



Review Article

Training for next-generation gynaecologic surgical & radiation oncologists – opportunities & challenges

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The global increase in cancer burden is a challenge for countries with scarce resources. Amongst all the malignancies, gynaecological cancer still continues to have a high incidence and prevalence leading to significant morbidity and mortality. While a multipronged strategy of decreasing the gynaecological cancer burden is a global priority, one of the key strategies to decrease the morbidity and mortality is to train gynaecological oncology specialists. Most of the developed nations have an established gynaecologic oncology training programme in the form of a well-designed curriculum and skill training. However, in developing countries where the actual disease burden of these cancers is highest, such focused training programmes have only started emerging and evolving over the past two decades. While it is a positive step to initiate such training programmes in a country like India, there are still gaps in the uniformity of curriculum and training. Also, exposure to modern practices in gynaecologic oncology surgery, chemotherapy and technology in radiation oncology, especially brachytherapy, is still insufficient in many centres. This review discusses some of the challenges and opportunities in the still evolving programmes for training gynaecologic oncologists in India.

Key words Education - gynecologic oncology training - gynecological cancers - radiation oncology training

There is an increasing disease burden of cancer in India, similar to the trend in other low- and middle-income countries¹. Gynaecological and breast cancers contribute close to one-fifth of all cancers, a significant cause of premature mortality¹ and morbidity² with higher mortality-to-incidence ratio due to existing socioeconomic disparities, which limit their access to treatment³. The recent call by the World Health Organization⁴, Lancet Oncology Commission⁵ and International Gynecologic Cancer Society aims to

close this global divide in the discrepancy of services. The growing cancer burden makes the training of next generation of oncologists' essential especially in gynaecological cancers. The challenge is to impart quality cancer care and develop an affordable research and education system with value for cost-effective, relevant, evidence-based, and professional cancer care of the highest quality. This article highlights the challenges and opportunities for training gynaecologic oncologists in developing countries like India.

Training for next-generation gynaecologic oncologists

Evolution of training in Gynaecologic Oncology: Cancer management has seen a remarkable global effort and progress in coordinated cancer care due to the refinement of surgical techniques, perioperative care and advances in radiation and medical oncology⁶. Oncologic outcomes in gynaecologic cancers can be enhanced by formal training⁷. According to the definition of the American Board of Obstetrics and Gynecology, a gynaecologic oncologist is ‘a specialist in obstetrics and gynecology who is prepared to provide consultation on comprehensive management of patients with gynecologic cancer and who works in an institutional setting wherein all the effective forms of cancer therapy are available’⁸. Following the formation of the Society of Gynecologic Oncologists⁹ the first batches of fellows for the fellowship in Gynaecologic Oncology (GO) were selected in 1974. Sub-speciality training in other countries was introduced much later. In the West, gynaecologic oncology groups and organizations have made significant contributions in establishing and improving formal GO training programmes¹⁰. Gynaecologic cancer surgery is performed by a few gynaecologists with expertise in gynaecologic cancers, general surgeons and surgical oncologists but limited to a few academic medical centres. Many gynaecologic cancer patients with poor access to surgical or gynaecological oncologists are initially managed in small hospitals¹¹. However, much has changed over the past decades. Central to the structuring of formal training courses in GO is the influence wielded by national oncology professional bodies and the establishment of more member of comprehensive cancer centres that provide multidisciplinary treatment and support services. The Association of Gynaecologists of India began one-year fellowships in four centres in India¹². This fellowship was followed by university recognized two-year fellowships provided by some centres such as CMC, Vellore¹³. The three year formal Master of Chirurgiae (MCh) training programme was initiated in 2011 for a single candidate at Tata Memorial Hospital (TMH), Mumbai. Over the past decade, as a result of persistent proactive discussions with regulatory bodies, there are 28 such training opportunities countrywide, 20 registered under the Medical Council of India (MCI) and eight under the National Board of Examination (NBE), besides many university-recognized fellowships. These training programmes are in academic and

comprehensive cancer centres with adequate patient volumes, providing comprehensive cancer care to impart complex surgical skills, principles and techniques of chemotherapy and radiation oncology. The selection of these is through the super-speciality national entrance and eligibility test. Counselling is online and done by the Directorate General of Health Services in Delhi.

Training in India: Opportunities for next-generation gynaecologic oncologists

Surgical intervention is often the first step in diagnosis, staging and treatment in gynaecological cancer¹⁴. The increasing burden of cancer in India provides opportunities for GO training. Gynaecologic oncologists are not just radical pelvic surgeon¹⁵. Formal training provides them with the opportunity and support to develop skills in upper abdominal, colorectal, urological and minimally invasive surgeries along with other procedures that decrease morbidity.

Standardization of training programme: The key to developing a sustainable, adaptable training programme is establishing a curriculum by professional medical, educational societies, which meets the country’s needs and nurtures a professional identity¹⁶. The MCI and NBE have standardized the GO training with a syllabus, selection examination, periodic assessment, peripheral rotations and exit examination for certification. It is good to have competency-based assessments and minimum training standards for the type and number of surgical procedures. Some universities have introduced a mandatory dissertation project and a logbook¹⁷.

Caseload and infrastructure: The training centres should have caseload, sufficient infrastructure and organization to sustain these training programmes. The development of surgical skills often needs collaboration with surgical colleagues, which is more comfortable with a parallel surgical oncology training programme. Acquisition of a theoretical framework and exposure to allied departments such as pathology, radiology, medical oncology, radiation oncology, genetic counselling and palliative care is essential for a modern gynaecologic oncologist. This can only be achieved by training in comprehensive cancer centres, delivering multidisciplinary treatment¹⁸.

Meeting the challenges: Teachers and the training environment need to provide the learning climate, a healthy and safe working environment. It is essential to promote fellow well-being, maximize training outcomes and produce experienced trainees who will

carry forward the training in future. This is essential for a relatively new programme to sustain itself in a low- and middle-income country (LMIC). The challenges faced might be met with lessons learned from established programmes in high-income countries (HICs).

Competency-based training and mentorship: Variations in training requirements and training trajectories are anticipated in any learning programme. Hence, competency-based education should be encouraged with a periodic formative evaluation to identify their strengths, weaknesses and target areas that need improvement^{19,20}. Formative and summative assessments should be held every six months to allow them to the next level of learning. In the quest to attain knowledge in cancer biology and genetics, learning gynaecologic pathology, systemic therapy, radiation oncology, hospice, and palliative care besides acquiring patient care and surgical skills and professionalism, training programmes can be physically, intellectually and emotionally demanding for the GO fellow. Fellows probably have to work 80 h a wk, but there is no mandated work hour restriction in India. Fellows must be allowed to recharge themselves so that one day does not run into the next. They need to develop a philosophical and emotional framework for the profession. Mentors need to impart attitudes, work ethics and attention to detail. Mentorship is a two-way process that requires the self-evaluation of both the trainer and trainee²¹. Faculty members need to serve as role models of compassion, besides excellence and professionalism.

Accreditation and partnerships with comprehensive cancer centres: There are variations in the standard of oncology training programmes depending on the available infrastructure and available resources. In some centres, primary chemotherapy is given by gynaecologic oncologists, whereas in some centres, access to training in minimally invasive surgery might be limited. Thus, elective postings for two to four weeks should help fill the training gaps at a particular centre. National accreditation of cancer centres and comprehensive cancer centres must ensure quality cancer care, research and education system²². An oncology training programme's requirements in a LMIC depend on the country's needs and its available resources. Hence, training in a LMIC differs from training in a HIC. Partnerships with identified cancer centres and accreditation with international oncology societies will improve training and ensure trainee

satisfaction^{23,24}. For example, Christian Medical College, Vellore, is accredited by the European Society of Gynaecological Oncology. An exchange programme with HIC with identified mentors and institutions will allow exposure to global gynaecologic oncology.

Chemotherapy: In most centres in India, chemotherapy is given either by medical oncologists or radiation oncologists. Gynaecologic oncologists should also have some exposure to the administration of chemotherapy and the management of its complications. If facilities and personnel are available, there is a lot to be said for the surgical team to administer first-line chemotherapy. There will be a continuity of care and follow up. Most training programmes have four to eight weeks of rotation in medical oncology.

Preventive oncology: Although general gynaecologists should manage routine screening for cervical and breast cancers, the specialist must also be trained to handle precancers. Thus, the time spent in a dedicated colposcopy clinic would be beneficial for the trainee.

Training for next-generation radiation oncologists: Opportunities and challenges

The burden of cancer is increasing in India, emphasizing the need to escalate the oncology services such as surgery, radiotherapy, and chemotherapy. The goal should be to provide patients with access to modern technology and high-quality services at a reasonable cost. The barriers include inadequate training facilities in all the country centres and insufficient radiotherapy equipment and technology. Private and public partnerships, commitment to technology acquisition and human resource development are needed to achieve this goal.

Radiation oncology is an indispensable speciality in the care pathway of managing cancer patients and is used either alone or in combination with surgery or chemotherapy⁶. Modern-day cancer care increasingly needs a joint multimodality approach. Therefore, the availability of quality and affordable radiotherapy services is a critical requirement for fighting cancer in countries such as India. The role of radiotherapy in GO is vital and is integrated into the standard of care, especially with cervical and endometrial cancers.

The objectives of the Doctor of Medicine (MD) programme in radiation oncology in India are to impart knowledge, practical skills and clinical experience in the non-surgical treatment of cancer. The MCI has described the learning objectives aligning with

Bloom's learning²⁵ theory. It has included the domains of cognitive (mental skills – knowledge), affective (growth in feelings or emotional areas – attitude or self) and psychomotor (manual or physical skills)²⁶. However, despite the advances in the technology and explosion of knowledge, the duration of training in India continues to be three years. The earlier system of diploma for two years, followed by two years of MD, ensured that a resident underwent four years of intense training. Some institutions had a practice of a student working in the department as a junior resident (non-postgraduate registrar) before he/she decided to join the formal training programme. This provided a window of opportunity for the student and the faculty to assess a student's aptitude for considering radiation oncology as a lifetime profession and commitment. Comparing the three-year MD (radiation oncology) in India to the training in other parts of the world, it is four years in the United States²⁷, five years in the UK²⁸ and five years in Australia/New Zealand²⁹. Hence, this training duration of three years for a highly technical end speciality like radiation oncology needs to be revisited.

Challenges in the training

Infrastructure: Currently, India has approximately 545 teletherapy machines (180 telecobalt units and 365 high-energy linear accelerators) and 22 advanced units (7 Gamma Knife units, 8 tomotherapy machines, 7 CyberKnife machines and 2 intraoperative radiotherapy machines)³⁰. The number of remote afterloading brachytherapy units is estimated at around 250³⁰. There is a vast disparity between North and South India concerning both teletherapy and brachytherapy facilities, and also there are significant gaps between demand and supply³¹.

Human resources: Even if facilities are established to meet the demand, there is a significant shortage of trained radiation oncology professionals. To meet the country's needs, 2756 radiation oncologists, 1533 medical physicists and 4737 radiation therapists should have joined the workforce by 2020³². This unmet need will have a bearing on the quality of training and nurturing of the residents.

Technology: High-speed internet has made the world a small place, but the disparity in access to technology and treatment between developed and developing countries has not diminished. Most of the cancer centres are still a decade behind in adopting the cutting edge care. However, few reputed cancer centres and

several corporate hospitals have invested in moving on par with the developed countries, which is only an exception and not the norm.

Munshi *et al*³⁰ noted that around 80 per cent of installation of advanced linear accelerators were done by private centres or groups while the corresponding growth or modernisation of existing government installations has lagged behind. This leads to a massive gap in training and necessitates further training post-residency in centres with state-of-the-art facilities³³. To a certain extent, this gap is being bridged by the advent of the Indian College of Radiation Oncology (ICRO) through which quarterly courses are being conducted for training radiation oncology post graduates. The newly introduced ICRO PRODVANCE also aims to bridge the gap for young graduates of radiation oncology up to five years post graduation.

Brachytherapy: Brachytherapy is an integral component in gynaecological malignancies, which demands dedicated infrastructure and trained professionals. This service also requires administrative efforts such as maintenance of licenses, upgrading technology and radioactive sources.

Interstitial brachytherapy: Interstitial brachytherapy is a crucial component in managing locally advanced cervical cancers with gross parametrial involvement at the end of external beam radiation therapy. It is also indicated in the treatment of vaginal vault recurrences and is considered superior to SBRT (stereotactic body radiotherapy) in pelvic re-irradiation. It is alarming to note that only 20 centres practice interstitial brachytherapy for advanced gynaecological cancers across India. Adequate exposure and training to fill these gaps can be addressed by providing short brachytherapy rotations in centres with a high volume of these procedures.

Image-guided brachytherapy: Recent clinical outcomes have changed the brachytherapy guidelines and made image-guided brachytherapy using computed tomography/magnetic resonance (CT/MR) guidance, the standard of care³⁴. In many training centres, the challenge is that residents are not exposed to this technology and skills in the residency period due to a lack of infrastructure and trained professionals. The European Society for Radiotherapy and Oncology in association with the Association of Radiation Oncologists of India (AROI) has been conducting annual courses in brachytherapy for hands-on training and assistance in implementation and execution of

image-guided brachytherapy for gynaecological cancers across India.

Radiology: With the increasing use of imaging in various aspects of care, it is expected from a radiation oncologist to have adequate knowledge and skills for identifying different typical anatomical structures and tumours on commonly used imaging like CT scan and MR imaging. Exposure to structured diagnostic radiology is limited during the training period in several centres, and this needs to be addressed by ensuring the residents have protected time in radiology. The radiology faculty would spend time training the radiation oncology residents to identify anatomical structures and choose the appropriate imaging modality and sequence for the diagnosis and structure delineation.

Multidisciplinary tumour boards: Multidisciplinary tumour (MDT) boards are one of the best ways of learning for residents as these have an opportunity to get to know from multiple specialities simultaneously. Thus, actively participating in the MDT helps them in decision-making and planning the treatment while being mentored by faculty across specialities. However, in many centres, regular MDTs are often not part of the training curriculum, limiting access to such a forum only to senior oncologists.

Site specialization: Site specialization in radiation oncology across many centres in India has led to gynaecologic radiation oncology becoming a niche area, especially with an emphasis on brachytherapy. This can help train young radiation oncologists and helps improve patient-related outcomes by forming specific disease management groups along with pathologists, radiologists, palliative care specialists, surgical and medical oncologists.

Specialized training: The current three-year programme is challenging for the residents to become adept in all the advanced radiation techniques apart from fulfilling the mandatory requirements. The next phase in training radiation oncologists will be to consider adding specialized training. The options can be in the form of a two-year fellowship or super-speciality with a DM degree in gynaecologic oncology and brachytherapy³⁵. A similar programme is now established by starting a MCh in gynaecologic oncology¹⁴.

Opportunities

Fellowships: Fellowships in gynaecologic oncology and brachytherapy are available globally as well as

within the country. This is an opportunity for those who had inadequate exposure in their residency and are considering a career interest in gynaecologic radiation oncology. TMH, Mumbai, offers a fellowship in GO post-residency.

International and national collaboration: There is a lot of learning scope for residents if there is international and national collaboration of cancer institutes. The residents can visit the centres for a short period and get exposure to the techniques which the parent centre lacks. Collaboration between centres can lead to improved quality of evidence in multicentric prospective randomized and non-randomized trials because of the larger sample size.

Educational wing of membership organizations: The AROI has a dedicated educational section in the form of the Indian College of Radiation Oncology (ICRO) for postgraduates and ICRO PRODVANCE for post MD candidates with less than five years of experience. The Young Radiation Oncologists of India provides a platform for young residents and graduates to participate in group and panel discussions. AROI encourages the participation of residents by providing various travel fellowships, awards and medals.

Exposure to allied specialities: Effective management for gynaecologic cancers involves a multidisciplinary approach. The residents are, to a certain extent, exposed to the weekly multidisciplinary team meetings. However, for more focused and structured training, a mandatory rotation in allied specialities such as medical oncology, palliative care, surgical oncology, radiology, and nuclear medicine are necessary. The cancer professionals' workforce disparity continues to be a challenge in India. There are still some centres in our country and in the world where a gynaecologic oncologist is also expected to give chemotherapy, and palliative care or a radiation oncologist will be the only cancer specialist available in a peripheral centre. In such circumstances, a clinical oncologist's role becomes all the more needed, and a broad exposure to the allied specialities adds significant value towards the preparedness for such occasions.

Research: Academic research requires dedicated time and funding, both of which are a challenge to find. Various oncology professional bodies provide platforms and encouragement to present research ideas and proposals. To avail of such opportunities, trainees need to be mentored proactively and encouraged to participate in scientific meetings to publish their research.

Translational medicine has contributed to the advancement of care of women with gynaecologic cancer. Several training programmes in the West include a year of research, a mandatory component of the training programme, which has inspired many to be physician-scientists. These fellows are exposed to cancer laboratories and often do good quality bench-side research. However, research is often neglected in LMICs for want of dedicated time, capacity, and funding also fellows get overwhelmed by the clinical workload. In such a scenario, interested trainees should be encouraged and allowed to take up translational research even if it means an additional year of training.

The discipline of radiation oncology has managed to attract a considerably high number of doctors to pursue their careers. The training centres and educational institutes have managed to train the radiation oncology residents in the available state-of-the-art technology. However, the same centres are unable to provide a research environment and facilities for the formation of physician-scientists to contribute to the innovation of new technology and molecular oncology^{36,37}. Furthermore, radiobiology is an integral part of radiation oncology. Developing a research laboratory in a few centres of excellence across the country will help create a platform and encourage the nurturing of potential physician-scientists who will be able to undertake relevant research in understanding the biologic effects of radiation. Residents also need training in research methodologies, statistics, grant applications and manuscript writing, which can be integrated in a staged manner aligning with their postgraduate dissertation's timelines. Translational research needs the hour in radiation oncology, and there is a considerable disparity between the developed and developing countries. Many government and non-government agencies such as the Department of Biotechnology, Wellcome Trust, Department of Science Technology, and Indian Council of Medical Research have come forward with grants exclusive for young oncologists undergoing training³⁸. This substantial aid can help in performing meaningful and relevant research.

Early exposure to medical students and postgraduates in obstetrics and gynaecology

Ahmed *et al*³⁹ analyzed the national resident matching programme data trends from 2004 to 2015

in the United States. They found a decreasing trend in the number senior medical student applications for radiation oncology than those of other specialities. To attract the best and competent to adopt this field, we need to proactively restructure our training models to support early exposure to radiation/gynaecologic oncology, meaningful educational experiences and dedicated mentorship to concerned medical students. Few centres have a structured formal rotation in radiation oncology for medical students for about two-week duration. Such programmes provide a broad focused exposure to radiation oncology.

Palisoul *et al*⁴⁰ studied to recognize the function of mentorship and other associated influences connected with obstetrics and gynaecology (OB/GYN) resident interest in seeking a fellowship in gynaecologic oncology in the United States. They found that robust mentor interactions and the demonstration of job satisfaction and work-life balance stimulate OB/GYN residents' curiosity in GO fellowships. In India, institutions where a department of GO is functional, postgraduates' exposure in OB/GYN is for around four weeks. For those institutions where there is no gynaecology department, GO exposure is received during their gynaecology rotations. The MCI syllabus for MS in OB/GYN prescribes that the residents know about benign and malignant gynaecological disorders. Radical operations for gynaecology malignancies must be observed and/or assisted when possible as part of skill training⁴¹. However, knowing the burden of gynaecological cancers in India and the challenges of managing these patients only by a gynaecologic oncologist is impractical. A structured and comprehensive exposure to GO training is essential to bridge the knowledge and skill gaps. Since the super-speciality of GO is established for some time, it will be prudent to consider a basic rotation for general exposure and for the residents considering a career in GO, an extended elective or observership in a higher centre for more comprehensive training in GO.

Communication skills

While clinical knowledge and skills are of paramount importance, it is equally important, especially in oncology, that the training includes teaching communication skills. To achieve this, we recommend scheduled orientation classes at the beginning of the training programme. These classes must include lectures by experts, videos and role-plays comprising various topics based on doctor-patient relationships, breaking

bad news, non-verbal communication, and ethics. In addition to this, residents must be taught to explain the disease stage and prognosis and help the patient and family in decision-making. Communication skills assessment should be part of the regular evaluation of each resident during the training programme, and appropriate feedback should be provided to them in order to facilitate the improvised overall performance of the resident^{42,43}.

Healthcare quality

The release of the report by the Institute of Medicine in 1998 ‘Crossing the Quality Chasm: A New Health System for the 21st Century’⁴⁴ highlighted three types of quality problems – overuse, underuse and misuse. Since then, the role of quality in healthcare outcomes is undisputed, and quality and safety are not only regarded as a key performance indicator for the care pathway, but several studies have also established a direct relationship on the outcome. Hence, integrating healthcare quality in the curriculum and training should be approached as a continuum of a comprehensive training programme. The residents should be taught to provide quality cancer care, which includes evidence-based treatment along with appropriate technology.

Mentorship

Mentorship is defined as ‘the process whereby an experienced, highly regarded empathic person (the mentor) guides another individual (the mentee) in the development and re-examination of their own ideas, learning, and personal and professional development’⁴⁵. Mentorship plays a significant role in the professional and personal growth of a resident and correlates with professional success, productivity, and job satisfaction⁴⁶. Oncology is becoming highly competitive not only in developed countries but also in developing countries like India. Therefore, the residents undergoing training in oncology are prone to high levels of stress not only due to aspiring professional success but also due to the burnout they experience when dealing with cancer patients. In a study conducted at a tertiary cancer care centre in India, it was found that increased work pressure, reduced job satisfaction and increased effective symptoms contribute to emotional exhaustion in oncology clinicians, and the risk increases, especially in female doctors⁴⁷. Hence, integrating and developing structured mentorship programmes during the oncology training is vital to identify and address the gaps in the wellness of residents and mitigate burnouts.

Conclusions

While gynaecological cancers continue to be a major disease burden, the emergence of a sub-speciality with focused training and practice in gynaecologic oncology will improve cancer care for women. Nurturing, training, and mentoring a growing workforce in GO is essential to improve oncologic outcomes of gynaecologic cancer in India. Training within the country in high-volume centres will impart patient care skills and sensitize the next generation of gynaecologic oncologists to resource constraints as they develop evidence-based, resource-appropriate, cost-effective solutions to meet the country’s growing cancer burden. With the increasing burden of cancer, training challenges should be identified, and the gaps are bridged to ensure uniformity and optimal standards of cancer care. The COVID-19 pandemic will continue to pose unique challenges towards the oncology training programme, and there is an urgent need for the institutions and universities to adapt the curriculum. The challenges should inspire the next generation to come up with innovative ways to overcome and transform barriers into opportunities. This also calls for the collaboration between the national guiding medical agency and societies MCI, national Cancer Grid and National Cancer Societies such as the AROI and Association of Gynecologic Oncologists of India to assess existing gynaecologic and radiation oncology training programmes across the country in various universities and design a contemporary and contextual curriculum for the emerging needs in cancer care, education and research.

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References

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2018; 68 : 394-424.
2. India State-Level Disease Burden Initiative Cancer Collaborators. The burden of cancers and their variations across the states of India: The Global Burden of Disease Study 1990-2016. *Lancet Oncol* 2018; 19 : 1289-306.
3. Ginsburg O, Bray F, Coleman MP, Vanderpuye V, Eniu A, Kotha SR, *et al*. The global burden of women’s cancers: A grand challenge in global health. *Lancet* 2017; 389 : 847-60.
4. World Health Organization. *WHO report on cancer: Setting priorities, investing wisely and providing care for all*. Available from: <https://apps.who.int/iris/handle/10665/330745>, accessed on April 30, 2020.

5. Chalkidou K, Marquez P, Dhillon PK, Teerawattananon Y, Anothaisintawee T, Gadelha CA, *et al*. Evidence-informed frameworks for cost-effective cancer care and prevention in low, middle, and high-income countries. *Lancet Oncol* 2014; *15* : e119-31.
6. Baskar R, Lee KA, Yeo R, Yeoh KW. Cancer and radiation therapy: current advances and future directions. *Int J Med Sci* 2012; *9* : 193-9.
7. Dahm-Kähler P, Palmqvist C, Staf C, Holmberg E, Johannesson L. Centralized primary care of advanced ovarian cancer improves complete cytoreduction and survival – A population-based cohort study. *Gynecol Oncol* 2016; *142* : 211-6.
8. Arnold M, Rutherford MJ, Bardot A, Ferlay J, Anderson TML, Myklebust TA, *et al*. Progress in cancer survival, mortality, and incidence in seven high-income countries 1995-2014 (ICBP SURVMARK-2): A population-based study. *Lancet Oncol* 2019; *20*: 1493-1505.
9. Averette HE, Wrennick A, Angioli R. History of gynecologic oncology subspecialty. *Surg Clin North Am* 2001; *81*: 747-51.
10. Johnston C, Ng JS, Manchanda R, Tsunoda AT, Chuang L. Variations in gynecologic oncology training in low (LIC) and middle income (MIC) countries (LMICs): Common efforts and challenges. *Gynecol Oncol Rep* 2017; *20* : 9-14.
11. Thomas V, Thomas A, Sebastian A, Chandu R, Peedicayil A. Inadequately staged endometrial cancer: A clinical dilemma. *Indian J Surg Oncol* 2018; *9* : 166-70.
12. Association of Gynaecologic Oncologists of India. *AGOI gynae fellowship guideline*. Accessed from <http://www.agoi.org/educational-activities/fellowship#:~:text=The%20registration%20fee%20per%20student,like%20medical%20and%20radiation%20oncology>, accessed on May 2, 2020.
13. Christian Medical College Vellore. *Admission Prospectus 2021-22, page 48*. Available from: <https://www.cmch-vellore.edu/sites/education/prospectus.pdf>, accessed on January 6, 2021.
14. Arora V, Somashekhar SP. Essential surgical skills for a gynecologic oncologist. *Int J Gynaecol Obstet* 2018; *143* (Suppl 2) : 118-30.
15. Nishikimi K, Tate S, Kato K, Matsuoka A, Shozu M. Well-trained gynecologic oncologists can perform bowel resection and upper abdominal surgery safely. *J Gynecol Oncol* 2020; *31* : e3.
16. Johnston C, Ng JS, Manchanda R, Tsunoda AT, Chuang L. Variations in gynecologic oncology training in low (LIC) and middle income (MIC) countries (LMICs): Common efforts and challenges. *Gynecol Oncol Rep* 2017; *20* : 9-14.
17. National Medical Council. *Guidelines for competency based postgraduate training programme for MCh in gynaecological oncology*. Available from: <https://www.nmc.org.in/wp-content/uploads/2019/09/MCh-Gynaecological-Oncology.pdf>, accessed January 11, 2021.
18. Antonsen SL, Avall-Lundqvist E, Salvesen HB, Auranen A, Salvarsdottir A, Høgdall C, *et al*. Subspecialist training in surgical gynecologic oncology in the Nordic countries. *Acta Obstet Gynecol Scand* 2011; *90* : 917-20.
19. Ross S, Binczyk NM, Hamza DM, Schipper S, Humphries P, Nichols D, *et al*. Association of a competency-based assessment system with identification of and support for medical residents in difficulty. *JAMA Netw Open* 2018; *1* : e184581.
20. Desy JR, Reed DA, Wolanskyj AP. Milestones and millennials: A perfect pairing-competency-based medical education and the learning preferences of generation Y. *Mayo Clin Proc* 2017; *92* : 243-50.
21. Ramondetta LM, Bodurka DC, Tortolero-Luna G, Gordinier M, Wolf JK, Gershenson DM, *et al*. Mentorship and productivity among gynecologic oncology fellows. *J Cancer Educ* 2003; *18* : 15-9.
22. Sirohi B, Chalkidou K, Pramesh CS, Anderson BO, Loeher P, El Dewachi O, *et al*. Developing institutions for cancer care in low-income and middle-income countries: From cancer units to comprehensive cancer centres. *Lancet Oncol* 2018; *19* : e395-406.
23. Chiva LM, Mínguez J, Querleu D, Cibula D, du Bois A. European surgical education and training in gynecologic oncology: The impact of an accredited fellowship. *Int J Gynecol Cancer* 2017; *27* : 819-25.
24. Chuang L, Berek J, Randall T, McCormack M, Schmelzer K, Manchanda R, *et al*. Collaborations in gynecologic oncology education and research in low- and middle-income countries: Current status, barriers and opportunities. *Gynecol Oncol Rep* 2018; *25* : 65-9.
25. Bloom BS, Engelhart MD, Furst EJ, Hill WH, Krathwohl DR. *Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain*. New York: David McKay Company; 1956.
26. Medical Council of India. *Guidelines for competency based postgraduate training programme for MS in obstetrics and gynaecology*. Available from: <https://www.mciindia.org/CMS/wp-content/uploads/2019/09/MD-Radiotherapy.pdf>, accessed on May 22, 2020.
27. Accreditation Council for Graduate Medical Education. *Radiation oncology*. Available from: <https://www.acgme.org/Specialties/Documents-and-Resources/pfcatid/22/Radiation%20Oncology>, accessed on May 22, 2020.
28. The Royal College of Radiologists. *Clinical oncology curriculum*. Available from: <https://www.rcr.ac.uk/clinical-oncology/specialty-training/clinical-oncology-curriculum>, accessed on May 22, 2020.
29. Royal Australian and New Zealand College of Radiologists. *Training Program*. Available from: <https://www.ranzcr.com/trainees/rad-onc/training-program>, accessed on May 22, 2020.
30. Munshi A, Ganesh T, Mohanti BK. Radiotherapy in India: History, current scenario and proposed solutions. *Indian J Cancer* 2019; *56* : 359-63.
31. Grover S, Gudi S, Gandhi AK, Puri PM, Olson AC, Rodin D, *et al*. Radiation oncology in India: Challenges and opportunities. *Semin Radiat Oncol* 2017; *27* : 158-63.

32. Datta NR, Samiei M, Bodis S. Radiation therapy infrastructure and human resources in low-and middle-income countries: Present status and projections for 2020. *Int J Radiat Oncol Biol Phys* 2014; 89 : 448-57.
33. International Atomic Energy Agency: Directory of Radiotherapy Centres. Available from: <https://dirac.iaea.org/Data/CountriesLight>, accessed on January 20, 2021.
34. Mahantshetty U, Gudi S, Singh R, Sasidharan A, Sastri SC, Gurram L, et al. Indian brachytherapy society guidelines for radiotherapeutic management of cervical cancer with special emphasis on high-dose-rate brachytherapy. *J Contemp Brachytherapy* 2019; 11 : 293-306.
35. Sarin R. Global trends in specialist training, certification, and regulation of oncology practice and its implications for the developing world. *J Cancer Res Ther* 2015; 11 : 675-8.
36. Buchholz TA, McBride WH, Cox JD. Preparing for the future of radiation oncology. *J Am Coll Radiol* 2007; 4 : 560-2.
37. Navarro A, Cacicedo J. The next generation of radiation oncologists: Challenges and perspectives. *Rep Pract Oncol Radiother* 2012; 17 : 243-5.
38. Indian Council of Medical Research. *Homepage*. Available from: http://14.139.60.56/mdms_web/, accessed on May 20, 2020.
39. Ahmed AA, Holliday EB, Deville C, Jagsi R, Haffty BG, Wilson LD. Attracting future radiation oncologists: An analysis of the national resident matching program data trends from 2004 to 2015. *Int J Radiat Oncol Biol Phys* 2015; 93 : 965-7.
40. Palisoul M, Greenwade M, Massad LS, Hagemann A, Powell M, Mutch D, et al. Factors influencing residents' interest in gynecologic oncology fellowship. *Gynecol Oncol Rep* 2019; 30 : 100504.
41. Medical Council of India. *Guidelines for competency based postgraduate training programme for MS in obstetrics and gynaecology*. Available from: <https://www.mciindia.org/CMS/wp-content/uploads/2019/09/MS-OBGY.pdf>, accessed on May 22, 2020.
42. Baile WF, Kudelka AP, Beale EA, Glober GA, Myers EG, Greisinger AJ, et al. Communication skills training in oncology. Description and preliminary outcomes of workshops on breaking bad news and managing patient reactions to illness. *Cancer* 1999; 86 : 887-97.
43. Stovall MC. Oncology communication skills training: Bringing science to the art of delivering bad news. *J Adv Pract Oncol* 2015; 6 : 162-6.
44. Institute of Medicine (US) Committee on Quality of Health Care in America. *Crossing the quality chasm: A new health system for the 21st century*. Washington (DC): National Academies Press (US); 2001. p. 1.
45. Hernandez-Lee J, Pieroway A. Mentorship for early career family physicians: Is there a role for the first five years in family practice committee and the CFPC?. *Can Fam Physician* 2018; 64 : 861-62.
46. Sambunjak D, Straus SE, Marusic A. A systematic review of qualitative research on the meaning and characteristics of mentoring in academic medicine. *J Gen Intern Med* 2010; 25 : 72-8.
47. Daruvala R, Ghosh M, Fratazzi F, Norzan SA, Laha A, Ahmed R, et al. Emotional exhaustion in cancer clinicians: A mixed methods exploration. *Indian J Med Paediatr Oncol* 2019; 40 : 111-20.

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