

# PRnews

WINNING OVER CANCER



India's 1<sup>st</sup> dedicated  
cancer centre  
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Celebrating Our Patients



“

37 years ago, when we started Apollo Hospitals, the purpose was to create a healthcare system of global standards. There was a sense of commitment in everything we did.

Way back in 1995, we performed India's first heart transplant and since then, we have treated over 10 million cardiac patients. But alongside, we realised that we needed the same passion for excellence in oncology, to win the war against cancer.

Whether it's cardiology or oncology, at Apollo, the effort is to be second to none.

We are changing the way cancer is managed by focusing on early diagnosis and personalised molecular oncology for surgical, medical and high-precision radiation treatment. We are driving smarter, safer and more effective treatments by being at the forefront of technology, expertise and research globally. Outcome measures which are benchmarked with the best centres around the world, empower the teams to achieve the highest standards of success in treatment.

With the first and only Pencil Beam Proton Therapy Centre in South Asia & The Middle East, and the zealous mission of Pro Health incorporating preventive oncology, Apollo Cancer Centres have all that is needed to strengthen the battle against cancer.

Across 14 cancer centres and 1000 dedicated beds, over 200 oncologists oversee delivery of high-end Precision Oncology Therapy. It warms my heart that our oncologists deliver world-class cancer care following an organ-based practice under competent Cancer Management Teams. This helps us in delivering exemplary treatment to the patient in an environment which has consistently delivered an international standard of clinical outcomes.

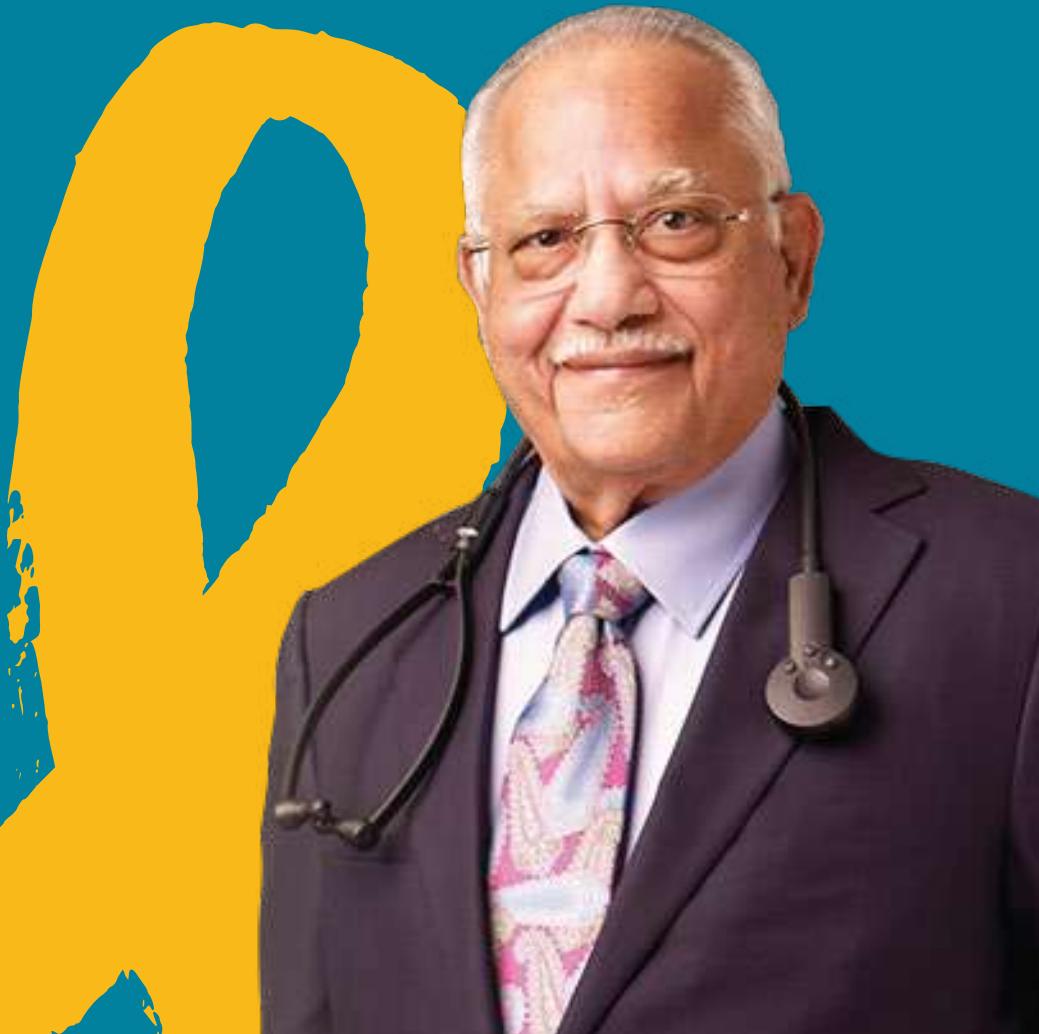
There was a time when people had to go abroad for advanced cancer care and cure. Today people from over 147 countries come to India for cancer treatment at Apollo Cancer Centres. The fact that cases of cancer are rising dramatically, worries me. I believe that to beat the disease, we must do all in our power to prevent it and also diagnose it as early as possible.

Just as India has come together to fight the pandemic, we must step up our efforts to reduce the burden of cancer and make it curable, ideally for every patient. This is my goal and I need the support of my fellow citizens to build a healthier and happier India!

- Dr Prathap C Reddy

Chairman, Apollo Hospitals Group

 Click here to watch  
**Future of Cancer Care**



## **Editor in Chief Dr. Sapna Nangia**

Senior Consultant - Radiation Oncology  
(Head & Neck, Breast and Gynaecology)



An institution is, as per the dictionary, an organization founded for a professional, educational, social or religious purpose. Subliminally, however, the word "institution" is endowed with a larger purpose - an all-encompassing vision and attention to quality in practice, personnel and infrastructure.

**At Apollo Proton Cancer Centre, the exercise of building the institution has been unique on many fronts.**

The first has been, of course, technology, in the form of proton therapy, hitherto unavailable to patients in this part of the world. Protons have unique characteristics that help radiation oncologists to better fulfil the goals of quality radiotherapy for cancer – optimal dose to the tumour, better sparing of normal tissues. These properties lead to better outcomes in some indications, protection from long term side-effects in other indications, and a combination of both in many disease sites. When discussing technology, it is essential to also mention the Radixact Helical Tomotherapy unit at APCC for highly conformal, image-guided photon treatments. Notwithstanding the unprecedented issues that arose during the COVID pandemic, patients from India and abroad continued to seek out proton therapy and we proudly completed treating our 250<sup>th</sup> patient a short while ago. In this issue of ProNews we address the role of proton therapy in pediatric cancers.

The surgical disciplines at APCC are also equipped with the best-in-class technology. The Kinevo operating microscope with 5-ALA and sodium fluorescence imaging, Sonopet bone and soft tissue cutting CUSA for neurosurgery and Zeiss Tivato microscope for microvascular surgery and AcuBlade CO2 laser for head & neck onco-surgery are supported by ancillaries such as narrow-band imaging, intraoperative neurophysiological monitoring etc. Our surgical teams have remained active with recommended protocols and precautions for surgeries during the ongoing pandemic.

The other significant component of building a medical institution is attracting and nurturing talent and creating an environment to harness this for the benefit of patients and the community. The site-specific combined management teams (CMTs) at APCC allow focussed attention, seamless joint decision making and personalization of treatment. In this issue, the GI, breast and pediatric CMTs are in focus. Instituting multi-disciplinary discussion, regular academic activities from the outset has promoted peer review and the scientific practice of medicine in this young organization. Some of our scientific endeavours are documented in the subsequent pages.

A strong institution requires attention to infrastructure. In this issue, we highlight our outpatient floor with its CMT based organization.

I hope you enjoy this second issue of ProNews, a peek into our processes, activities and outcomes.

## **Editorial Board**

**Dr. Sapna Nangia, Dr. Bhawna Sirohi, Dr. Sushama Patil, Dr. Shanti Radhakrishnan Ms. Asha Margaret.**

## Dr. Srinivas Chilukuri

Radiation Oncologist  
(Pediatric, Bone & Soft Tissue, Thoracic & Urology)



# FIRST PUBLISHED PROTON EXPERIENCE FROM INDIA

## Preliminary Experience of Treating Children and Young Adults with Image-Guided Proton Beam Therapy in India

Srinivas Chilukuri, MD, MBBS; Nagarjuna Burela, MD, DNB; Ramya Uppuluri, MD, FNB; D. Indumathi, MD; Sapna Nangia, MD; Pankaj Kumar Panda, BDS, MSc; Dayananda Sharma Shamurailatpam, PhD; Revathi Raj, DCH, MRCP, FRCPPath; Thirumalai Raja, MD, DM; and Rakesh Jalali, MD.

### Background:

Proton Beam Therapy (PBT) has been a preferred modality in pediatric malignancies requiring radiotherapy. We report our preliminary experience of treating consecutive patients younger than 25 years with image-guided Pencil Beam Scanning (PBS) PBT from the first and only centre in the Indian subcontinent.

### Material and methods

Patients were selected for PBT based on multidisciplinary tumour board decisions. Patients eligible for only radical intent treatment requiring relatively high doses of radiation or with tumours located adjacent to radiosensitive structures or those requiring magna-field irradiation were recommended PBT. Patient demographics, tumour and treatment-related characteristics of the cohort were captured. Patient and treatment-related factors and their association with acute toxicities were analyzed using univariate and multivariate analysis.

### Results

Forty-seven patients with a median age of nine years (2-25 years) were treated at our institution with image-guided PBS PBT from January 2019 to March 2020. Table-1 describes the baseline characteristics of the patients; 27 patients were diagnosed with a CNS tumour, and the rest with a non-CNS tumour [Fig 1a and 1b]. The most common diagnosis was ependymoma followed by rhabdomyosarcoma (RMS) and glioma. Twenty-three patients had recurrent disease, of which seven patients were for re-irradiation. Thirteen children (80%) of children younger than six years and two children between 6-8 years required at least one procedure of sedation during either simulation and/or treatment [Fig 2a and 2b]. Among these, only seven required sedation during the entire treatment (all of them were <4 years except one autistic child who was eight years old).

Treatment-related characteristics have been described in Table-2. Among patients who received CSI, three patients were younger than six years, seven were between 7-15 years and three were >15 years. One 15-year-old girl with an intracranial germinoma received whole ventricular irradiation (WVI). On analysis of the technique of PBT planning, MFO was used in 21 patients (of which 17 were non-CNS tumours), SFO was used in 11 patients (all of them being CNS tumours) and hybrid plans were used in 15 patients (including all 13 patients of CSI). The median number of fractions received was 30 (23-33) for CNS patients to a median dose of 54 CGE (40-55.8Gy) and 32 (17-35) for non-CNS patients to a median dose of 59.4 CGE (30.6-70.4). One patient of recurrent parameningeal RMS received hypofractionation with 52.8 CGE in 40 fractions with a twice-daily fractionation.

The median number of CBCTs per patient for CNS tumours was 16 (4-29), whereas for patients with non-CNS tumours it was 20 (7-33). Six patients underwent an adaptive re-planning based on the check CT scans and/or CBCT imaging. Sixteen patients (34%) also received concurrent chemotherapy as per the original treatment plan.

### Tolerance and acute toxicity

Overall, weight-loss was noted in 30 patients during the treatment with a median weight-loss of 0.95 kg (0.1-10.5 kg corresponding to 0.15-10.9% of body weight). Seventeen patients gained weight during the treatment with a median of 0.9 kg (0.1-5.3 kg or 0.5-21.7%). Table 3 depicts acute toxicities noted in CNS and non-CNS tumours. The most common acute toxicity noted irrespective of the site of irradiation as radiation dermatitis. Twenty-one patients (45%) had grade 2 dermatitis and only one patient (2%) had grade 3 dermatitis (13-year child with nasopharyngeal carcinoma who received 70Gy to the bilateral neck). Eighteen patients (38%) had grade >2 and 14 patients (30%) had grade >3 hematological toxicities of which 12 patients (26%) had grade >3 neutropenia. None of the patients developed grade 3 mucositis or dysphagia which mandated a need for a feeding tube during treatment.

On univariate analysis (Chi-square test) of patients with CNS tumours, concurrent chemotherapy ( $p=0.009$ ), CSI ( $p<0.001$ ) and volume of CTV were associated with  $>$  2-grade hematological toxicity. On multivariate analysis both concurrent chemotherapy ( $p=0.03$ ) and CSI ( $p<0.001$ ) were independently associated with  $>$  2-grade hematological toxicity. Among non-CNS tumours, on univariate analysis CTV $>150\text{cc}$  was significantly associated with  $>$  2-grade fatigue ( $p=0.017$ ), head and neck irradiation ( $p=0.01$ ) was associated with  $>$  2-grade mucositis and concurrent chemotherapy ( $p=0.02$ ) was associated with grade  $>$  2 hematological toxicities. The same was found significant in multivariate analysis. ( $p=0.05$ ,  $p=0.03$  and  $p=0.01$  respectively)

### Follow-up and early outcomes

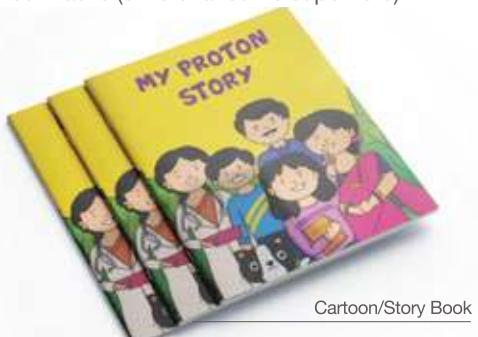
With a median follow-up of six months (2-14 months), four patients had progressed (after a median time of three months) of which three patients progressed in the irradiated volume whereas one child with refractory yolk sac tumour progressed with lung metastases. Three of these patients are undergoing salvage treatment whereas one patient remains controlled after salvage surgery and chemotherapy. All other patients continue to be on follow-up and have no clinical or radiological signs of progression.

### Conclusion

This study demonstrated the safe implementation of PBT for children and young adults in the Indian subcontinent. It also reported demographic features of the consecutive 47 patients treated at a new proton therapy facility and demonstrated that PBT leads to encouraging toxicity outcomes in judiciously selected children and young adults with CNS and non-CNS tumours. A longer follow-up is needed to evaluate its efficacy concerning disease outcomes and late toxicities.v



Coloured Masks (child's favourite superhero)



Cartoon/Story Book

**TABLE 1 Baseline characteristics**

Parameter	CNS(n)	Non-CNS(n)	Total Number (n)
<b>Age</b>			
>1-3	3	2	5
>3-6	3	6	9
>6-12 years	13	6	19
>12-18 years	3	2	5
>18-25 years	5	4	9
<b>Sex</b>			
Male	22	12	34
Female	5	8	13
<b>Origin</b>			
India	26	13	39
Middle East	0	5	5
South East Asia	1	1	2
Others	0	1	1
<b>Residence from our proton centre</b>			
Within 500 km	5	6	11
>500km	22	14	36
<b>Metropolitan cities</b>	14	19	33
<b>Non-metropolitan cities</b>	13	1	14
<b>Pre-arrival Diagnosis</b>			
Present	26	20	46
Not present	1	0	1
<b>Pre-treatment surgical procedure</b>			
Radical excision with negative margins	9	2	11
Radical excision with positive margins	6	8	14
Partial excision	11	4	15
Biopsy only	1	6	7
<b>Pre-treatment Chemotherapy</b>			
Yes	6	14	20
No	21	6	27
<b>Concurrent Chemotherapy</b>			
Yes	8	8	16
No	19	12	31
<b>Presentation</b>			
Upfront	14	10	24
Recurrent/Salvage	13	10	23
<b>Sedation during treatment</b>			
For complete proton therapy	5	2	7
For simulation only	2	0	2
For simulation and initial fractions	2	2	4
No sedation	18	16	33
<b>Re-irradiation</b>	4	3	7

**TABLE 2 Treatment characteristics**

Site of treatment	CNS Tumours	Non-CNS Tumours	Total patients
CSI	12	1	13
Whole ventricular	1	0	1
Focal supratentorial	8	0	8
Focal infratentorial	6	0	6
Skull base	0	3	3
Cervical spine	0	1	1
Face and ipsilateral neck	0	2	2
Face and bilateral neck	0	3	3
Thorax	0	2	2
Abdomen	0	0	0
Pelvis	0	4	4
<b>Median CTV in cc</b>	253 (18.7-3083)	148.5 (30-2155)	175 (18.7-3083)
<b>Median Dose Prescribed in CGE (range)</b>	54 (40-55.8)	59.4 (30.6-70.4)	54.8 (40-70.4)

CSI-craniospinal irradiation, CTV-clinical target volume, CGE-cobalt grey equivalent, SFO-single field optimisation, MFO-multifield optimisation, QA-quality assurance, CBCT-cone beam computed tomography

**TABLE 3 Acute Toxicities CNS vs Non-CNS**

Toxicity	CNS (percentage)	NonCNS (percentage)
<b>Fatigue</b>		
Grade 0	1	5
Grade 1	18	11
Grade 2	6	19
<b>Alopecia</b>		
Grade 0	0	10
Grade 1	0	6
Grade 2	27	4
<b>Dermatitis</b>		
Grade 0	1	1
Grade 1	17	3
Grade 2	9	15
Grade 3	0	1
<b>Nausea</b>		
Grade 0	6	6
Grade 1	16	9
Grade 2	5	5
<b>Vomiting</b>		
Grade 0	8	8
Grade 1	9	8
Grade 2	10	4
Grade 3	0	0
<b>Mucositis</b>		
Grade 0	20	7
Grade 1	2	1
Grade 2	5	11
Grade 3	0	0

Toxicity	CNS (percentage)	NonCNS (percentage)
<b>Dysphagia</b>		
Grade 0	20	9
Grade 1	2	1
Grade 2	5	10
Grade 3	0	0
<b>Bowel</b>		
Grade 0	26	18
Grade 1	1	1
Grade 2	0	1
<b>Anemia</b>		
Grade 0	13	11
Grade 1	11	5
Grade 2	3	2
Grade 3	0	2
Grade 4	0	0
<b>Leucopenia</b>		
Grade 0	14	7
Grade 1	3	2
Grade 2	2	5
Grade 3	7	3
Grade 4	1	3
<b>Neutropenia</b>		
Grade 0	15	11
Grade 1	2	2
Grade 2	2	3
Grade 3	7	3
Grade 4	1	1
<b>Thrombocytopenia</b>		
Grade 0	20	12
Grade 1	7	8
Grade 2	0	0
Grade 3	0	0
Grade 4	0	0

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# CASE SNIPPETS

Dr. Rakesh Jalali

Medical Director & Lead - Neuro Oncology



## PROTON BEAM THERAPY IN A 16-MONTH OLD CHILD WITH A BRAIN TUMOUR: CHANGING PARADIGMS OF CARE

Rakesh Jalali, Rishan TS, Rajesh Thiagarajan<sup>1</sup>, Indumathi<sup>2</sup>, Julius Scott<sup>3</sup> and Roopesh Kumar. Neuro Oncology CMT, <sup>1</sup>Medical Physics, <sup>2</sup>Anesthesia, APCC, Chennai <sup>3</sup>Pediatric Oncology, Kanchi Kamakoti Child Trust Hospital, Chennai.

A young infant of ten months was evaluated in August 2019 for sudden onset vomiting and sluggishness. An MRI scan of brain and spine done showed a space-occupying lesion with heterogeneous contrast enhancement in fourth ventricle with hydrocephalus. He underwent a posterior fossa craniotomy and microsurgical excision of tumour on 10.09.2019 and a VP shunt placement on 24.10.2019. Postsurgical histopathology was reported as Anaplastic Ependymoma, WHO Gr III, PF-A type (GFAP, EMA, D2-40: Positive; Ki 67-25-30%, NF-expansile growth pattern, p53-negative, H3K27 me3-Negative). His case was discussed at the APCC's MDT Tumour Board. The consensus was that while there is growing evidence for administering radiation therapy for posterior fossa ependymomas in children less than three years of age, given the very young age of the child, it would be reasonable to consider chemotherapy to defer radiation therapy (RT) for some more time. The child was planned for chemotherapy with vincristine, cyclophosphamide, cisplatin and Etoposide. After completing five cycles of chemotherapy, an MRI scan in March 2020 showed progression of the disease and he subsequently underwent a sub-occipital craniotomy and excision of tumour on 06.04.2020. Postoperative histopathology was again suggestive of anaplastic ependymoma, with chemotherapy-related changes. Spine screening did not show any obvious leptomeningeal spread. His case was re-discussed in APCC's Neuro-oncology /pediatric MDT. It was unanimously decided to consider the child for radiation now because of the histology and growing evidence to administer RT safely in this location at this age. The clinical team had a detailed discussion with the family and was consented to receive focal radiotherapy using image-guided intensity-modulated proton therapy (IMPT).



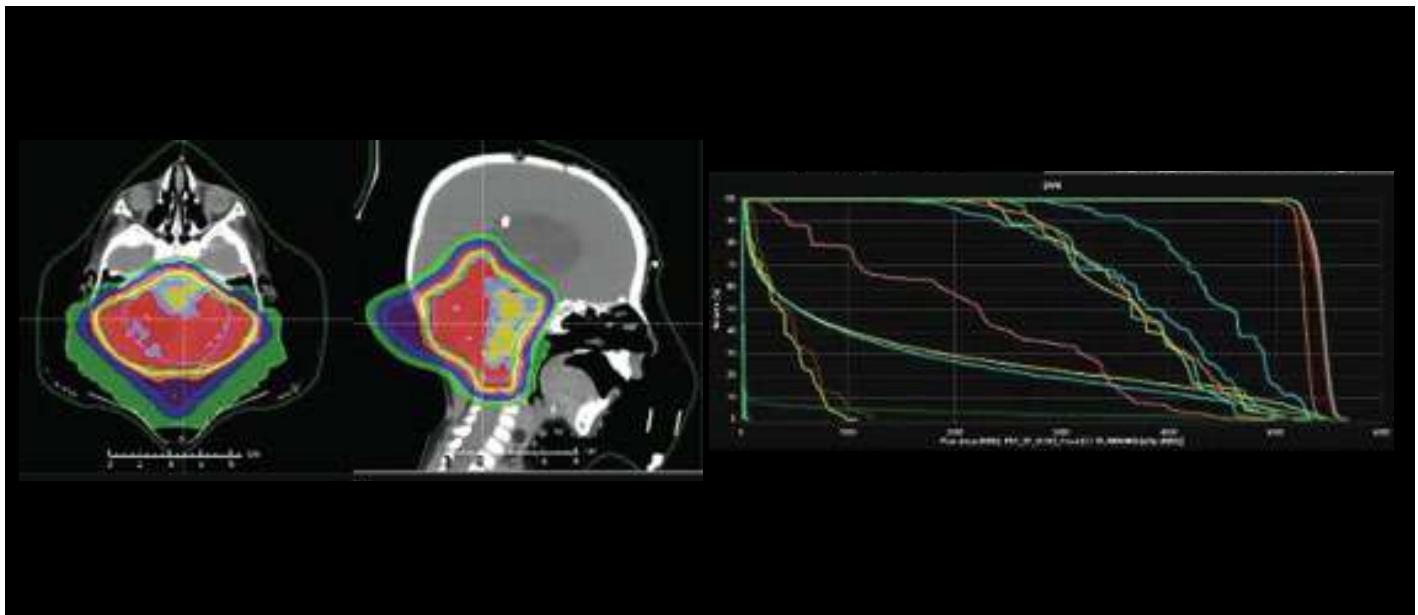
### Pediatric Cancer

**Proton therapy planning:** Being only 16 months of age, the child needed short-term sedation for immobilization, CT scan and volumetric MRI for planning. Smooth coordination between our pediatric anesthesia, radiotherapy and clinical teams was ensured for his daily treatments. A two-field single field optimization (SFO) plan was generated (two posterior obliques) with a pencil beam scanning technique to a total dose of 55.8 CGE in 31 fractions from 20.05.2020 to 01.07.2020 [Fig 1]. As part of stringent quality assurance (QA) protocol during the treatment, the child underwent two QACT scans, which were overlaid with the radiation treatment plans to ensure optimal delivery of treatment.

**Treatment tolerance:** The child tolerated the treatment well except for Grade I neutropenia with anemia. He did not have any interruptions during treatment

### Radiation therapy in children less than three years with brain tumours:

We report successful implementation and treatment of India's youngest child to be treated with proton beam therapy. Close coordination between various teams including nursing and parents was accomplished. In view of such a young age, every care was taken to ensure the most optimal dose distribution with maximal sparing of the normal critical structures and normal brain. Traditionally, RT is not considered in children less than three years of age in view of potential long-term adverse effects on the developing brain. With the advent of highly conformal radiotherapy techniques, posterior fossa location of the tumours with sparing of the supratentorial brain, and ependymoma, generally being considered as chemoresistant due to the overexpression of multidrug-resistance-1 gene, there is rising evidence to consider radiotherapy immediately post-surgery even in the age group of fewer than three years, with encouraging neurocognitive outcomes (1).



**Figure 1:** Dose distribution and DVH of Intensity modulated proton therapy plan

Recent ACNS0121 data published from St. Jude's and supported by the Children's Oncology Group (COG) included 356 patients with ependymoma aged 1-21 years, out of which, 108 patients (28%) were younger than three years of age. The 5-year EFS and OS of children less than three years of age in the study was 62.9% and 87.4%, which compared favorably with 70.5%, 85.8%, respectively seen in older children. This is perhaps the best possible outcome data in children less than three years and significantly superior to 24.4% EFS and 42.7% OS reported in earlier POG 9233 study, where RT was not given upfront and considered only as a deferred modality (2,3).

Modern proton beam therapy employs pencil beam scanning under image guidance and results in a considerable limiting of doses to cochlea, hippocampi, hypothalamic-pituitary axis and integral doses to normal brain. Health-related quality of life (HRQOL) studied in pediatric patients less than four years of age post-treatment with proton beam therapy has been also very encouraging (4,5). Based on these encouraging data, most of the international pediatric protocols include RT in upfront setting in children less than three years of age as well (6).

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# CASE SNIPPETS

Dr. Ajit Pai

Lead - GI Oncology



## PRESSURIZED INTRA-PERITONEAL AEROSOL CHEMOTHERAPY (PIPAC) IN GI MALIGNANCIES

Pressurized Intra-peritoneal Aerosol Chemotherapy (PIPAC) is a novel treatment modality for patients with refractory peritoneal cancers. It is a technique delivering chemotherapeutic drugs in an aerosolized form into the abdominal cavity through a laparoscopic approach using a special device (CapnoPen®). It has the benefits of:

- Intraperitoneal administration (increased intra-tumoural concentrations, low systemic toxicity)
- Pressurized vaporization (homogenous distribution, deep penetration)
- Minimal-invasive approach (repetitive application possible, low morbidity, better quality of life)

Most abdominal cancers (Gastric, Colorectal, Ovarian and Appendicular cancers) in advanced stages have diffuse spread to the peritoneum. Currently these patients are treated with systemic therapy - chemotherapy or targeted monoclonal antibodies; however due to the plasma-peritoneal barrier the effective therapeutic results are not attained.

Intra-peritoneal therapies namely PIPAC, Lap HIPEC, Intra-peritoneal chemotherapy have the advantage of attaining high concentrations of drug in peritoneum and subsequently better clinical results. PIPAC has additional advantage of aerosolizing the chemotherapy and injection of chemotherapeutic agent under pressure which enhances the uptake of drugs. Due to minimal invasive approach, the procedure can be repeated multiple times and response can be assessed every time.

This procedure has been pioneered in Germany and is being practised in multiple European Centers. Clinical results reported from these centers are encouraging.



## Gastrointestinal Cancer

- It reduces the incidence of bowel obstructions and ascites.
- With repeated administration, the median survival is reported in the range of 15-18 months.

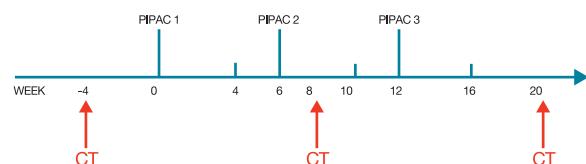
### Treatment Plan

PIPAC is typically placed as an adjunct for systemic chemotherapy in between the cycles of chemotherapy. Typically a bicompartimental effect is achieved with chemotherapy for systemic effects and PIPAC for local peritoneal effect. PIPAC is generally well tolerated and is offered as a short stay procedure.

### Clinical details and results

We have initiated the PIPAC program in our centres since 2019 and we have performed four procedures in three patients till date. Three patients had gastric carcinoma and one patient had colorectal cancer. There was resolution of ascites in all three patients and the median time for recurrence of ascites was 150 days. One patient had considerable resolution of peritoneal disease in the second session but however he succumbed to systemic progression.

### PIPAC - Treatment plan



**1**

Operating team placing ports

**2**

Capnopen placed laparoscopically

**3**

Drugs mixed in Pressure Injector

**4**

Remote device outside Operation Room for Pressure Injector

**5**

Capnopen diffusing aerosolised chemo

**6**

Monitoring from outside OR

#### Future course

The indications and evidence for the use of PIPAC in GI malignancies is evolving and promising results are attained from many centres. This can be used as palliative therapy for intractable ascites of abdominal cancers. PIPAC is a promising therapy as a Neoadjuvant therapy in peritoneal carcinomatosis.

# SPECIAL FOCUS

**Dr. Bhawna Sirohi**

Lead - Medical Oncologist



## YOUNG WOMEN WITH BREAST CANCER – UNIQUE CHALLENGES AND OPPORTUNITIES

Bhawna Sirohi, Selvi Radhakrishnan, Asha Reddy, Sapna Nangia – Breast CMT at APCC

The cancer burden in India and other low and middle-income group countries (LMIC) has doubled over the last two decades, with breast cancer being the commonest among urban Indian women. On an average, 1 in 60 women in rural India compared to 1 in 25 women in urban India will develop breast cancer.

Given that our population matrix is younger, the numbers are more in the younger population. This is also related to a transition in cancer mix with lifestyle factors replacing infection-related cancers (a drop in HPV related cervical cancer and H. Pylori related stomach cancer). Over the last few decades, there has been a social and cultural change with migration to urban areas, higher education, office sedentary work, late marriages which has led to not being able to maintain a healthy weight, eating fast food, use of tobacco/alcohol, long-term use of oral contraceptive/hormone replacement pills, not breastfeeding and some reproductive factors like delayed childbirth, lesser number of children (an average of 2.1 children in her lifetime for women in urban compared to 3.0 children in rural India).

Increasingly, we are seeing breast cancer patients younger than 40 years (YWBC). In this age group, breast cancer is diagnosed at an advanced stage and is aggressive (20-30% of patients have triple-negative breast cancer). 50-60% of patients less than 40 years of age present with locally advanced or metastatic breast cancer. There is often misdiagnosis at the primary level as there is a lack of awareness, the stigma attached to the diagnosis and lack of screening guidelines for this age group.



## Breast Cancer

Women are at the peak of their careers if working or are busy bringing up a young family. The diagnosis has a long-lasting impact on self-development, relationships, family dynamics, professional lives, social interactions and dealing with treatment-related sequelae. Cancer survivorship has an important role to play in supporting YWBC. Increasing attention to their unique issues may improve care and outcomes for this population.

The fifth ESO-ESMO international consensus symposium for breast cancer in young women (BCY5) has come up with guidelines to be followed internationally for the management of YWBC. This group takes inputs from leaders all around the globe and patient groups as well to formulate these important statements which help us treat YWBC optimally and to the highest standards of patient care. India /LMIC is represented by one of the co-authors in this group.

### The key issues that a YWBC thinks about when diagnosed are:

- Will the treatment affect my future fertility?
- Can I do something to not pass the gene to my children?
- How long will I live?
- Will I be able to look after my parents and kids?
- Do I have to give up my work? Can I continue working during treatment?
- What options are there for breast reconstruction if a mastectomy is needed?
- How will it affect my children? Are they likely to be affected because of my diagnosis?
- What type of contraception should I use?
- How will it affect my sexuality?
- Is pregnancy after breast cancer safe?

To address these questions, at APCC, we have established a program for YWBC which aims:

- To support and care for young women through breast cancer
- To educate patients and physicians about the unique issues for YWBC
- To provide a research setting to understand more fully and improve the experience and outcomes of young women: a global breast cancer registry has been set up.

#### To address the effects of disease and/or treatment on:

- Menopausal symptoms
- Fertility and family planning
- Genetic risk
- Role functioning at home and/or work
- Beauty and attractiveness
- Sexual functioning

#### Facilities available:

Joint clinics with Medical, Radiation and Surgical Oncology specialists (Mon / Wed / Friday afternoons) Oncofertility Clinics: Medical and surgical interventions Cancer genetics clinic with a trained genetics counsellor and oncologists Bone Health: comprehensive evaluation and advise Mental Health: psychological support throughout the treatment and follow-up Reproductive and Sexual Health Hot flushes clinic to address menopausal transition Cancer Survivorship: after completion of therapy, clinics to address long-term side effects of therapy Breast Support Group meetings: This is run every third Monday of the month and at other time points also. Pre-habilitation and Post-habilitation with emphasis on keeping BMI <=25

The authors also lead on a national registry for young women with breast cancer which will help drive collaborative research which is India-specific and has a local, national implication.

#### A Comprehensive and Integrated Program Focused on Young Women



# FACILITY TOUR OF THE OUT-PATIENT DEPARTMENT

Apollo Proton Cancer Centre is complemented by a fully integrated treatment suite that offers the most advanced treatment procedures in surgical, radiation and medical oncology. True to the Apollo Pillars of Expertise and Excellence, the Centre brings together a powerful medical team helmed by renowned specialists in the field of Oncology.

At the bedrock of APCC's approach to treat cancer is its robust multi-disciplinary platform; highly skilled professionals - united by expertise and commitment - come together to form Cancer Management Teams (CMT). Each CMT is focused on delivering the best possible outcomes to their patients.

We have clusters for each CMT to offer holistic cancer care. The consultants are easily accessible for the patients since all specialists are available on one single floor.

Patients are usually anxious before seeing their doctor; therefore, the waiting room should make them feel welcomed and comfortable. The OPD at APCC has warm ambience, comfortable seating, mobile café, play station for entertainment during the waiting time, kids play area and also a vibrant book store with collections of several books. In addition, we have the high speed WIFI facility for the guest to use Internet inside the facility.

Tumour Board is one of the unique practices followed at Apollo Proton Cancer Centre. It is conducted three times a week where all the stakeholders of the case participate and discuss the clinical case to come up with the best medical solution in a collective approach. New cases referred to our centre for further management, cases referred for opinion regarding primary diagnosis, second opinion, referral cases and clinical outcomes of the completed cases are discussed during the Tumour Board discussion. IT platforms such as Microsoft Teams, PACS, Philips Digital Pathology are being used securely for all MDT deliberations and to enable seamless participation of all experts including referring doctors/oncologists. Depending on the CMT specific MDT, representation from all or a combination of the following disciplines is required along with the primary doctor/referring oncologist. Through this multidisciplinary approach, patients have access to a diverse team of APCC cancer experts instead of relying on a single opinion.



# PUBLICATIONS

## 1.NEURO ONCOLOGY

### ISNO Position Statement on Treatment Guidance in Neuro-oncology during Pandemics.

Gupta T, Singh VP, Balasubramian A, Menon H, Kurkure PA, Kumar S, Jalali R. Neurol India. 2020 Jul-Aug; 68(4):769-773. doi: 10.4103/0028-3886.293460. PMID: 32859812

#### Abstract:

The entire world including India is currently fighting the coronavirus (COVID-19) pandemic that threatens to disrupt healthcare systems globally in terms of capacity and resources. This outbreak necessitates an urgent review of existing management guidelines for commonly encountered tumours of the brain and central nervous system (CNS). Such a review should include a reassessment of benefit-risk ratio to align with local, national, and international priorities without compromising on delivery of care in terms of safety, compassion, efficiency, and effectiveness. Towards this end, the Indian Society of Neuro-Oncology (ISNO) constituted an online expert panel with adequate representation from all major treatment modalities (neuro-surgery, radiation oncology, and pediatric/medical oncology) to formulate a "COVID-19 context" position statement to guide the care of neuro-oncology patients during the ongoing crisis. The ISNO position statement suggests graded prioritization (based on clinical presentation, type of tumour, expected prognosis, and relevance of immediate therapy) for efficient utilization of resources and provides a framework through a set of general considerations, treatment modality-based considerations, and disease-specific considerations for the guidance of healthcare professionals involved in the delivery of care and services to patients with CNS tumours. The views expressed herein represent the current consensus of key opinion leaders from within the Indian neuro-oncology community and should not be in any case considered binding medically or legally to individual physicians and/or hospitals who may formulate their guidelines based on local setup and health-environment and update them periodically based on emerging evidence through

the COVID-19 pandemic.

Link:[http://www.neurologyindia.com/temp/ni684769-1737613\\_044936.pdf](http://www.neurologyindia.com/temp/ni684769-1737613_044936.pdf)

## 2.NEURO ONCOLOGY

### Reassuring quality of life in younger childhood (<4 years) brain tumour survivors treated with proton beam therapy.

Chilukuri S, Jalali R.

Neuro Oncol. 2020;noaa173. doi:10.1093/neuonc/noaa173

#### Abstract:

Treatment outcomes for brain tumours affecting the very young have been traditionally associated with poor outcomes. 1. For children younger than six years, there has been a strong thrust to choose relatively intensive and prolonged systemic therapy regimens to delay and/or avoid radiation therapy. Most of these attempts, however, have failed to establish standard of care. Current Children's Oncology Group (COG) protocols for ependymoma and atypical teratoid rhabdoid tumour (ATRT) have incorporated a cut-off age limit for immediate postoperative focal radiation of six months of age for infratentorial lesions and 12 months for supratentorial lesions. 2. And yet for children less than three years old...

Link:<https://academic.oup.com/neuro-oncology/advance-article-abstract/doi/10.1093/neuonc/noaa173/5873257?redirectedFrom=fulltext>

## 3. HEAD & NECK CANCER

### An Insight Into Pharyngeal Closure Techniques During A Laryngectomy -Can We Minimize Pharyngocutaneous Fistulas? I. Pharyngocutaneous Fistula (PCF) - Incidence, Risk Factors and Prognostication.

Kadapathri A, Munnangi A, Hedne N, Mohiyuddin S, Pillai V, Shetty S, Narayana SIOSR Journal of Dental and Medical Sciences. 35-39. DOI: 10.9790/0853-1906163539

In this age of chemoradiation for carcinoma of laryngopharynx, post-operative pharyngocutaneous fistula (PCF) it has become quite common. It results in significant morbidity and prolonged patient stay. Although conservative management is the mainstay of its treatment, it causes tremendous psychological impact on the patient due to repeated visits to hospital, inability to take oral feeds, social stigma because of neck wound. We have explored literature to present various risk factors associated with this complication and how to treat it. The technique of pharyngeal closure during a laryngectomy surgery has an important role in preventing a pharyngocutaneous fistula. All surgeons dealing with laryngopharyngeal malignancies need to know the available evidence and described techniques in literature to minimize the incidence of post-operative fistulae. We present to you an extensive literature review regarding pharyngoplasty techniques.

Link:<https://www.iosrjournals.org/iosr-jdms/papers/Vol19-issue6/Series-16/G1906163539.pdf>

#### Abstract:

## 4. MEDICAL PHYSICS

### Characterization and Performance Evaluation of the First-Proton Therapy Facility in India.

Shamurailatpam DS, Manikandan A, Ganapathy K, Noufal MP, Patro KC, Rajesh T, Jalali R. J Med Phys. 2020;45(2):59-65. doi:10.4103/jmp.JMP\_12\_20

#### Abstract:

**Purpose:** The purpose of this study is to evaluate the performance characteristic of volumetric image-guided dedicated-nozzle pencil beam-scanning Proton Therapy (PT) system.

#### Materials and methods:

PT system was characterized for electromechanical, image quality, and registration acc using various X-ray and proton-beam specific detectors following standard protocols.

**Results:** All electro-mechanical, imaging, and safety parameters performed well within the specified tolerance limit. The image registration errors along three translation and three rotational axes were  $\leq 0.5$  mm and  $\leq 0.2^\circ$  for both point-based and intensity-based auto-registration. Distal range (R90) and distal dose fall-off (DDF) of 70.2-226.2 MeV proton beams were within 1 mm of calculated values based on the international commission on radiation units and measurements 49 and  $0.0156 \times R90$ , respectively. The R90 and DDF were reproducible within a standard deviation of 0.05 g/cm<sup>2</sup> during the first eight months. Doses were linear from 18.5 (0.011 MU/spot) to 8405 (5 MU/spot) MU, reproducible within 0.5% in five consecutive days and consistent within 0.8% for full rotation. The cGy/MU for

70.2-226.2MeV was consistent within 0.5%. In-air X(Y) spot-sigma at isocenter varies from 2.96 (3.00) mm to 6.68 (6.52) mm for 70.2-226.2 MeV. Maximum variation of spot-sigma with air-gap of  $\pm$ 20 cm was  $\pm$ 0.36 mm (5.28%) and  $\pm$ 0.82 mm ( $\pm$ 12.5%) along X- and Y-direction and 3.56% for full rotation. Relative spot positions were accurate within  $\pm$ 0.6 mm. The planned and delivered spot pattern of known complex geometry agreed with ( $\gamma\% \leq 1$ ) for 1% @ 1 mm >98% for representative five-proton energies at four gantry angle.

**Conclusion:** The PT-system performed well within the expected accuracy level and consistent over a period of eight months. The methodology and data presented here may help upcoming modern PT centres during their crucial phase of commissioning.

**Link:**  
<https://pubmed.ncbi.nlm.nih.gov/32831487/>

## 5. PATIENT RELATED OUTCOME MEASURES

### Memantine for Prevention of Brain Irradiation-Induced Cognitive Toxicity: A Tale of an Underappreciated and Underused Intervention.

Chilukuri S, Burela N. JCO Glob Oncol. 2020 Sep;6:1384-1388.  
doi: 10.1200/GO.20.00342. PMID: 32926643

**Link:**  
<https://ascopubs.org/doi/10.1200/GO.20.00342>

## 6. LYMPHOMA

### Total marrow and lymphoid irradiation with helical tomotherapy: a practical implementation report

Chilukuri S, Sundar S, Thiagarajan R, Easow J, Sawant M, Krishnan G, Panda PK, Sharma D, Jalali R

#### Objective:

To standardize the technique; evaluate resource requirements and analyze our early experience of total marrow and lymphoid irradiation (TMLI) as part of the conditioning regimen before allogenic bone marrow transplantation using helical tomotherapy.

#### Methods:

Computed tomography (CT) scanning and treatment were performed in head first supine (HFS) and feet first supine (FFS) orientations with an overlap at mid-thigh. Patients along with the immobilization device were manually rotated by 180° to change the orientation after the delivery of HFS plan. The dose at the junction was contributed by a complementary dose gradient from each of the plans. Plan was to deliver 95% of 12 Gy to 98% of clinical target volume with dose heterogeneity <10% and pre-specified organs-at-risk dose constraints. Megavoltage-CT was used for position verification before each fraction. Patient specific quality assurance and in vivo film dosimetry to verify junction dose were performed in all patients.

#### Results:

Treatment was delivered in two daily fractions of 2 Gy each for 3 days with at least eight-hour gap between each fraction. The target coverage goals were met in all the patients. The average person-hours per patient were 16.5, 21.5, and 25.75 for radiation oncologist, radiation therapist, and medical physicist, respectively. Average in-room time per patient was 9.25 hours with an average beam-on time of 3.32 hours for all the six fractions.

#### Conclusion:

This report comprehensively describes technique and resource requirements for TMLI and would serve as a practical guide for departments keen to start this service. Despite being time and labor intensive, it can be implemented safely and robustly.

**Link:** <https://www.e-roj.org/journal/view.php?number=1461>

## 7. RADIO-THERAPEUTICS

### Empirical 188Re-HDD/lipiodol intra-arterial therapy based on tumour volume, in patients with solitary inoperable hepatocellular carcinoma.

Shinto, Ajit Sugunan; Karuppusamy, Kamaleshwaran K.; Kurup, Radhakrishnan E.R.; Pandiyan, Arun; Jayaraj, Arnold V. Nuclear Medicine Communications: September 21, 2020 Volume Publish Ahead of Print - Issue - doi:  
10.1097/MNM.0000000000001296

#### Abstract: Objective:

This study aimed to assess the potential benefits and tolerability of an empirical dose of approximately 0.8–1.2 mCi (29.6–44.4 MBq) of 188Re-4-hexadecyl-1-2,9, 9-tetramethyl-4,7-diaza-1, 10-decanethiol/lipiodol (188Re-HDD/lipiodol) per milliliter of tumour volume, administered after super-selection of the tumour feeding branches of hepatic artery for treatment of inoperable hepatocellular carcinoma (HCC).

#### Methods:

Patients with advanced HCC or classified as inoperable, with no demonstrated extrahepatic disease and no significant comorbidities were eligible. The patients selected for this study had a single tumoural lesion, measuring less than 150 cc. The range of total activity administered was between 30 and 100 mCi (1.2–3.7) GBq 188Re-HDD/lipiodol, administered in the super selected branches of the hepatic artery supplying the tumour in 42 patients. Whole-body scintigraphies and single-photon emission computed tomography-computed tomography (SPECT-CT) of the liver including tumour were performed at four-time points after injection. Absorbed doses to the various organs were calculated according to the Medical Internal Radiation Dose formalism. Blood and urine samples were collected at multiple time points until 72 h after injection. Hematological, hepatic and pulmonary toxicity was assessed until 12 weeks after administration using the Common Toxicity Criteria for Adverse Events (version 3.0) scale. Responses were evaluated on contrast enhanced computed tomography (CECT) and by alfa-fetoprotein (AFP) level monitoring.

## Results:

About  $40.6 \pm 4.8\%$  of the injected activity was excreted in the urine by 72 h after injection. The mean absorbed dose to the liver, lungs, stomach, kidney and intestine was  $14.4 \pm 1.8$ ,  $4.8 \pm 0.6$ ,  $5.5 \pm 1.1$ ,  $5.1 \pm 0.7$ , and  $6.5 \pm 1.0$  Gy (mean  $\pm$  SD), respectively. Up to six days after administration, 26 of 44 patients had adverse events consisting of aggravations of pre-existing laboratory changes (24 patients), fatigue (5 patients), vomiting (6 patients), fever (2 patients), right hypochondrial pain (8 patients), and pain at site of femoral catheter insertion (8 patients). Toxicity assessment at weeks 6 and 12 revealed two cases of mild worsening of liver function tests and no lung or hematological toxicity noted. Two patients were lost to follow-up after the six-week visit. The response was assessed on CECT in all the remaining patients and the classification of results was more standardized when using European Association for the Study of the Liver (EASL) criteria rather than response evaluation criteria in solid tumours (RECIST) criteria. According to EASL criteria, eight patients had a partial response, 28 patients had a complete response, four patients had progressive disease and four patients with stable disease were reported. Thirty-six patients had a baseline elevated AFP and on follow-up at six weeks, six of these patients showed stable AFP, progression in four patients and 26 showed a reduction.

## Conclusion:

After the administration of 1.2–3.7 GBq  $^{188}\text{Re}$ -HDD/lipiodol based on empirical activity calculation of 0.8–1.2 mCi/mL of tumour volume, more than half of the patients in the present study had an objective response on imaging and biochemically. No significant adverse side effects were noted and most of the laboratory markers as well as symptoms returned to normal after 48–72 h post-administration. Selective administration of the radiopharmaceutical into the tumour feeding arteries gives a good anti-tumoural effect with minimal side effects and damage to surrounding normal liver tissue.

## Link:

[https://journals.lww.com/nuclearmedicinecomm/Abstract/9000/Empirical\\_188Re\\_HDD\\_lipiodol\\_intra\\_arterial.98162.aspx](https://journals.lww.com/nuclearmedicinecomm/Abstract/9000/Empirical_188Re_HDD_lipiodol_intra_arterial.98162.aspx)

## Methods:

All adult and Pediatric ICUs in India were eligible to join if they committed to entering data for ICU admissions. Data are collected by a designated representative through the electronic data collection platform of the registry. IRIS hosts data on a secure cloud-based server and access to the data is restricted to designated personnel and is protected with standard firewall and a valid secure socket layer (SSL) certificate. Each participating ICU owns and has access to its own data. All participating units have access to de-identified network-wide aggregate data which enables benchmarking and comparison.

## Results:

The registry currently includes 14 adult and one Pediatric ICU in the network (232 adult ICU beds and nine Pediatric ICU beds). There have been 8721 patient encounters with a mean age of 56.9 (SD 18.9); 61.4% of patients were male and admissions to participating ICUs were predominantly unplanned (87.5%). At admission, most patients (61.5%) received antibiotics, 17.3% needed vasopressors, and 23.7% were mechanically ventilated. Mortality for the entire cohort was 9%. Data availability for demographics, clinical parameters, and indicators of admission severity was greater than 95%.

## Conclusion:

IRIS represents a successful model for the continual evaluation of critical illness epidemiology in India and provides a framework for the deployment of multi-centre quality improvement and context-relevant clinical research.

## Link:

<https://wellcomeopenresearch.org/articles/5-182>

## 9. CRITICAL CARE

### Basic Critical Care for Management of COVID-19 Patients: Position Paper of Indian Society of Critical Care Medicine, Part II.

Deven Juneja, Raymond Dominic Savio et al.

Indian J. of Critical Care Medicine 2020; <https://www.ijccm.org/doi/IJCCM/pdf/10.5005/jp-journals-10071-23593>.

### Click here to watch the video series of Webinar on Wednesday.

(<https://www.youtube.com/channel/UCKX76zgrjHM2UFd2vrxDUg>)

## 8. CRITICAL CARE

### Implementing an intensive care registry in India: preliminary results of the case-mix program and an opportunity for quality improvement and research.

Neill K. J. Adhikari, Rajeshwari Arali, Udara Attanayake, Raymond Dominic Savio et al. Wellcome Open Research 2020; 5:182. (<https://doi.org/10.12688/wellcomeopenres.16152.1>)

## Abstract:

### Background:

The epidemiology of critical illness in India is distinct from high-income countries. However, limited data exist on resource availability, staffing patterns, case-mix and outcomes from critical illness. Critical care registries, by enabling a continual evaluation of service provision, epidemiology, resource availability and quality, can bridge these gaps in information. In January 2019, we established the Indian Registry of Intensive care to map capacity and describe case-mix and outcomes. In this report, we describe the implementation process, preliminary results, opportunities for improvement, challenges and future directions.

# PRONEWS SPECIAL : CELEBRATING OUR PATIENTS

There are myriad facets of life and it is never more important to remember that than when one is grappling with illness.

Nurturing the human being inside us is as relevant as stepping out to deal with the mundane and the necessary.

We are so happy to share these stories of our patients who have kept alive their passion for life while grappling with adversity and difficulty. Do read these inspiring stories shared by our patients in their own words.

## **Mr. Milind Kharge**

**Under the care of Dr. Sapna Nangia and the Head & Neck Cancer Management Team**

Having worked in finance for more than a decade now, my job is very quantitative and analytical. But it also requires common sense, creativity and good old elbow grease. While I never consciously chose painting, sailing or golf as hobbies, they - purely through serendipity - complement my job. Good painting, for example, requires skill, observation, patience and creativity – but at the end of the day, it is still a simple act of applying pigment on a surface. When I paint, I think of how I can simplify a complex 3D object into simple shapes on canvas – an attitude that I strive for in everyday life. Simplifying a complex problem into manageable tasks, doing the basics right and enjoying the results of my success or learning from my failure. I view sailing or golf in a similar vein, where nature challenges me (the seas, the earth or the winds) to adapt to ever-changing environments and think on my feet. As a bonus, it's extremely fun, especially with a group of your mates. The most important aspect for me is having fun and enjoying the things I do, without worrying or pressurizing myself into inaction.



## Mr. Shreyas Shankar

Under the care of Dr. Siddhartha Ghosh and the Neuro Sciences Team

I was born with hydrocephalus and meningomyelocele. Despite that I completed a yellow belt in mixed martial arts and I've run two 10k marathons. I've done a second level course of yoga at the Satyananda Yoga Center just recently over a period of six months.

My professional life is as an artist and graphic designer. Here are some of my works.





*Wishing you a happy new year!  
One filled with good health & hope*