, JNKVV, Jabalpur in 2001 and promoted to Professor on 25.06.2012. She started ultrasonography and echocardiography for the first time in MP in year 2005 and subsequently established the procedure for ophthalmic ultrasound, colour Doppler and spectral Doppler in dogs. She organized 28 ASCAD and RKVY trainings of diagnostic-imaging techniques in veterinary practice, small animal surgery and large animal surgery for field veterinarians and private practitioners of Madhya Pradesh. Her research interests include ophthalmic and soft tissue surgery. She established the use of regenerative therapies such as PRP, PRF, L-PRP clot for ophthalmic and dental surgeries of dogs. Under her guidance the acellular buhaline diaphragmatic scaffold was developed and successfully used for perineal herniorrhaphy and dental fistula in dogs for which her students got young scientist award in MP Council of Science and Technology. She is the author of many review articles and published more than 100 research articles in the reputed National and International Journals. She is the member of four scientific societies and won 8 gold medal and 12 appreciation certificates for research articles presented in Indian Society for Veterinary Surgery and Radiology and other societies. She guided twenty one M.V.Sc. and three Ph.D. students. Two M.V.Sc. and one Ph.D. student under her guidance won Young Surgeons Award.

Dr. Shobha Jawre joined as Director, School of Wildlife Forensic and Health, NDVSU, Jabalpur on 07.04.2021. She completed her B.V.Sc. & A.H. and M.V.Sc. & A.H. (Veterinary Surgery and Radiology) from College of Veterinary Science and Animal Husbandry, JNKVV, Jabalpur in 1996 and 1998, respectively. She completed Ph.D. from the same institute as in-service candidate in the year 2012. She worked as Veterinary Extension Officer at Veterinary Hospital, Bhimpur, Distt Betul from 10.01.2000 to 09.05.2003. Her passion for teaching and research motivated her to join as an Assistant Professor in the Department of Veterinary Surgery and Radiology, College of Veterinary Science and Animal Husbandry, JNKVV, Jabalpur on 12.05.2003 and promoted to Associate Professor on 21.12.2012. She became Professor of Veterinary Surgery and Radiology on 23.12.2015. She also served as Assistant Controller of Examination (2013-14) and Coordinator TVCC, CoVSc. Rewa (2014-15). She also acted as Member of Board of Studies, Academic Council, Disciplinary



Committee, Public Service Committee for selection of Veterinary Assistant Surgeon. Dr. Jawre has guided 16 M.V.Sc. & A.H. and 01 Ph.D. student as Major Advisor and acted as Minor Advisor or Member of Advisory Committee for 20 M.V.Sc. & A.H. and 04 Ph.D. students. She has been the Principal Investigator of the Research Project on “Limb prosthesis in indigenous cattle of Madhya Pradesh” under the MANDI budget (MP). She acted as Co-PI for the research project entitled, “Evolving strategies for non-surgical contraception in male dogs” funded by MPCOST, Bhopal and Associated Scientist in the ICAR project of NAIP on “Development of goat having knocked-down myostatin gene through RNA interference technology to enhance meat production” She worked hard for strengthening of the diagnostic and therapeutic facilities of the department. Her dedication towards teaching and clinical services made her popular among the students and farmers. She popularized the diagnostic imaging techniques viz., endoscopic and laparoscopic techniques in small animals, internal and external fixation techniques in large and small animals etc. Her innovative and dedicated efforts evolved prosthetic limbs for heifer, calf and cows and initiated research in the field of orthopaedics in large animals. Besides teaching and research activities, she participated in extension activities viz., attended many Clinical Camps, Pet Vaccination Camp, Pashu Vigyan Mela etc. organized by the university time to time. She acted as Co-ordinator/ Co-coordinator for organization of 25 ASCAD and 9 RKVY trainings on Small Animal Surgery and Diagnostic Imaging Techniques, Hands-on-Training programme on Neuter Surgeries for field Veterinarians (VAS) and Hands-on-Training on Diagnostic Imaging Techniques for Small Animals for Private Practitioners and Field Veterinarians. She was the organizing committee member of 24th Annual Congress of Indian Society for Veterinary Surgery and National Symposium on “Current Trends in Veterinary Clinical Orthopaedics” and Technical Secretary for 10th National Symposium and Annual Conference of IALV on “Contribution of Women Veterinarians in upliftment of livestock Production through New Technologies” organized at Jabalpur in the year 2004 and 2009, respectively. Dr. Jawre was bestowed with Best Teacher Award for the year 2011, Ph.D. University Topper Medal, Gold Medal and Appreciation Certificate for Best paper presentation for signifying her contribution in the field of Veterinary Surgery and Radiology. She has published more than 40 research/clinical articles in different scientific journals of national and international repute, one compendium, 9

training manuals, 3 CD of Surgical procedure for field veterinarian and presented more than 15 research papers in different national and international conferences. She has participated in 14 national/ international Symposiums, Seminars, Trainings and workshops. She is life member of six scientific societies and reviewer of three journals of national and international repute. Presently, she is also working as Zonal Secretary (Central Zone) of Indian Society for Veterinary Surgery, and Secretary for Local Chapter of ISVS (MP and CG).

Dr. Ayyappan Subburamanujam

joined as Head of the Department of Veterinary Surgery and Radiology, Madras Veterinary College, Tamilnadu Veterinary and Animal Sciences University (TANUVAS), Chennai, on 30th April 2021. Dr. Ayyappan has a Speciality in Small Animal Orthopaedic surgeon having passed out from Madras Veterinary College in 1986. Dr. Ayyappan completed his Masters and Doctoral programme in veterinary surgery in 1988 and 1996 at Madras Veterinary College respectively. He worked as the Resident Veterinary Officer and Head, Resident Veterinary services, Madras Veterinary college in charge of the emergency and critical Care unit and subsequently was in charge of Radiology and CT unit at the Madras Veterinary College teaching hospital. His area of interest is Small animal orthopedic surgery for fracture fixation, pediatric orthopedics, skeletal deformities, Joint affections and Neurology. He possesses 31 years of clinical and teaching experience in small animal surgery. He has authored 76 clinical publications, 25 popular articles on pet practice. Dr Ayyappan completed a 2 month AO fellowship training at the Small animal hospital, University of Zurich, Switzerland in 1994. He also completed the basic, advanced and special training in orthopedic surgery at AO-International, Davos, Switzerland in 1994, 1995 and 1999 and an External skeletal fixation training course and a PENNHIP evaluation course in the US. Dr. Ayyappan completed a two year Clinical Post-doctoral orthopaedic fellowship at the Department of Veterinary Clinical Medicine, School of Veterinary Medicine, Purdue University, USA from October, 2000-August, 2002. Dr. Ayyappan also completed an Advanced AO fellowship in 2012 at the Cummins school of Veterinary Medicine, Tufts University, USA. Dr. Ayyappan also completed AO courses in minimally invasive surgery, CORA based levelling osteotomy, Total hip replacement, spinal surgery and surgical anatomical approaches in the dog. He also worked as a senior lecturer in small animal orthopaedics in the school of Veterinary



Medicine, Trinidad, West Indies for over 3 years. Has conducted both national and international training programmes in orthopaedic surgery. Dr. Ayyappan organized the first International AO small animal fracture management course held in India in 2012. Dr. Ayyappan has won 29 (Includes three International and two national fellowships, and 7 student guidance and awards for presentations in conferences. He has guided one doctoral, four masters and twelve PG diploma students. He was a part of the group which carried out the first successful stem cell therapy treatment for grade 4 spinal trauma in a dog. Dr. Ayyappan was responsible for developing the e learning course in small animal orthopaedics at TANUVAS. Dr. Ayyappan is presently working as the Professor and Head i/c, Department of Veterinary Surgery, MVC

Dr. Randhir Singh has been promoted as Associate Professor Department of Veterinary Surgery and Radiology, NDVSU, Jabalpur (MP) in the month of January 2021.



WEBINARS/WORKSHOPS/SYMPIOSIA/TRAININGS

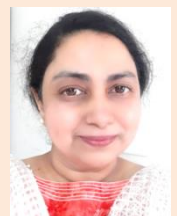
WEBINARS

Aftermath of COVID-19

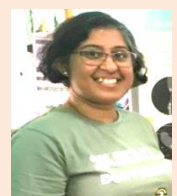
In continuation with the previous exercise, the ISVS has successfully organized five webinars under the leadership of Dr. Simart Sagar Singh, President and Dr. D.B. Patil, Executive Secretary, ISVS:

Dr. Aditi Sharma, Senior Veterinary Officer, Rajaji Tiger Reserve, Dehradun delivered a webinar on **Laparoscopic sterilization of Rhesus Macaques as a mitigation tool for monkey menace** on 02.01.2021.

Dr. Pallavi Verma, Associate Professor, Department of Veterinary Surgery and Radiology, College of Veterinary Sciences, Guru Angad Dev Veterinary and Animal Science University, Ludhiana delivered a webinar on **Application of Doppler Ultrasound in Veterinary Practice** on 09.01.2021.



Dr. Salisha Whitney Correia, Veterinary Surgeon, CGS Hospital, Gurgaon delivered a webinar on **Laparoscopic Procedures in Canine and Feline patients** on 16.01.2021.



Dr. Leena Dalal, PetZone Veterinary Clinics, Mumbai and Goa delivered a webinar on **Interventional Radiology and Image Guided Procedures** on 23.01.2021.

Dr. P. Veena, Professor, Department of Veterinary Surgery and Radiology, College of Veterinary Sciences, Sri Venkateshwara Veterinary University, Tirupati delivered a webinar on **Canine Mammary Tumours** on 30.01.2021.

The webinars were organized and coordinated by **Drs. Deepak Kumar Tiwari, Divyesh Kelawala and Neelesh Sindhu** in collaboration with Knowledge partner Intas Animal Health on Microsoft Teams and were also uploaded on YouTube Channel of ISVS.



Dr. Deepak Kr Tiwari



Dr. Divyesh Kelawala



Dr. Neelesh Sindhu

WORKSHOPS/TRAININGS/SYMPOSIA

Dr. D.B. Patil, Executive Secretary, ISVS and Director of Research & Dean PGS, Kamdhenu University, Gandhinagar, Gujarat, delivered lectures on:

- **Veterinary Ophthalmology: An Overview**, during Vocational Training on Advance Diagnostic Techniques in Livestock and Pets on 04.01.2021, organised by College of Veterinary Science & AH, JAU, Junagadh.
- **Gastric Affections** during online training programme on Advances in Diagnosis and Management of Ailments in Pet Animals on 30.01.2021, organised by College of Veterinary Science & AH, MHOW, Jabalpur.
- **Expedition in Veterinary Ophthalmology and its Pathway to Clinical Application** during Veterinary Ophthalmology Workshop on 23-02-2021, organised by College of Veterinary Science & A.H., Rewa.

A five Days Online Vocational Training programme on **Advance Diagnostic Techniques in Livestock & Pets** was organized by Department of Veterinary Surgery & Radiology, COVSAH, JAU, Junagadh under IDP- ICAR from 4th to 8th January, 2021. Dr. S.H.Talekar, Associate Professor and HOD was convenor for online vocational training. The Chief Guest of function Dr. T. K. Gahlot, Retd. Professor & Director of Clinic, RAJUVAS, Bikaner, Rajasthan joined the inaugural ceremony online by video conference. The five days programme was

divided in five technical sessions and demonstrations in afternoon session in which covered total 12 online lectures and 4 practical demonstrations on different topics from experts. Total numbers of 1,779 participants were registered for the online training from mother University and different agricultural universities. Finally, online vocational trainings summarized with concluding remarks by Dr. P.H. Tank, Principal and Dean, COVSAH, JAU, Junagadh and President of the function.



Dr. B.P. Shukla, Professor and Head, Department of Veterinary Surgery and Radiology, Mahow, NDVSU, Jabalpur (MP) organized 11 days Online training programme on **Advances in diagnosis and management of ailments in pet animals** from 25 January to 4 February 2021 with active participation of 360 delegates. In this training, many renowned Surgeons from all over the India has given their lectures.



The Department of Veterinary Surgery & Radiology, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana organized 5-day National training program (online) on **“Systematic Approach to reading Radiographs in small Animal Patients”** under All India Network Program in Diagnostic Imaging and Management of Surgical Conditions in animals (AINP-DIMSCA) from March 22-26, 2021. The faculty members of the department delivered 10 lectures on various

aspects of small animal radiographic technique and interpretation. The training was attended by more than 250 participants from all over India

Dr. Jitender Mohindroo, Professor, Department of Veterinary Surgery & Radiology, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana delivered lectures on:



- **Advances in Ultrasonography and its application in Livestock and Pets** in Five day Online Vocational Training on “Advance Diagnostic Techniques in Livestock and Pets” organized by College of Veterinary Science and Animal Husbandry, Junagadh Agricultural University, Junagadh, Gujrat on 7th January, 2021.
- **Interpretation of abdominal Radiographs** in eleven day training on “Advances in Diagnosis and management of Ailments in pet animals” organized by College of Veterinary Science Mhow, MP on 25th January, 2021.
- **Radiographic Interpretation of Vertebral Column, Radiographic Interpretation of Bone and Joint (fore Limb) and Radiographic Interpretation of Bone and Joint (Hind Limb)** in the National level canine conference “Indian VETexpo-2021” organized by Paws Learning and Research Council (PLRC) India from March 20-21, 2021. The conference was organized under the banner of Self Sufficient India in association with Pet Animal Welfare Society, New Delhi and Association for Veterinary Dermatology, India.



Dr. Shashi Kant Mahajan, Professor, Department of Veterinary Surgery & Radiology, Guru AngadDev Veterinary and Animal Sciences University, Ludhiana delivered twowebinars entitled



Basics of Diagnostic Ophthalmology in dogs and **Surgico-therapeutic management of common ophthalmic disorders in dogs** during e-certificate course on “Fundamentals on Veterinary Ophthalmology” organized by Department of Veterinary Surgery & Radiology, RAJUVAS, Bikaner March 15-19, 2021.

Dr. Ashwani Kumar, Professor, Department of Veterinary Surgery & Radiology, Guru AngadDev Veterinary and Animal Sciences University, Ludhiana delivered a Webinar on **Intramedullary Pin**



Fabrication for Veterinary Patients though AM during the one week short term training course on Additive Manufacturing for Biomedical Applications, organized by National Institute of Technical Teachers Training and Research, Chandigarh from April 26-30, 2021.

Dr. Arun Anand, Professor, Department of Veterinary Surgery & Radiology, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana delivered lecturers on:



- **Additive Manufacturing for Dental Prosthetics in Veterinary Patients** during the one week short term training course on Additive Manufacturing for Biomedical Applications, organized by National Institute of Technical Teachers Training and Research, Chandigarh from April 26-30, 2021.
- **Equine colic: Challenges in Imaging Diagnosis and its Management** at Bihar Animal Sciences University, Patna (Bihar) under NAHEP_IG Project on 21.05.2021.

Dr S.P. Tyagi delivered lectures on **Thoracic radiography in animals: Understanding the lung patterns and Skull radiography in dogs** in 5th CPD workshop of National Veterinary Foundation, the “India-VETopia-2021” held at Jaipur, Rajasthan from 26 to 28 March 2021, which was attended by Vets from all over India.



Dr. Reshma Jain, Assistant Professor, Department of Veterinary Surgery and Radiology, College of Veterinary Science & A.H. Mhow, delivered an online lecture on **Recent**



Update in Fracture Healing in Second International Conference on “Veterinary & Livestock” during 19-20 March 2021.

The Balasaheb Thackeray International Zoological Park & Wildlife Research & Training Centre, Gorewada celebrated Azadi ka Amrut Mahotsava

The Honourable Prime Minister of India Shri. Narendra Modi Ji has flagged off Azadi ka Amrut Mahotsava-Commemoration of 75 years of India's Independence on the 12th of March 2021. Under this campaign, CZA, has been taking this forward through a massive outreach campaign titled **‘Conservation to co-existence: The people connect’**. The campaign aims to generate awareness for conservation priority identified 75 wild animal species through continued public engagement across 75 weeks, starting from March 12,2021 and concluding on August 15, 2022. This year the theme for world environment day is **‘Tigers as flag-bearers for ecological restoration’**. Balasaheb Thackeray Gorewada International Zoological Park, Nagpur along with Central Zoo Authority, New Delhi; Maharashtra Forest Department and Wildlife Research & Training Centre, Nagpur collaborated to celebrate the public outreach week on ‘Tigers’.The inaugural session was marked by the presence of dignitaries from diverse backgrounds. The podium saw a rich assemblage of administrators, academicians and conservationists. An online photography competition highlighting the moods and tiger in its natural habitat was organized from May 11 to 25, 2021. The collection of all entries was presented in the form of an exhibition for general public. The exhibition was made available on www.gorewadaproject.com for viewers. The technical session of the inaugural session began with a webinar on **‘Saving Tigers in Human Dominated Landscape - Lessons learnt from Indian Tarai’** by Shri Ramesh Pandey, Director, National Zoological Park Delhi. The webinar was followed by interaction with the participants. This webinar was followed by a webinar on **‘Rescue and Rehabilitation of Large Felids’** by Dr. Parag Nigam, Scientist-E, Wildlife Institute of India, Dehradun.A series of webinars were hoisted during the occasion to mark the outreach initiative including ‘Tiger Conservation & Veterinary Intervention: SWOT Analysis’ by Dr. Shirish Upadhye, Director, Wildlife Research & Training Centre, Nagpur; ‘Wildlife Forensics with special reference to Wild Felids’ by Dr. Samrat Mondal, Scientist, Wildlife Institute of India, Dehradun; Conserving India's Tiger – The Actions, Achievements & Challenges by Dr. Ravikiran

Govekar, Field Director, Pench Tiger Reserve, Maharashtra and Tigers in Human Dominated Landscape – Movement Ecology Approach by Dr. Bilal Habib, Scientist, Wildlife Institute of India, Dehradun. A virtual symposium was organized with an aim to facilitate interaction among various professionals engaged in the arena of wildlife conservation. There are very few opportunities available to veterinarians, zoologists, administrators and biologists to interact on a common platform. Hence, a virtual symposium was conceived by Wildlife Research & Training Centre, Nagpur through collaboration with Balasaheb Thackeray Gorewada International Zoological Park, Nagpur and Central Zoo Authority, New Delhi. The theme for the conference was **‘Management of Large Felids in Zoos and Protected Areas’**. Dr. Shirish Upadhye, Director, WRTC, Nagpur & Vice-President, ISVS was the Chairman & Convener for the organization. A total of 46 abstracts were selected by the technical committee for presentation at the symposium in four sessions viz., Management of Captive Large Felids; Health Management & Interventions in Captive Large Felids; Conservation Biotechnology and Forensic Investigation in Large Felids; Rescue and Rehabilitation in Large felids. An array of experts in the respective field acted as chairman for the sessions including Dr. Abhijeet Pawde, Principal Scientist, Indian Veterinary Research Institute, Izatnagar, Bareilly; Shri. R.D. Kamboj, Former Director, GEER Foundation; Ms. Tilotama Varma, Additional Director, Wildlife Crime Control Bureau and Dr. Amit Malik. IGF- National Tiger Conservation Authority. The sessions attracted discussion and brainstorming on various issues of conservation and wildlife health management. To mark the ‘Environment Day’ national interschool debate competition and poster making competition was organized. The poster making competition saw 2700+ entries while 8 semi-finalist battled in a dazzling episode of debate which highlighted issues of environmental concerns. The celebration concluded on the seventh day with Dr. Sonali Ghosh, DIG – Central Zoo Authority, New Delhi extending the concluding remarks and congratulating Dr. Shirish Upadhye, Director, Wildlife Research & Training Centre, Nagpur for the valiant effort to make the week a grand success.





other domesticated animals. Dr. Bijukumar stressed the importance of the aquatic life for the conservation of ecological balance for securing future sustainability.

The Webinar was organized by Dr. Vilas Aher, Director of Extension Education and Dean, Faculty of Fisheries, MAFSU under the Chairmanship of Col. Prof (Dr.) A. M. Paturkar, Hon'ble Vice-Chancellor MAFSU. Dr. Sariput Landge, Assistant Professor and Technical Officer hosted the programme and presented vote of thanks.

For successful organization of the programme Dr. Landge and the staff of the directorate of Extension Education has taken efforts under the guidance of Dr. Vilas Aher.

Apparatus to explore the ocean

Self-contained Underwater Breathing Apparatus (SCUBA)

"ROV" : Remotely operated vehicle; ROVs are unoccupied, highly maneuverable **underwater robots** that can be used to explore ocean depths while being operated by someone at the water surface.

The autonomous benthic explorer (ABE)

Autonomous underwater vehicles (AUVs)



This biodiversity needs protection through sustainable utilization

- Identification of livestock biodiversity
- Characterization of livestock biodiversity
- Documentation and registration of livestock biodiversity



MAFSU Organized Webinar to Celebrate the International Biodiversity Day

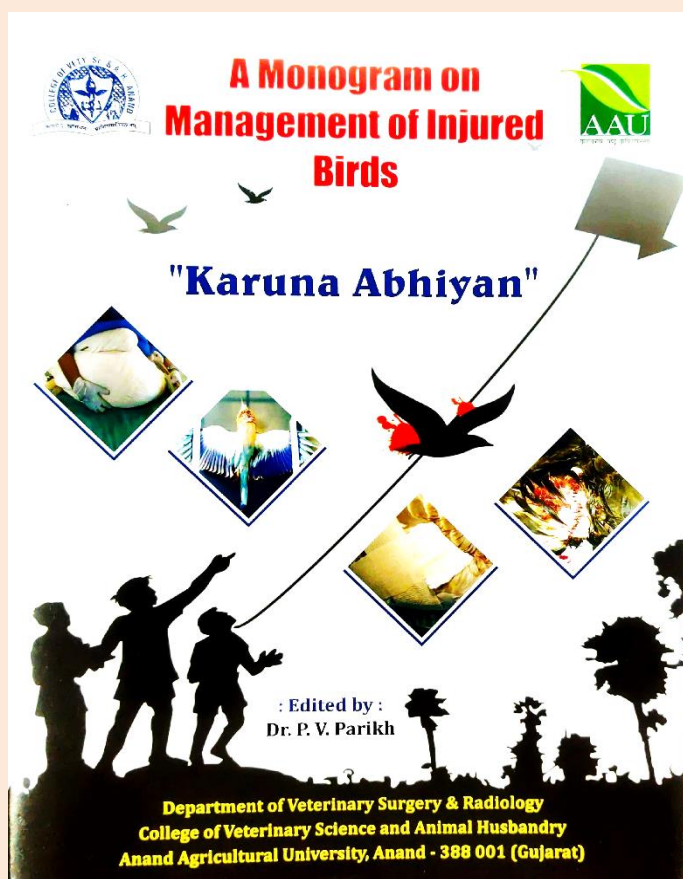
On the occasion of International Biodiversity Day- 2021, the Directorate of Extension Education, Maharashtra Animal & Fishery Sciences University, Nagpur organized a National Webinar on 22nd May. In this series two lectures



were organized in a special webinar with the theme **"We are part of the solution"**. The deliberation on **"Current status and future strategies for managing Livestock Biodiversity of India"** was delivered by Dr. Arjava Sharma, Ex-Director, ICAR-National Bureau of Animal Genetic Resources, Karnal, Haryana while another deliberation on **"Protecting Marine Biodiversity: Sustainable Solutions"** was delivered by Dr. A. Bijukumar, Professor and Head, Department of Aquatic Biology & Fisheries, University of Kerala, Trivendram. Dr. Sharma emphasized on the identification, characterization and conservation of indigenous species of animals including livestock, poultry and

PUBLICATIONS

Dr. P.V. Parikh, Professor & Head, Department of Veterinary Surgery and Radiology, Veterinary College, Anand, Kamdhenu University, Gandhinagar edited book entitled "**A Monogram on Management of Injured Birds**" with technical support by Dr. K.M. Panchal, Dr. J.K. Mahla, Dr. D. N. Kelawala and hardworking post graduate students and is released on 4th February, 2021 during 14th convocation of AAU with the hands of Governor of Gujarat Respected Acharya Devvrat ji. This monogram, collated from different sources will give vital inputs about management and care of injured birds to field vets and those called 'once in a year' for treatment of injured birds during 'Kite Festival'.



VISITS

Dr. Shailendra Kumar Tiwari, Dean, College of Veterinary Science & A.H., Anjora, Durg (CG) and Professor and Head, Department of Veterinary Surgery and Radiology has been honoured as Chairman of VCI team for inspection of Veterinary College Jabalpur in the month of March 2021.



COVID-19: Safety Measures for Surgeons

Personal Protective Equipment (PPE)

Personal Protective Equipment (PPEs) are protective gears designed to safeguard the health of workers by minimizing the exposure to a biological agent. Occupational Safety and Health Administration (OSHA) defines PPE as “specialized clothing or equipment worn by an employee for protection against an infectious material”.

Components of PPE

Coverall, gloves, shoe cover, triple-layer mask, N95 respirator, head cover (hood), face shield, and goggles.

Levels of PPE

Level 1 PPE: For Standard Infection control precautions – It includes disposable gown and disposable gloves. If risk of spraying or splashing is anticipated, surgical mask and face shield/goggles are recommended.

Level 2 PPE: For direct/indirect contact precautions/droplet precautions/airborne precautions – It includes fluid-resistant disposable gown and disposable gloves. If risk of spraying or splashing is anticipated, surgical mask and face shield/goggles are recommended. Head cover and N95 respirator are to be considered in cases of airborne infection.

Level 3 PPE: Enhanced precautions for suspected or confirmed infectious diseases of high consequence which spread by direct/indirect contact or by airborne route – It includes fluid-resistant coverall with hood/long-sleeved gown with disposable fluid-resistant hood, N95 mask, face shield, two sets of gloves, and shoe covers.

Details of Each Element of PPE

Fluid-resistant coverall: The coverall should have following specifications - Impermeable to blood and body fluids, single use, meets or exceeds ISO 16603 class 3 exposure pressure, or equivalent. The coverall should be SITRA or DRDO approved if manufactured in India.

Disposable gown: Impermeable to blood and body fluids, single use.

Disposable gloves: Nitrile nonsterile, powder-free gloves are preferred.

Value of gloves in COVID-19 scenario: Gloves should be worn when providing direct care for a COVID-19 case and then removed, followed by hand hygiene. Extended use of gloves for caring COVID-19 cases is not recommended. Changing gloves between dirty and clean tasks during care to a patient and when moving from a patient to another, accompanied by hand hygiene, is absolutely necessary. Double gloving is not recommended, except for surgical procedures that carry a high risk of rupture. **Triple-layer surgical mask:** The triple-layer surgical mask should be made of a melt-blown polymer, most

commonly polypropylene, placed between nonwoven fabrics.

N95 mask: Ideally should be NIOSHN95, EN 149 FFP2, or equivalent.

Triple-layer mask or N95: N95 masks should be used in COVID suspect and positive cases. Surgical mask should only be used for routine cases in which there is no suspicion for COVID infection. Only in crisis times and nonavailability of N95 masks, surgical mask with visor may be considered for examining COVID suspect cases with all due precautions.

Face shield: It should be made of clear plastic and provide good visibility to both the wearer and the patient. It should be fog resistant, should have adjustable band to attach firmly around the head and fit snugly against the forehead, and completely cover the sides and length of the face.

Goggles: Goggles should have transparent glasses with zero power. It should be covered from all sides with elastic band/or adjustable holder. It should have good seal with the skin of the face and should be fog and scratch resistant.

Shoe cover: It should be made up of the same fabric as of the coverall and should cover the entire shoe and reach above the ankles.

Hospital Attendant and Housekeeping staff in non-COVID areas should wear triple-layer mask, gown, heavy duty gloves, heavy duty boots, goggles or face shield if splash of fluid is expected. Anywhere where there is aerosol generating procedure, Level 3 PPE to be used. PPEs are not alternative to basic preventive public health measures such as hand hygiene, respiratory etiquettes which must be followed at all times. Doctor and nursing staff should wear gloves while handling patients whose clothes are visibly soiled

Hospital Attendant and Housekeeping staff in non-COVID areas should wear triple-layer mask, gown, heavy duty gloves, heavy duty boots, and goggles or face shield if splash of fluid is expected. Anywhere where there is aerosol generating procedure, Level 3 PPE to be used. PPEs are not alternative to basic preventive public health measures such as hand hygiene and respiratory etiquettes which must be followed at all times

Rational and appropriate use of PPE that is reusable, economical, and recyclable is the need of hour. The above guidelines depend upon the resources available with the institutions, hospitals, and diagnostic centers. One can think of using their own customized PPEs as many local textile manufacturers are coming up with economical solutions as announced by our Honourable Prime Minister for implementing the *Atmanirbhar Bharat Abhiyan Scheme*.

Rational Use of PPE in Radiology

For example

Appropriate use of PPE in non COVID areas in diagnostic radiology

Diagnostic radiology non-covid areas						
Setting	Target personnel	PPE	Level of PPE	Remarks	Patient oriented	
Radiology Reception Area/ Help Desk	Receptionist/Data entry operator	Triple-layer mask	-	Ideally, build glass/plastic screens to create a barrier between health care workers and patients	Physical distancing to be followed at all times	
					Patients should wear a cloth mask/triple-layer mask at all times	
X-ray	Radiologist/ Technician	Gown and triple-layer mask	-	-	Patients should wear a cloth mask/triple-layer mask at all times	
Fluoroscopy procedures	Radiologist/ Nurse/Technician	Gown, triple-layer mask, gloves	Level 1	Face shield/goggles with a visor, when splash of body fluid is expected	Patients should wear a cloth mask/triple-layer mask at all times	
Ultrasound	Radiologist/ Nurse/Attendant	Gown, triple-layer mask	-	Ideally, build glass/plastic screens with a hole for hand to create a barrier	Patients should wear a cloth mask/triple-layer mask at all times	
All radiology procedures in covid areas						
All Diagnostic and Interventional procedures	Radiologist/ Nurse/Technician/ Housekeeping/ Hospital Attendant	Full component of PPE	Level 3	- Physical distancing to be followed at all times - Ideally, build glass/plastic screens to create a barrier between health care workers and patients	Patients should wear a cloth mask/triple-layer mask at all times if feasible	

Use of Mask

N95 respirators and surgical masks (face masks) are examples of personal protective equipment (PPE) that are used to protect the wearer from airborne particles and from liquid contaminating the face. The respirators are designed to reduce inhalation exposure to particulate contaminants (dust, mist, and fume). The authorities which regulate the quality control for the respirators are Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH), and Occupational Safety and Health Administration (OSHA).

Surgical Mask

A surgical mask is a loose-fitting, disposable device that creates a physical barrier between the mouth and nose of the wearer and potential contaminants in the immediate environment. Surgical masks are made in different thicknesses and with different ability to protect healthcare personnel from contact with liquids. If worn properly, a surgical mask is meant to help block large-particle droplets,

splashes, sprays, or splatter that may contain germs (viruses and bacteria), keeping it from reaching to the mouth and nose. The surgical masks do not form a tight seal against the face skin and so are not recommended to protect people from airborne infectious diseases. Surgical masks have been relegated for protection against infection through fluid repellence only. The protection provided by the surgical masks against particles (0.04–1.3 μm) is 8–12 times less than N95 respirators. These masks are not intended to be used more than once.

The triple layer surgical mask is made up of a melt-blown polymer, most commonly polypropylene, placed between nonwoven fabrics. The melt-blown material acts as the filter that stops microbes from entering or exiting the mask. Pleats are commonly used to allow the user to expand the mask such that it covers the area from the nose to the chin. These masks are secured to the head with ear loops, head ties, or elastic straps.

N95 Respirators

An N95 respirator is a type of disposable filtering half-facepiece respirator (DFHFR) classified as air-purifying respirator. To be a certified filtering facepiece respirator, the mask must be NIOSH approved, double strapped, and clearly labelled. The “N95” designation means that when subjected to careful testing, the respirator blocks at least 95% of very small (0.3 µm) test particles. The key features of N95 masks are adjustable nose clip (for leak-proof fit and disallows fogging of eyewear), nose foam (for absorption of perspiration), and headbands. The nose clip is made of aluminum, nose foam made of polyurethane, filter made of polypropylene, and the cover made of polyester. [3] Respirators in this family are rated as N, R, or P for protection against oils. N (not resistant to oil) means that the respirators cannot be used in an oil droplet environment; R (somewhat resistant to oil) and P (strongly resistant to oil) mean that these respirators can be used for protection against nonoily and oily aerosols. The US National Institute for Occupational Safety and Health (NIOSH) classifies filtering face piece respirators (FFRs) into nine categories (N95, N99, N100, P95, P99, P100, R95, R99, and R100). Numerical designations 95, 99, and 100 show the filter's minimum filtration efficiency with 95%, 99%, and 99.97%, respectively. [4,5] N95 respirator may have an exhalation valve which reduces excessive dampness and warmth in the mask from exhaled breath. According to the European standards, the FFP2 respirators are equivalent to NIOSH approved N95 respirator. Table 1 below highlights where to use which mask in various sections in Radiology.

Table 1
N95 Respirator and Surgical Mask: Where to Use What?

Setting	COVID Suspect		COVID Positive	
	Surgical mask*	N95	Surgical mask*	N95#
X-Ray	-	√ (**)	-	√ (**)
Ultrasound	-	√	-	√

*-Surgical mask with face shield or mask with integral visor can be used as a measure in only crisis situations with adequate social distancing (**)-Surgical mask with face shield can be an alternative if glass barrier created between equipment and the patient # It is recommended that those with beards consider shaving their facial hair for an appropriate N95 mask fitting. Note that N95 masks may have a metal strip, risking loss of seal in the MRI room; nonferrous N95 masks may

be available. N95 masks may be preserved for reuse by wearing overlying surgical/isolation masks and/or face shield or by central cleaning per institutional practice

Comparison between N95 Respirator and Surgical Mask

Surgical mask	N95 respirator
Fluid resistant - provides protection against large droplets, splashes, or sprays of bodily or other hazardous fluids	Provides protection against small particle aerosols and large droplets (only nonoil aerosols)
Loose-fitting	Tight-fitting
Does not require Fit Test	Requires Fit Test before use
Does not require seal check	Requires seal check
Does not provide a reliable level of protection from inhaling smaller airborne particles	Filters out at least 95% of airborne particles including large and small particles
Leakage occurs around the edge of the mask when user inhales	When properly fitted and donned, minimal leakage occurs around edges of the respirator when user inhales
Disposable - discarded after each use	Ideally should be discarded after each patient encounter and after aerosol-generating procedures. It should also be discarded when it becomes damaged or deformed; no longer forms an effective seal to the face; becomes wet or visibly dirty; if it becomes contaminated with blood, respiratory or nasal secretions, or other bodily fluids from patients. During crisis situations can be reused after proper disinfection

Valved vs. Non-valved Respirators

The most important difference between the valved and non-valved respirator is the location of filter. In a valved respirator, the filter is located inside the valve, whereas in a nonvalved respirator, the filter is situated within the fabric itself. Valved respirators make it easier to exhale air and are

thus more comfortable to wear, and leads to less moisture build-up inside the respirator. Valved respirators do not filter the wearer's exhalation and, hence, are not suitable for a COVID-19 patient. No clear cut guidelines are available if the valved respirator can be used by a healthcare worker inside the hospital; however, putting a surgical mask over the valved respirator can provide protection to others especially when there is community transmission. Valved respirators are especially recommended for heart and lung patients because they provide low resistance in exhaling air.

Donning and Doffing of N-95 Masks and Surgical Mask

Donning (Putting on) an N95 mask

- Perform hand hygiene
- Hold the respirator in one hand, with the front of the respirator touching the inside of your hand. The metal nose piece should rest near the fingertips. Be sure the top and bottom straps of the respirator are hanging down below your hand and are not tangled or twisted
- Take the respirator and place it over your nose, mouth, and under the chin. Hold the respirator in place with one hand
- Use your free hand to place the straps on your head. It is very important the straps rest on the head and are not overlapping or tangled
- First, take the top strap of the respirator and place it just past the top of your head, above the ears
- Then take the bottom strap of the respirator and place it around the bottom of the head, just below the ears
- To ensure a proper seal of the respirator around the nose area, use the fingertips of both hands to bend the metal nose piece around the nose, starting in the center and working your way outward on each side.

Doffing (Taking off) an N95 mask

- Grasp the bottom strap of the mask and lift it over the head
- Then grasp the top strap of the mask and lift it over the head
- Dispose or reuse the mask per policy protocol
- Perform hand hygiene.

Donning Surgical mask

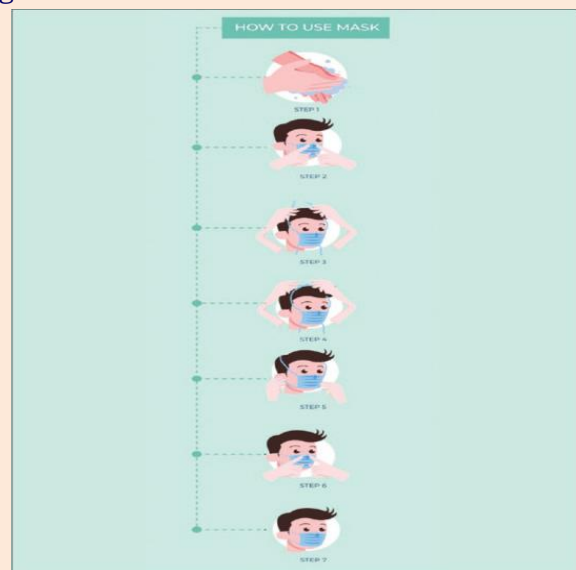
- Open the mask
- Prebend the nosepiece
- Place the mask on your face making sure to cover your nose
- Bring both top ties to the crown of your head and secure with a bow
- Tie bottom ties securely in a bow at the nape of your neck

- Once the mask is tied, press the malleable nose piece until a secure fit and good seal are achieved. This will reduce blow-by at the top of the mask
- Security check should be performed by checking the security of ties, nosepiece, and amount of air escaping from top, bottom, and sides of the mask.

Doffing the surgical mask

- Remove the mask by handling only the ties
- Untie the bottom, then the top tie
- Remove the mask from your face
- Properly dispose of the mask by touching only the ties.

The illustrative diagrams for donning and doffing of surgical mask and N95 masks are shown.



Donning surgical mask



Donning and doffing N95 respirator

Recommendations for Extended Use/Reuse and Decontamination of N95 Respirators and Surgical Mask

Ideally the N95 respiratory masks are only for single use, and this should be the standard practice whenever possible. CDC recommends extended use and reuse of N95 masks when there is a shortage of supplies during the pandemic. Extended use refers to wearing the same N95 respirator for repeated close contact encounters

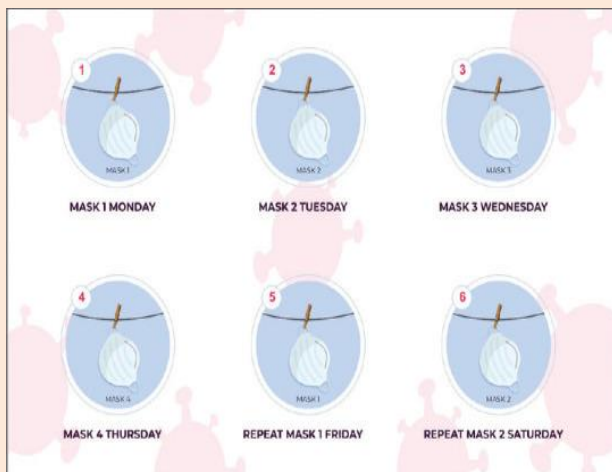
with several patients, without removing the respirator between patient encounters. Limited reuse refers to the practice of using the same N95 respirator for multiple encounters with patients but removing it after each encounter.

Extended use is favored over limited reuse because it is expected to involve less touching of the respirator and therefore less risk of contact transmission.

Following points should be strictly implemented regarding reuse of N95 masks:

- Discard N95 respirators after aerosol-generating procedures
- Discard N95 respirators contaminated with blood and body fluids from patients
- Use a face shield or a surgical mask over an N95 respirator, when feasible to reduce surface contamination of the respirator
- Hang used respirators in a designated storage area or keep them in a clean, breathable container such as a paper bag between uses
- Avoid touching the inside of the respirator

Limit the number of reuses to no more than five uses per respirator at a gap of at least 72 h before reusing again, i.e., N95 masks are to be reused after 3 days of placement in a paper bag.



Reuse policy for N95 respirator

N95 respirators must only be used by a single wearer.

Discard any respirator that is damaged or becomes hard to breathe through.

Risks associated with extended use and reuse of N95 respirators are risks of contact transmission, contamination of respirators with other pathogens and discomfort to wearer, and skin side effects like rash and ulcers.

Decontamination of N95 masks should be allowed only if there are severe crisis and shortage of supply. Decontamination might cause loss of filtration efficiency, poor fit and seal as a result of changes to the filtering material, straps, nose

bridge material, or strap attachments. An ideal decontamination method should reduce the pathogen burden, maintain the integrity and function of the N95 respirator, and present no residual chemical hazard.

Most effective methods to decontaminate N95 masks are ultraviolet germicidal irradiation (UVGI), vaporous hydrogen peroxide (VHP), and moist heat. Reprocessing methods have not been validated by substantial research and there are currently no standardized methods or protocols for ensuring neither effectiveness nor integrity of the respirators after reprocessing. Numbers of reprocessing cycles are highly variable, depending on the reprocessing method used and the respirator brand/model.

(i) *Ultraviolet germicidal irradiation (UVGI)*: The UV dose ranges from 60–950 J/cm² in the literature and can vary depending upon each Institutions standardization procedure. UVGI systems are relatively quick and easy to use, and do not leave chemical residues or risk exposing workers to toxic chemicals. However, ultraviolet light is harmful, so proper precautions are required to avoid UVGI exposure to skin or the eyes. There is a risk of degradation of the respirator material and reduced ability of the mask to filter out infectious bioaerosols after two to three cycles of decontamination. However, the effects of prolonged UVGI exposure after multiple decontamination cycles are still not known and it is unclear how much a cumulative dose of UVGI respirators can withstand.

(ii) *Vaporous hydrogen peroxide*: STERRAD100S Gas Plasma Sterilizer 55 min standard cycle has been recommended as one of the methods of decontamination by WHO. [13] Disadvantages of using vaporous hydrogen peroxide are cannot be used with any material containing celluloses and degradation in elastic straps after few cycles of decontamination. The most time-consuming part of this procedure is time required (4 h) before the decontamination room can be safely entered after fumigation. Both the UV light and hydrogen peroxide methods require equipment that not all hospitals have.

(iii) *Moist heat*: Moist heat, consisting of 60°C and 80% relative humidity have been tried by many researchers as this method causes minimal degradation in the filtration and fit performance. One limitation of the moist heat method is the uncertainty of the disinfection efficacy for various pathogens.

Extended use of surgical mask without removing up to 6 h is recommended. No quality evidence is available to date on surgical mask reprocessing and is not advised.

Comparison of FFP2, KN95, and N95 Filtering Facepiece Respirators

The filter capacity (capacity to remove x% of all particles that are 0.3 μm in diameter or larger) of FFP2 respirator is 94%, KN95 is 95% compared to N95 which is also at least 95%. Hence, it is reasonable to consider China KN95, P2 (Australia/New Zealand AS/NZ P2), Korea 1st Class KMOEL, and Japan DS2FFRs as “similar” to US NIOSH N95 and European FFP2 respirators, for filtering nonoil-based particles. KN95 respirators are held in place by over-ear elastic loops, rather than behind the head elastics, resulting in a loose seal compared to N95 masks. Not all KN95 respirators meet the Chinese KN95 standards. However, with the current respirator shortage, unfortunately, the same applies for N95/FFP also.

Cloth Face Mask

CDC recommends wearing cloth face masks for general public at places where social distancing is difficult to maintain, especially in areas where there is a significant community-based transmission. Cloth face masks prevent the person wearing the mask from spreading respiratory droplets when talking, sneezing, or coughing especially in community settings like grocery stores, pharmacies, and gas stations. Cloth face mask or coverings can be made from household items. Children less than 2 years of age, and anyone who has difficulty in breathing, unconscious, unable to remove the mask without assistance should not wear cloth mask. The cloth face masks are not comparable to surgical masks or N95 respirators in terms of filtering capacity, however are economical, can be made anywhere by anyone, reusable, and easily available. Maximum protection from catching the infection from others by the aerosol route offered by cloth mask is around 50%–70%, compared to the N95 mask (99%) and surgical mask which offers 75%–80% protection.

Recently, Indian Institute of Technology (IIT) Delhi and its start-up “ETEX” has developed an affordable alternative mask, “Kawach.” The “Kawach” mask, developed by ETEX, is at par with N95 in terms of fitting and filtration efficiency. It provides up to 98% filtration efficiency up to 3- μm size particle and is economical being priced at Rs 45.

Face Shields

A face shield is classified as PPE that provides barrier protection to the facial area and mucous membranes of eyes, nose, and lips. An ideal face shield should cover the forehead, extend below the chin, and wrap around the side of the face. The advantages of using face shield are many: more comfortable, protect a larger portion of the face,

less fogging than goggles, less claustrophobic, no impact on breathing resistance, no fit testing required, can be disinfected easily, wearers do not need to be clean shaven, easy to don and doff, relatively inexpensive, no impact on vocalization, can be worn concurrent to other face/eye PPE, do not impede facial nonverbal communication, protects against self-inoculation over a wider facial area, and may extend the useful life of a protective facemask when used concurrently. Disadvantages of using a face shield are glare effects, fogging, may be optically imperfect, some models may not fit properly over some respirators, and may be bulkier than goggles. The major structural components of face shield are (i) visor, (ii) frame, and (iii) suspension straps. Since face shield is not a tight facial fit, it cannot be used as a replacement for a mask. Face shields provide a barrier to body fluids and are commonly used as an alternative to goggles as they confer protection to a larger area of the face.



(A) Face shield and (B) mask with integral visor

Various studies have reported 96% and 92% reductions in the risk of inhalational exposure immediately after a cough for a face shield at distances of 18 in (46 cm) and 72 in (183 cm), respectively. The World Health Organization recommends the use of a face shield as an alternative to the use of a surgical mask with goggles. In Radiology Department, face shield can be used alone when a splash of body fluid is expected like during drainage procedures. During COVID crisis, surgical mask with face shield or mask with integral visor is preferable in imaging COVID suspect cases maintaining adequate social distancing and hand hygiene practices. However, when imaging COVID positive patients, face shield is an integral part of full PPE and should be worn along with an N95 respirator. In emergency situations, at times of crisis, WHO recommends the use of isolated face shield with proper design in the absence of surgical masks.

Face shields cannot be used as a replacement for a mask. Cloth face mask should not be used by the healthcare worker in the hospital setting and is not to be considered a substitute for N95 mask or surgical mask. N95 masks should be reserved for COVID suspect and positive cases. Surgical mask should only be used for routine cases in which there is no suspicion for COVID infection. Only in crisis times and nonavailability of N95 masks, surgical mask with visor may be considered for examining COVID suspect cases with all due precautions.

Personal Protective Equipment (PPE)

Personal Protective Equipment (PPEs) are protective gears designed to safeguard the health of workers by minimizing the exposure to a biological agent. Occupational Safety and Health Administration (OSHA) defines PPE as “specialized clothing or equipment worn by an employee for protection against an infectious material”.

Components of PPE

Coverall, gloves, shoe cover, triple-layer mask, N95 respirator, head cover (hood), face shield, and goggles.

Levels of PPE

Level 1 PPE: For Standard Infection control precautions – It includes disposable gown and disposable gloves. If risk of spraying or splashing is anticipated, surgical mask and face shield/goggles are recommended.

Level 2 PPE: For direct/indirect contact precautions/droplet precautions/airborne precautions – It includes fluid-resistant disposable gown and disposable gloves. If risk of spraying or splashing is anticipated, surgical mask and face shield/goggles are recommended. Head cover and N95 respirator are to be considered in cases of airborne infection.

Level 3 PPE: Enhanced precautions for suspected or confirmed infectious diseases of high consequence which spread by direct/indirect contact or by airborne route – It includes fluid-resistant coverall with hood/long-sleeved gown with disposable fluid-resistant hood, N95 mask, face shield, two sets of gloves, and shoe covers.

Details of Each Element of PPE

Fluid-resistant coverall: The coverall should have following specifications - Impermeable to blood and body fluids, single use, meets or exceeds ISO 16603 class 3 exposure pressure, or equivalent. The coverall should be SITRA or DRDO approved if manufactured in India.

Disposable gown: Impermeable to blood and body fluids, single use.

Disposable gloves: Nitrile nonsterile, powder-free gloves are preferred.

Value of gloves in COVID-19 scenario: Gloves should be worn when providing direct care for a COVID-19 case and then removed, followed by hand hygiene. Extended use of gloves for caring COVID-19 cases is not recommended. Changing gloves between dirty and clean tasks during care to a patient and when moving from a patient to another, accompanied by hand hygiene, is absolutely necessary. Double gloving is not recommended, except for surgical procedures that carry a high risk of rupture.

Triple-layer surgical mask: The triple-layer surgical mask should be made of a melt-blown polymer, most commonly polypropylene, placed between nonwoven fabrics.

N95 mask: Ideally should be NIOSHN95, EN 149 FFP2, or equivalent.

Triple-layer mask or N95: N95 masks should be used in COVID suspect and positive cases. Surgical mask should only be used for routine cases in which there is no suspicion for COVID infection. Only in crisis times and nonavailability of N95 masks, surgical mask with visor may be considered for examining COVID suspect cases with all due precautions.

Face shield: It should be made of clear plastic and provide good visibility to both the wearer and the patient. It should be fog resistant, should have adjustable band to attach firmly around the head and fit snugly against the forehead, and completely cover the sides and length of the face.

Goggles: Goggles should have transparent glasses with zero power. It should be covered from all sides with elastic band/or adjustable holder. It should have good seal with the skin of the face and should be fog and scratch resistant.

Shoe cover: It should be made up of the same fabric as of the coverall and should cover the entire shoe and reach above the ankles.

For example

Appropriate use of PPE in non COVID areas in diagnostic radiology

Diagnostic radiology non-covid areas					
Setting	Target personnel	PPE	Level of PPE	Remark	Patient oriented
Radiology Reception Area/ Help Desk	Receptionist/Data entry operator	Triple-layer mask	-	Ideally, build glass/plastic screens to create a barrier between health care workers and patients	Physical distancing to be followed at all times

Diagnostic radiology non-covid areas					
Setting	Target personnel	PPE	Level of PPE	Remark	Patient oriented
					Patients should wear a cloth mask/triple-layer mask at all times
X-ray	Radiologist/Technician	Gown and triple-layer mask	-	-	Patients should wear a cloth mask/triple-layer mask at all times
Fluoroscopy procedures	Radiologist/Nurse/Technician	Gown, triple-layer mask, gloves	Level 1	Face shield/goggles with a visor, when splash of body fluid is expected	Patients should wear a cloth mask/triple-layer mask at all times
Ultrasound	Radiologist/Nurse/Attendant	Gown, triple-layer mask	-	Ideally, build glass/plastic screens with a hole for hand to create a barrier	Patients should wear a cloth mask/triple-layer mask at all times

Hospital Attendant and Housekeeping staff in non-COVID areas should wear triple-layer mask, gown, heavy duty gloves, heavy duty boots, goggles or face shield if splash of fluid is expected. Anywhere where there is aerosol generating procedure, Level 3 PPE to be used. PPEs are not alternative to basic preventive public health measures such as hand hygiene, respiratory etiquettes which must be followed at all times. Doctor and nursing staff should wear gloves while handling patients whose clothes are visibly soiled

All radiology procedures in covid areas

All Diagnostic and Interventional procedures	Radiologist/Nurse/Technician/Housekeeping / Hospital Attendant	Full component of PPE	Level 3	- Physical distancing to be followed at all times- Ideally, build glass/plastic screens to create a barrier between health care workers and patients	Patients should wear a cloth mask/triple-layer mask at all times if feasible
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Hospital Attendant and Housekeeping staff in non-COVID areas should wear triple-layer mask, gown, heavy duty gloves, heavy duty boots, and goggles or face shield if splash of fluid is expected. Anywhere

where there is aerosol generating procedure, Level 3 PPE to be used. PPEs are not alternative to basic preventive public health measures such as hand hygiene and respiratory etiquettes which must be followed at all times

Rational and appropriate use of PPE that is reusable, economical, and recyclable is the need of hour. The above guidelines depend upon the resources available with the institutions, hospitals, and diagnostic centers. One can think of using their own customized PPEs as many local textile manufacturers are coming up with economical solutions as announced by our Honourable Prime Minister for implementing the Atmanirbhar Bharat *Abhiyan* scheme.

GUIDELINES

COVID-19 pandemic: Cleaning and disinfection – What should the radiologist know?

Introduction

The current outbreak of the novel coronavirus SARS CoV-2, epi-centred in Hubei Province of the People's Republic of China, has spread to many other countries. On 30th January 2020, the WHO Emergency Committee declared a global health emergency based on the growing case notification rates at Chinese and international locations. As of 3rd May 2020, the Ministry of Health and Family Welfare have confirmed a total of 26535 cases and 1223 deaths in the country since its first case on 30th January.

Cleaning and disinfecting activities in hospitals are critical for preventing healthcare-associated infections. The purpose of this article is to consider the effects of COVID-19 on the imaging equipment, with particular consideration from the guidelines currently available from the Centers for Disease Control and Prevention, Ministry of Health and Family Welfare that may be applicable to radiology. General principles to be followed while cleaning and disinfecting the radiology facilities and equipment are listed in Table 1. Various chemical disinfectants available in the market are highlighted in Table 2.

	
Chemicals used in cleaning and disinfection	Sterifog Fogging machine

Table 1
General principles to be followed for cleaning and disinfection

1. Wear proper personal protective equipment (PPE) – triple-layer surgical mask, disposable gown, heavy duty gloves, shoe cover, cap and face shield/ goggles while cleaning.
2. Always switch the system off at the main power before cleaning.
3. Follow manufacturer's instructions for cleaning. Never mix household bleach with ammonia or any other cleanser.
4. X-ray and ultrasound systems should be covered with two-layer of fluid impermeable plastic if fogging is being done.
5. Alcohol solutions should contain ≤70% alcohol.
6. Do not shake dirty laundry.
7. Wash hands with soap and water after removal of gloves.
8. If soap and water are not available and hands are not visibly dirty, an alcohol-based hand sanitizer that contains at least 60% alcohol may be used.
9. While disinfecting facilities, care should be taken to ensure that the discharge of the vapours is sufficiently removed from the windows. Air must not be recirculated. Ensure ten air exchanges per hour.
10. Install exhaust ventilation systems in ultrasound and x-ray rooms.
11. The air-conditioning units should be switched off during the cleaning process.
12. Seal the equipment room with tape and plastic covering doors and vents during cleaning.
13. Downtime of at least 30–60 minutes is required after disinfection.
14. All instructions in the operator manual regarding cleaning and disinfection must be always observed.
15. Read all the instructions written on each disinfectant and cleansing bottle carefully before using.

Table 2
List of chemical agents for cleaning and disinfection

Cleaning agents	Purpose and mechanism of action	Options
Aldehyde (high-level disinfectant)	Glutaraldehyde (1.0-1.5%) - excellent disinfective qualities against all bacteria, bacterial spores and viruses. The biocidal activity of glutaraldehyde results from its alkylation of sulfhydryl, hydroxyl, carboxyl, and amino groups of microorganisms, which alters RNA, DNA and protein synthesis.	Formaldehyde, paraformaldehyde, glutaraldehyde, calgocide 14, cidex and vespore
Quaternary compounds (Available as both high- and low-level disinfectant)	The bactericidal action of the quaternaries has been attributed to the inactivation of energy-producing enzymes, denaturation of essential cell proteins and disruption of the cell membrane. Their effectiveness and safety increase when they are combined with other disinfecting agents. They are not effective against hydrophilic viruses but are effective against lipophilic viruses.	Alkyl dimethyl benzyl ammonium chloride, alkyl dimethyl ethylbenzyl ammonium chloride, benzyl alkyl dimethyl ammonium chloride, didecyl dimethyl ammonium chloride, dioctyl dimethyl ammonium chloride, N-alkyl dimethyl benzyl ammonium chloride, octyldecyldimethylammonium chloride and quaternary ammonium chloride

Cleaning agents	Purpose and mechanism of action	Options
Alcohol (Intermediate)	The most feasible explanation for the antimicrobial action of alcohol is denaturation of proteins.	70% ethyl alcohol Isopropyl
Chlorine derivatives (High-level disinfectant)	The germicidal action has been attributed to oxidation of sulfhydryl enzymes and amino acids; ring chlorination of amino acids; loss of intracellular contents; decreased uptake of nutrients; inhibition of protein synthesis; decreased oxygen uptake; oxidation of respiratory components; decreased adenosine triphosphate production; breaks in DNA; and depressed DNA synthesis	NaDCC (Sodium dichloroisocyanurate). Sodium hypochlorite ('bleach'). Calcium hypochlorite Chlorine products are available as liquids or solid powders. The strength of a chlorine solution is expressed in ppm of free chlorine. Disadvantages of hypochlorite include corrosiveness to metals in high concentrations (>500 ppm), discolouring of fabrics.
Benzene (High-level disinfectant)	Interact with amino acids, proteins, and microorganisms. These chemicals kill spores by blocking the spore germination process.	Ortho-phthalaldehyde (OPA)
Alkylamines	Also referred as aliphatic amines. New category of germicides effective against fatty acids.	Monoethanolamine and triethanolamine
Phenol derivatives (0.5-3%) (Low-level disinfectant)	In high concentrations, phenol acts as a gross protoplasmic poison, penetrating and disrupting the cell wall and precipitating the cell proteins. Low concentrations of phenol and higher molecular-weight phenol derivatives cause bacterial death by inactivation of essential enzyme systems and leakage of essential metabolites from the cell wall. Usually they are black or white fluids.	Ortho-phenylphenol, ortho-benzyl-para-chlorophenol, amphyll, staphene, hexachlorophene - Phisohex, chlorhexidine - Hibistat, Hiblicens and Lysol
Organic acids (High-level disinfectant)	Function similarly to other oxidizing agents- that is, it denatures proteins, disrupts the cell wall permeability and oxidizes sulfhydryl and sulphur bonds in proteins, enzymes and other metabolites.	Peracetic acid, carboxylic acid and acetic acid
Peroxide compounds (High-level disinfectant)	Peroxide compound works by producing destructive hydroxyl-free radicals that can attack membrane lipids, DNA, and other essential cell components. Hydrogen peroxide is active against a wide range of microorganisms, including bacteria, yeasts, fungi, viruses and spores	Hydrogen peroxide (3.0-6.0%)
Guanidine compounds	Bactericidal and fungicidal	Polyhexamethylene guanidine (PHMG)

Cleaning and Disinfection of Radiology Department

- Radiology reporting rooms, office spaces, waiting areas and conference rooms should be cleaned every evening after office hours or early in the morning before the rooms are occupied
- If contact surface is visibly dirty, it should be cleaned with soap and water prior to disinfection. Prior to cleaning, the worker should wear disposable rubber boots, gloves (heavy duty), and a triple layer mask
- All indoor areas should be mopped with a disinfectant with 1% sodium hypochlorite or phenolic disinfectants
- High contact surfaces such as elevator buttons, handrails/handles and call buttons, public counters, intercom systems, equipment like telephone, printers/scanners and other office machines should be cleaned at least 3-4 times daily by with a linen/absorbable cloth soaked in 1% sodium hypochlorite. Guidelines for preparation of 1% sodium hypochlorite are in Table 3.

Table 3
Guidelines for Preparation of 1% sodium hypochlorite solution

Product	Available chlorine	1% hypochlorite (10000 chlorine ppm)
Sodium hypochlorite - liquid bleach	3.5%	1 part bleach to 2.5 parts water
Sodium hypochlorite - liquid	5%	1 part bleach to 4 parts water
NaDCC (sodium dichloroisocyanurate) powder	60%	17 grams to 1 litre water
NaDCC (1.5 g/tablet) - tablets	60%	11 tablets to 1 litre water
Chloramine - powder	25%	80 g to 1 litre water
Bleaching powder	70%	7 g to 1 litre water

5% sodium hypochlorite: 50000 chlorine ppm; 1% hypochlorite: 10000 chlorine ppm; 0.5% hypochlorite: 5000 chlorine ppm

- Frequently touched areas like table tops, chair handles, pens, diary files, keyboards, mouse, mouse pad, tea/coffee dispensing machines etc., should specially be cleaned
- Barrier protective coverings (e.g., clear plastic wraps) can be used for surfaces particularly those that are difficult to clean.
- For metallic surfaces like door handles, security locks, keys etc., 70% alcohol can be used to wipe down surfaces where the use of bleach is not suitable.
- Hand sanitizing stations should be installed in office premises (especially at the entry) and near high contact surfaces.

Cleaning and Disinfection of Radiology Equipment

General mandatory principles for cleaning and disinfecting radiology equipment are listed in Table 1.

X-ray equipment

Parts: Main equipment, touch user interface, monitors, keyboard, liquid crystal displays (LCD) and detector.

Cover- Wrap the X-ray machine, image receptor and anatomical marker with disposable two-layer double-bagged fluid-impermeable plastic material. The detector should be wrapped in a disposable single-use water impermeable plastic bag and ideally this plastic bag should be changed after every patient.

Cleaning- Only use water or a lukewarm diluted household cleaning agent solution. The use of other than the recommended cleaning agents can result in damage in the equipment. Wipe machine parts with a moist cloth (squeeze out wet cloth before using it) until all contaminations are removed. Remove any watery residues immediately. The back of the X-ray detector should be cleaned first so that it has more time to dry while the front is being cleaned. Appropriate cleaning wipes with vendor-approved disinfectants must be used to clean the detector at least twice daily.

Disinfection- Since the radiography equipment is a non-critical medical device, and also the equipment is wrapped in a cover, it does not require disinfection. However, when there is hazardous spill on the equipment, disinfection may be required. To disinfect surfaces, aldehyde solutions, guanidine derivatives and peroxide compounds should be used. Alcohol-based products should not be used for surface cleaning. After disinfection, wipe the system with a dry soft cloth or let the system dry naturally. Sterilization is not allowed for X-ray equipment.

Ultrasound

Parts: Transducer, console, liquid crystal displays (LCD), touch user interface, monitors and keyboard

Precautions:

1. Do not clean the system with chlorinated or aromatic solvents such as isopropyl alcohol
2. Do not use spray cleaners on the ultrasound as it may damage the internal components
3. Do not pour fluid on the ultrasound system
4. Disconnect transducers from the main system before cleaning
5. Take extra precautions to clean trackball, touchpad, keys, knobs and side controls
6. Ensure fluid does not seep into the openings of system.

Critical item: Ultrasound probe used in sterile body cavities (intraoperative) – should be sterilised using glutaraldehyde or hydrogen peroxide.

Semi critical item: Endocavitary probes - should be treated with high-level disinfectant like glutaraldehyde, hydrogen peroxide, ortho-phthalaldehyde, and peracetic acid with hydrogen peroxide.

Noncritical item: Probes used in intact skin – should be treated with low-level disinfectant.

Cleaning the transducer: Dip the transducer (not cable) in clean water or soap water to remove all foreign material or wipe the transducer with moist sponge. Avoid using a brush. Dry the transducer with a clean cloth.

Disinfecting the transducer: Immerse the transducer (not cable) into a solution (22% hydrogen peroxide or 4.5% peroxyacetic acid or 2.4% glutaraldehyde) for 10–12 hours. After this, rinse the transducer with water to remove all chemical residues. Wipe off the water with sterile cloth after this.

Probes used only for external use (linear, curvilinear and phased array transducers) on intact skin without contamination of blood or bodily fluids should be cleaned with low-level disinfection (soap water, quaternary ammonia wipes) between each use. Probes used externally for percutaneous procedures (vascular access, thoracentesis, paracentesis, arthrocentesis, pericardiocentesis, lumbar puncture, regional anaesthesia and other procedures) should be covered with single-use protective covers and sterile gel applied. They should subsequently be cleaned with low-level disinfection.

Probes used internally on mucous membranes and internal orifices (endocavitary probe for intraoral procedures/transvaginal examinations and transesophageal probes) should be covered with high-quality single-use probe covers during each examination, followed by high-level disinfection between each use. An alternative procedure for disinfecting the endocavitary probes involves:

- Removing the gel from the transducer
- Cleaning the transducer with soap and water
- Wiping the transducer with 70% alcohol or soak it for 2 minutes in 500 ppm chlorine
- Rinsing with tap water
- Air drying and wiping with cloth.

Sources

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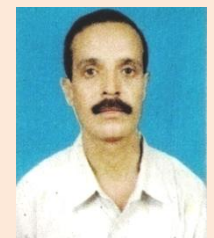
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RETIRAL

Dr. Tapan Kumar Pattanaik,

Department of Veterinary Surgery & Radiology. College of Veterinary Science and Animal Husbandry, Odisha University of Agriculture & Technology, Bhubaneswar had



retired from his active service on 31.01.2021. Dr. Pattanaik was born on 09th January 1961 in Cuttack district of Odisha. He completed his matriculation in the year 1977 and I.Sc. from Utkal University, Odisha in the year 1980. Then he completed his B.V.Sc. & A.H. in the year 1985 and M.V.Sc. (Veterinary Surgery & Radiology) in the year 1987 from Odisha University of Agriculture & Technology, Bhubaneswar. He completed his PhD degree in the year 1992 from Indian Veterinary Research Institute. He joined as Junior Veterinary Officer in the year 1987 and Veterinary Assistant Surgeon in the year 1992 under Director of A.H. & V.S., Odisha. Later on he joined as Assistant Professor in the year 1984, Associate Professor in 2003 and Professor in 2011 in the Department of Veterinary Surgery and Radiology, C.V.Sc. & A.H., OUAT. During his MVSc the main field of research was “Surgical repair of hip displacement and its post operative complication in experimental bovine”. His PhD research was on “Development and evaluation of an external fracture fixation device – An experimental study in cattle”. He was awarded **Young Surgeon Award and Gold Medal** in the year 1991, **Dr. A.K. Bhargav Memorial Award** in the year 1996, **Appreciation Certificate** in Wild Life Surgery session in the year 2006, 2007 by Indian Society for Veterinary Surgery. He guided seven MVSc students and published more than 40 research articles in different national and international journals. The ISVS wishes his healthy and peaceful retired life.

REMEMBRANCE

Dr. S.C. Ojha left us to his heavenly abode on 05th May, 2021 at Ajmer, Bikaner. Dr. Ojha was born on 29th November 1938 in the Ajmer, Bikaner. He had completed his college education in Stewart Science College, Cuttack, Odisha. Then he had completed his B.V.Sc. & A.H. in the year 1961 under Utkal University, Odisha and M.V.Sc. (Veterinary Surgery & Radiology) in the year 1963 from Bihar Veterinary College. He had completed his PhD degree in the year 1983 from Banaras Hindu University (BHU), Varanasi. He had joined as Lecturer in the Department of Veterinary Surgery & Radiology, College of Veterinary Science and Animal Husbandry, Odisha University of Agriculture and Technology, Bhubaneswar, Odisha. Then he was selected as Professor, Central Clinic, C.V.Sc. & A.H., Dantiwada, Gujarat. He had expatriation in the field of Gastro-Intestinal Surgery, Radiology and Diagnostic Imaging. He had retired from his active service on 29.11.1998. Dr. Ojha was a thorough gentleman, a great veterinary surgeon and very dedicated professional. His innumerable students and colleagues mourn his departure. May His Soul Rest in Peace.



Dr. Kanaksinh Sureshkumar Gameti entered into the glory on 7th June 2021 after a period of post-COVID illness. Dr. Gameti was born on 25th February 1991. He graduated from Veterinary College, SDAU in 2014 and M.V.Sc from Anand Veterinary College in 2016 and was pursuing Doctorate programme at College of Veterinary Science and A.H., K.U., Junagadh. He joined Assistant Professor on 08.12.2016 in the Department of Veterinary

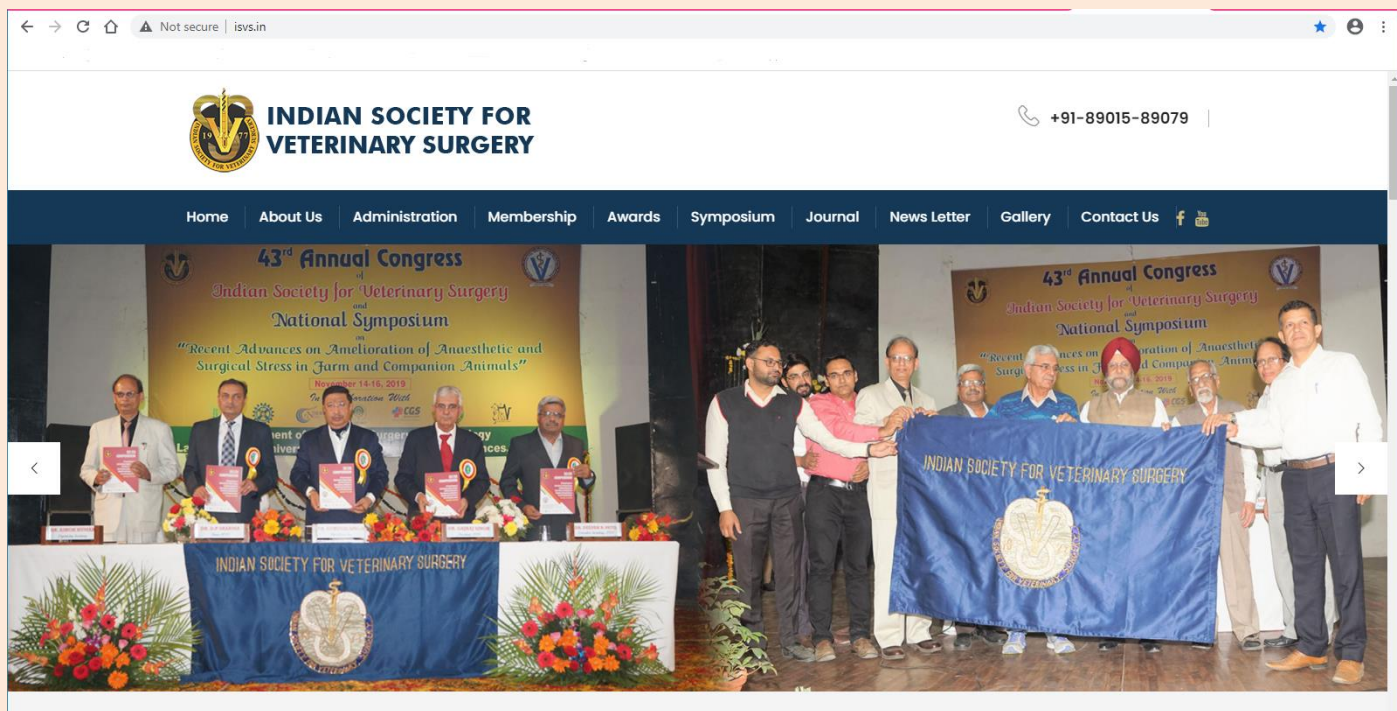


Surgery and Radiology, Junagadh. Dr. Gameti was a brilliant student as well as active in extracurricular activities and was General Secretary during his under graduation time. Dr. Gameti was a very good teacher and surgeon. His contribution towards Students, College and Profession will always be remembered. He had immensely contributed to the profession in the field of Veterinary Surgery as a teacher and clinician. The ISVS expresses heartfelt condolences to his family at this moment of grief and pray Almighty for his soul to rest in peace.

Dr. Prachi Eknath Taksande, Assistant Professor, Nagpur Veterinary College, Maharashtra Animal & Fishery Sciences University, Nagpur succumbed to Post COVID-19 complication on May 16, 2021. She fought for life for 25 days in hospital at Nagpur. Dr Prachi did her graduation and Post-graduation from Nagpur Veterinary College and completed her Doctoral studies from GADVASU, Ludhiana. She was expert in large and small animal urogenital surgeries. She was a dedicated veterinarian and veterinary profession has lost a talented comrade due to her demise. She will always be remembered as a sincere, hard working, trustworthy and enthusiastic teacher. The ISVS expresses profound condolences to her family at this moment of bereavement and pray Almighty for her soul to rest in peace.



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