



C/Can 2025

City Cancer Challenge

Guiding Principles for Quality Cancer
Treatment Services in Cities



Letter from Anil D'Cruz



The past five years has witnessed unprecedented efforts in addressing the financial and human impact of cancer. The establishment of global targets to reduce premature deaths from non-communicable diseases (NCDs) by 2025, and the subsequent inclusion of cancer and NCDs in the Sustainable Development Goals (SDGs) has provided a platform to drive global action to reduce barriers to the accessibility and availability of quality cancer care.

The Union for International Cancer Control (UICC) working alongside its members and partners, has been a major force in advocating and building capacity to support the delivery of cancer interventions that will underpin the achievement of these ambitious goals. Major milestones such as the adoption of the groundbreaking resolution on palliative care in 2014 and the addition of 16 new cancer medicines to the World Health Organization (WHO) Model List of Essential Medicines in 2015, demonstrate the impact of collective action when all stakeholders work together to create shared value. Now the challenge for governments and policy makers is to turn these successes into better outcomes for patients, families and communities by focusing action in the areas that have the greatest impact.

The global population living in medium sized cities nearly doubled between 1990 and 2014 and is projected to increase by another 36% between 2014 and 2030, growing from 827million to 1.1billion. Coordinated global efforts are needed to improve cancer care infrastructure to keep pace with the scale and rate of urbanisation, with specific efforts required to improve availability of affordable cancer technologies and essential cancer medicines. UICC has launched the C/Can 2025: City Cancer Challenge - an ambitious, first-of-its-kind initiative to support cities to improve the health of its citizens and accelerate equitable access to quality cancer care. Our vision is to report back to the UN High-level meeting in 2025 on how the global community has worked collectively to impact the lives of millions by building cancer treatment solutions in hundreds of cities, making a tangible contribution to the 2025 goal of reducing premature deaths from cancer as well as improving quality of life.

This guide is the culmination of a comprehensive consultation process with subject experts in cancer care and research from around the world to set out for city leaders and policy makers the elements needed to operationalise cancer treatment services from diagnosis through to palliative care. The report also recognises that quality and access to services are intrinsically linked and provides the key guiding principles for the delivery of a holistic quality offering that focuses on the individual needs of patients.

Our ambition was to create a foundation piece that will form the basis of a broader set of tools to be developed in 2017 that city stakeholders - from city leaders, patient advocates, to cancer care professionals - can use to guide the planning, implementation and evaluation of cancer treatment and care services in their cities. Our focus in this first iteration, is to set the baseline for good practice and start the conversation with cities on the scope of services and interventions needed to deliver quality care - from physical facilities to an appropriately skilled cancer workforce.

As a member of the UICC Board of Directors and Director at Tata Memorial Hospital in Mumbai, I am excited to be Chair of the C/Can 2025 Task Force who are leading the development of tools and resources which can guide action for cancer at the local level. We believe strongly that cities can be key drivers of a global coordinated response to reducing inequities in access to cancer care, and by creating a platform to support this response, UICC and the global cancer community can work in partnership with city stakeholders to improve the health of their citizens and build sustainable, resilient cities and communities.

Professor Anil D'Cruz

Director, Tata Memorial Hospital, Mumbai
UICC Board of Directors



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Introduction

With 1 in 3 people directly affected, cancer is one of the world's most pressing health concerns. Cancer is estimated to cost world economies as much as US\$1.16 trillion annually - a figure that is projected to grow exponentially if action is not taken now to reduce the spiralling growth in the number of cases, and the impact on both individuals and healthcare budgets.



The greatest financial and human impact of cancer is felt within low- and middle-income countries (LMICs), those least equipped to respond to this growing burden, but also where rapid urbanisation is already bringing significant sustainable development challenges – as recognised by the 2011 United Nations (UN) Political Declaration on Non-communicable Diseases (NCDs), and more recently, the Sustainable Development Goals (SDGs). In little more than a decade, the global population living in medium-sized cities is expected to increase to over one billion and serious public health concerns such as cancer and other NCDs will be increasingly concentrated in cities. At the same time, cities offer important opportunities to expand access to health services, including quality cancer care, for large numbers of people in a sustainable way that delivers value for patients, communities, businesses and governments, and ultimately improves patient outcomes.

Recent reports including the UICC World Cancer Declaration Progress Report 2016, demonstrate that progress is being made in the delivery of cancer services across the care continuum. At the same time, some standout achievements have been realised for the global cancer community. This includes the addition of 16 new cancer medicines to the World Health Organization (WHO) Model List of Essential Medicines (EML) in 2015 bringing the total to 46 medicines, and global commissions on expanded access to cancer surgery and radiotherapy. Yet despite these successes, access to surgery, radiotherapy

and essential cancer medicines remains an enormous challenge for many governments. Equally the gap in skilled human resources for cancer care is evident across all regions. Even in high-resource settings, there remain challenges in equity of access to quality care and concerns of sustainability.

In response to the urgent need to reduce the inequities in access to cancer treatment, UICC has launched the C/Can 2025: City Cancer Challenge a global campaign to engage all cities with a population above one million to commit to improve access to quality cancer treatment for their citizens. C/Can 2025 is a truly multi-sectoral initiative where all city stakeholders are engaged in the design, planning and implementation of cancer treatment solutions, and cities are encouraged to take the lead on improving the health of their citizens through better access to quality cancer medicines and technologies for early diagnosis and safe, effective treatment.

UICC recognises that each city is unique in its social, economic and environmental development and that there is no 'one-size-fits-all' city cancer treatment solution. At the same time, city leaders and policy makers in all settings need to know the core elements of a cancer treatment solution – the 'entry point' or baseline that can then be built upon depending on stage of development; human, financial and technical resources; other health priorities; and the local cancer burden.

In this toolkit, we define the critical core package of interventions for the delivery of a quality cancer solution at a city level to guide city leaders and policy makers.

A set of evidence-based guiding principles incorporates four core areas of practice within a multi-disciplinary cancer care facility recognising the spectrum of clinical services required to provide a quality cancer diagnosis and curable and palliative treatments. They also acknowledge that investment in service delivery, infrastructure and a skilled health workforce cannot occur in isolation, but instead must go hand-in-hand with a commitment to quality and placing the patient at the centre of care.

We believe that consideration of all four areas of practice would go a significant way to the delivery of a cancer care facility that increases access to quality, safe cancer care for patients, and ultimately improves patient outcomes and quality of life.



How to use this tool

This toolkit consists of a set of guiding principles for four core areas of practice which were determined following a comprehensive consultation process of global best practice for the delivery of quality cancer care:

1 Core Cancer Services: guiding principles for diagnostic services, service delivery, infrastructure and health workforce elements needed to operationalise cancer treatment services from diagnosis through to palliative care at a cancer care facility.

- a. Core Diagnostic Services
 - I. Imaging and Nuclear Medicine
 - II. Pathology and Laboratory Medicine
- b. Core Clinical Services
 - I. Medical Oncology
 - II. Radiotherapy
 - III. Surgical Care
 - IV. Palliative and Supportive Care

2 Management of Cancer Care Services: principles for the active and efficient management of a cancer care facility.

3 Quality of Cancer Care: cross-cutting elements to ensure a cancer care facility functions at its optimal state and integrates high quality care across all aspects of clinical service delivery.

- a. Ethics and Patient-Centered Care
- b. Evidence-Based Protocols for Care
- c. Data/Information Acquisition and Management
- d. Safety and Occupational Hazards

4 Community Access and Integrated Care: elements which ensure any cancer facility is linked and engaged with other facilities, referral systems and communities within the city.

Each core area of practice includes information on:



Inputs: Key areas of action and/ or key resources or equipment



Processes: A qualitative measure describing the key activities required for each area of action and/ or delivery of resources



Outputs: A quantitative measure of the direct outcomes of activities/ processes



Outcomes: A broader measure of the overall impact of successful implementation (e.g. improvements in patient outcomes)

Core Cancer Services

The Core Cancer Services module features categories for assessing cancer diagnostic and clinical service delivery. It looks at the infrastructure and workforce needed to operationalise quality services from diagnosis through to palliative care in a cancer care facility.



The module presents an overview of the six aspects of core services for care which include:

- 1 **Core Diagnostic Services**
 - a. Imaging and Nuclear Medicine
 - b. Pathology and Laboratory Medicine
- 2 **Core Clinical Services**
 - a. Medical Oncology
 - b. Radiotherapy
 - c. Surgical Care
 - d. Palliative and Supportive Care

Core Diagnostic Services



Pathology and Laboratory Medicine Framework for Cancer Care Services

Pathology and Laboratory Medicine are essential components for cancer diagnosis and treatment management. Accurate and timely testing on patient specimens and samples is crucial. Pathology and laboratory medicine essential services outlined below require the appropriate processes (pre-analytic, analytic and post-analytic) to perform testing on blood, serum, tissues and body fluids.

Facilities need to be equipped to handle biological specimens with appropriate quality assurance for precautions and specimen procurement. In addition to qualified personnel and safety standards, there needs to be availability of appropriate laboratory information for reporting with integrated essential elements that includes timeliness, accuracy, completeness, and usability.



Infrastructure for Pathology and Laboratory Medicine

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> • Facility readiness • Facilities and Rooms • Laboratories • Equipment^{1,2} • Allied services from other fields (imaging, medical oncology, radiotherapy, surgery, palliative and supportive care) • Local evidence-based guidelines for pathology and laboratory medicine 	<ul style="list-style-type: none"> • Availability of clinical evaluation services for patients (physical exam, phlebotomy, sample reception and distribution, etc.)¹ • Determine availability of essential services for pathology and clinical laboratory medicine¹: <ul style="list-style-type: none"> • Cytopathology • Histopathology • Autopsy • Immunohistochemistry • Clinical biochemistry • Hematology • Molecular pathology and genetics • Transfusion medicine • Microbiology • Determine availability to perform essential services for pathology and clinical laboratory medicine^{1,6,11} <ul style="list-style-type: none"> • Determine if there's a pre-analytic stage for pathology: <ul style="list-style-type: none"> • Selecting appropriate test to order • Obtaining the specimen • Labeling with patient's name • Transporting the specimen to the laboratory • Receiving the specimen at the laboratory • Determine if there's an analytic stage for pathology: <ul style="list-style-type: none"> • Processing the specimen for analysis prior to testing • Analysing the specimen • Interpreting the test results 	<ul style="list-style-type: none"> • Number of cases detected early with timely confirmation of diagnosis; Proportion of patients who get timely diagnosis¹ • The time required from receipt of tests to sending test results back to the testing site i.e. turnaround time^{1,13} • The current and potential volume of tests processed, quality of the tests performed and samples received, and the quality of the test results^{1,13} • The mechanisms and effectiveness of linkages for communicating results from the laboratory to the health facilities^{1,13} • Availability / Number of essential equipment and supplies needed to process the tests^{1,13} • Availability of laboratory procedures, processes including the flow of information, procedures for processing tests^{1,13} 	<ul style="list-style-type: none"> • Proportion of cancer diagnosis in early stages¹ • Proportion of cancers detected on examination and testing¹

- Determine if there's post-analytic stage for pathology:
 - Data entry
 - Reporting the results of the analysis to the responsible clinician and patient to guide their diagnostic and therapeutic decisions, storing specimens and record
- Availability of mechanism to archive samples (biobanking) and laboratory information systems
- Equip facilities and rooms with appropriate essential devices/ systems to be able to perform selected procedures¹²
- Quality control methods used within the laboratory and external to the laboratory^{1,10}
 - Determine if facility satisfies appropriate pathology protocols
 - Determine if facility has quality control protocols that meet international standards for medical laboratories (ISO 15189)
 - Availability of local and national guidelines to support safety and quality control for pathology and laboratory medicine

Health Workforce Pathology and Laboratory Medicine

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> • Skilled personnel in pathology and laboratory medicine¹² • Education and training programmes for specialists and ancillary staff in pathology and laboratory medicine 	<ul style="list-style-type: none"> • Availability of multidisciplinary and skilled personnel in pathology and laboratory medicine (physicians, nurses and medical physicist, etc.), to perform procedures at local and international standards: • Availability of training and education strategy for all pathology and laboratory medicine and ancillary staff based on population and needs of city and/or facility • Availability biomedical engineering for the management of medical devices and procurement • Availability of professional health-care managers and administrators to support pathology and laboratory medicine services • Existence of national plans and programmes for occupational provider safety • Existence of a core curriculum and continuing education programme in pathology and laboratory medicine • Determine presence of attraction and retention strategies for staff in pathology and laboratory medicine 	<ul style="list-style-type: none"> • Percentage full-time equivalent (FTE) staff in pathology and laboratory medicine • Density nurses, ancillary staff including operational managers, biomedical engineers providing pathology and laboratory medicine at facilities in city • Density and distribution of pathology and laboratory medicine specialist health providers in city • Percentage of education and training programmes accredited for pathology and laboratory medicine, if any • Number of education and specialist training programmes (or equivalent) for pathology and laboratory medicine available in city • Number of education and training sessions available for all other health professionals in pathology and laboratory medicine (nurses, biomedical engineers, medical physicists, health-care managers) • Availability of continuing professional education programmes in pathology and laboratory medicine • Percentage of staff turnover in pathology and laboratory medicine • Level of provider job satisfaction in pathology and laboratory medicine 	<ul style="list-style-type: none"> • Proportion of cancer diagnosis in early stages¹ • Proportion of cancers detected on examination and testing¹

References

1. An Essential Pathology Package for Low- and Middle-Income Countries. Kenneth A. Fleming; Mahendra Naidoo; Michael Wilson; John Flanigan; Susan Horton; Modupe Kutji; Lai Meng Looi; Chris Price; Kun Ru; Abdul Ghafur; Jianxiang Wang; Nestor Lago. *American Journal of Clinical Pathology* 2016; doi: 10.1093/ajcp/aqw143
2. African Strategies for Advancing Pathology Group Members. Quality Pathology and Laboratory Diagnostic Services Are Key to Improving Global Health Outcomes: Improving Global Health Outcomes Is Not Possible Without Accurate Disease Diagnosis. *American Journal of Clinical Pathology*. 2015 Mar 1;143(3):325–8.
3. Adeyi OA. Pathology services in developing countries—the West African experience. *Archives of pathology & laboratory medicine*. 2011;135(2):183–186.
4. Schroeder LF, Amukele T. Medical laboratories in sub-Saharan Africa that meet international quality standards. *Am J Clin Pathol*. 2014 Jun;141(6):791–5.
5. Adesina A, Chumba D, Nelson AM, Orem J, Roberts DJ, Wabinga H, et al. Improvement of pathology in sub-Saharan Africa. *The lancet oncology*. 2013;14(4):e152–e157.
6. Sullivan R, Alatisse OI, Anderson BO, Audisio R, Autier P, Aggarwal A, et al. Global cancer surgery: delivering safe, affordable, and timely cancer surgery. *The Lancet Oncology*. 2015;16(11):1193–1224.
7. Pace LE, Mpunga T, Hategekimana V, Dusengimana J-MV, Habineza H, Bigirimana JB, et al. Delays in Breast Cancer Presentation and Diagnosis at Two Rural Cancer Referral Centers in Rwanda. *The Oncologist*. 2015 Jul 1;20(7):780–8.
8. Building a pathology laboratory in Malawi - Available from: http://ac.els-cdn.com/S1470204513701098/1-s2.0-S1470204513701098-main.pdf?_tid=50c0146a-57fe-11e6-8c6f-00000aacb362&acdnat=1470066227_3c06fd1eba004530948b293c1c31c827
9. Alliance for Cervical Cancer Prevention (ACCP). *Planning and Implementing Cervical Cancer Prevention and Control Programs: A Manual for Managers*. Seattle: ACCP; 2004.
10. Adams J., Bartram J., Chartier Y. WHO Essential Environmental Health Standards for Health Care [Internet]. 2008 [cited 2016 Sep 19]. Available from: <http://apps.who.int/bookorders/anglais/detart1.jsp?codlan=1&codcol=15&codcch=712>
11. Global Cancer Surgery - Supplementary Appendix [Internet]. [cited 2016 Aug 1]. Available from: <http://www.thelancet.com/cms/attachment/2037362612/2051841608/mmc1.pdf>
12. WHO List of Priority Medical Devices for Cancer Management. In Press. 2017.
13. Alliance for Cervical Cancer Prevention (ACCP). *Planning and Implementing Cervical Cancer Prevention and Control Programs: A Manual for Managers*. Seattle: ACCP; 2004.



Imaging and Nuclear Medicine Framework for Cancer Care Services

Imaging (diagnostic radiology) is a major component for cancer diagnosis, staging (determining the extent of progression), treatment planning and management. In addition, it is critical to assess the effects of cancer treatment, recurrence and any complications. Imaging techniques range from conventional X-rays to molecular imaging (nuclear medicine), depending on what procedure is needed. With the advent of new technologies that store radiology images electronically, images can now be analysed to detect cancers more accurately. Imaging can also be used for image-guided and minimally invasive procedures (interventional radiology) such as biopsies for tumors and other therapeutic interventions.

Imaging and nuclear medicine require equipment and specialised staff to operate and maintain the equipment. It is also important to maintain quality assurance in this field, therefore having guidelines for safe installation, operation, use of imaging equipment and communication systems for picture archiving is valuable.

Infrastructure for Imaging and Nuclear Medicine

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> • Facility readiness • Shielded Radiology Facilities and Rooms • Equipment^{1,4} • Allied services from other fields (pathology and laboratory medicine, medical oncology, radiotherapy, surgery, palliative and supportive care) • Local evidence-based radiology and safety guidelines 	<ul style="list-style-type: none"> • Availability of essential techniques and contrast injection procedures for imaging services (diagnostic radiology)^{2,3,13}: <ul style="list-style-type: none"> • X-ray • Fluoroscopy • Mammography • Ultrasonography (US) • Computed tomography (CT) • Magnetic Resonance Imaging (MRI) • Positron Emission Tomography (PET) • Availability of essential imaging services to perform interventional radiology procedures^{2,3,13} (angiography, biopsies, drainage, catheters, etc.) • Determine availability to perform essential disciplines for imaging services: ^{2,3,13} • Determine if there's a pre-analytic stage for cancer staging: <ul style="list-style-type: none"> • Selecting appropriate medical imaging test • Preparing the patient for imaging • Determine if there's an analytic stage for cancer staging: <ul style="list-style-type: none"> • Acquiring, analysing and interpreting the result of the image • Determine if there's post-analytic stage for cancer staging: <ul style="list-style-type: none"> • Data entry • Reporting the results of the analysis to the responsible clinician and patient to guide their diagnostic and therapeutic decisions, and storing specimens and record 	<ul style="list-style-type: none"> • Number of cases detected early with timely confirmation of diagnosis; Proportion of patients who get timely diagnosis^{2,3,13} • The time required from receipt of imaging tests to sending image results back to the testing site i.e. image turnaround time² • The current and potential volume of imaging processed, quality of the imaging performed and images received, and the quality of the imaging results² • The mechanisms and effectiveness of linkages for communicating results (e.g reports) from radiology to other components in treatment continuum¹³ • Availability / Number of essential equipment and supplies needed to process the tests² • Average age of major imaging systems; number of late-generation imaging devices^{2,13} • Average availability of different essential imaging modalities^{2,13} • Ratio of number of imaging staff to number of machines^{2,13} 	<ul style="list-style-type: none"> • Proportion of cancer diagnosis in early stages¹ • Proportion of cancers detected on examination and testing in conjunction with pathology and laboratory medicine¹

- Availability of diagnostic and therapeutic nuclear medicine techniques^{2,3,13}
 - Positron Emission Tomography (PET)
 - Gamma Camera
- Availability of picture archiving and communication system for reporting^{2,3,13}
- Equip facilities and rooms with appropriate essential devices/ systems to be able to perform essential procedures^{1,4}
- Quality assurance within facilities:
 - Determine if radiology facility has quality control, ethical and safety (clinical, radiation, technical, pharmacological) protocols that meet local and international standards^{1,2}
 - Availability of quality assurance programmes, specifically radiation protection standards^{1,4}

Health Workforce for Imaging and Nuclear Medicine

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> • Skilled personnel in imaging and nuclear medicine¹⁴ • Education and training programmes for specialists and ancillary staff in imaging and nuclear medicine 	<ul style="list-style-type: none"> • Availability of multidisciplinary and skilled personnel in imaging and nuclear medicine (physicians, nurses and medical physicist, etc.) to perform the following based on local and international standards: <ul style="list-style-type: none"> • Imaging modalities • Nuclear medicine related work • Availability of training and education strategy for all imaging and nuclear medicine and ancillary staff based on population and needs of city and/or facility • Availability biomedical engineering for the management of medical devices and procurement • Availability of professional health-care managers and administrators to support imaging and nuclear medicine services • Existence of national plans and programmes for occupational provider safety • Existence of a core curriculum and continuing education programme in imaging and nuclear medicine • Determine presence of attraction and retention strategies for staff in imaging and nuclear medicine 	<ul style="list-style-type: none"> • Percentage full-time equivalent (FTE) staff in imaging and nuclear medicine • Density nurses, ancillary staff including operational managers, biomedical engineers providing imaging and nuclear medicine at facilities in city • Density and distribution of imaging and nuclear medicine specialist health providers in city • Percentage of education and training programmes accredited for imaging and nuclear medicine, if any • Number of education and specialist training programmes (or equivalent) for imaging and nuclear medicine available in city • Number of education and training sessions available for all other health professionals in imaging and nuclear medicine (nurses, biomedical engineers, medical physicists, health-care managers) • Availability of continuing professional education programmes in imaging and nuclear medicine. • Percentage of staff turnover in imaging and nuclear medicine; • Level of provider job satisfaction in imaging and nuclear medicine 	<ul style="list-style-type: none"> • Proportion of cancer diagnosis in early stages¹ • Proportion of cancers detected on examination and testing in conjunction with pathology and laboratory medicine¹

References

1. "Radiology in Global Health: Strategies, Implementation and Applications." *Radiology*, 275(3), p. 664
2. WHO Eastern Mediterranean Series | Quality Systems for Medical Imaging- Guidelines for Implementation and Monitoring [Internet]. [cited 2016 Sep 8]. Available from: http://www.who.int/diagnostic_imaging/publications/QualitySystemforMedicalImaging.pdf?ua=1
3. The WHO manual of diagnostic imaging [Internet]. [cited 2016 Sep 8]. Available from: <http://apps.who.int/medicinedocs/documents/s15634e/s15634e.pdf>
4. Abujudeh HH, Kaewlai R, Asfaw BA, Thrall JH. Quality Initiatives: Key Performance Indicators for Measuring and Improving Radiology Department Performance. *RadioGraphics*. 2010 May;30(3):571–80.
5. Karami M. A Design Protocol to Develop Radiology Dashboards. *Acta Inform Med*. 2014 Oct;22(5):341–6.
6. Alliance for Cervical Cancer Prevention (ACCP). Planning and Implementing Cervical Cancer Prevention and Control Programs: A Manual for Managers. Seattle: ACCP; 2004.
7. International Atomic Energy Agency. Worldwide implementation of digital imaging in radiology: a resource guide. 2015.
8. Pan-American Health Organization, Weltgesundheitsorganisation, editors. Radiological protection for medical exposure to ionizing radiation: safety guide. Vienna: Internat. Atomic Energy Agency; 2002. 75 p. (IAEA safety standards series RS-G).
9. International Atomic Energy Agency, European Commission. Radiation protection and safety of radiation sources: international basic safety standards : general safety requirements. 2014.
10. RAD-AID Radiology Readiness Assessment Tool [Internet]. Available from: <https://www.rad-aid.org/wp-content/uploads/Radiology-Readiness-2013-RAD-AID.pdf>
11. European Qualifications Framework (EQF) Level 6 Benchmarking Document: Radiographers - EFRS_EQF_level_6_benchmark [Internet]. [cited 2016 Oct 23]. Available from: http://www.efrs.eu/publications/see/EFRS_EQF_level_6_benchmark?file=749
12. International Atomic Energy Agency. Design, development and optimization of a low-cost system for digital industrial radiology. 2013.
13. International Atomic Energy Agency. Setting up a radiotherapy programme: clinical, medical physics, radiation protection and safety aspects. Vienna: IAEA; 2008. 229 p.
14. WHO List of Priority Medical Devices for Cancer Management. In Press. 2017

Core Clinical Services





Medical Oncology Framework for Cancer Care Services

Chemotherapy plays a key role in any cancer treatment. Over the past 35 years, the effectiveness of chemotherapy has increased, and, combined with diagnostic services (imaging and pathology), it greatly contributes to cancer survival. Chemotherapy is used alone or in combination with surgery and radiotherapy to reduce cancer recurrence and improve survival. Traditionally, chemotherapy has been administered by intravenous infusion in an oncology inpatient unit or outpatient clinic. As a minimum, it is important to ensure the availability of essential chemotherapy formulas for cancer treatment.

Accidental exposure to toxic chemotherapeutic agents can occur at various stages during handling (e.g, transport, unpacking, storage, handling, administration, and disposal). Therefore, it is important that safety protocols are available for patients and providers to ensure appropriate handling and chemotherapy administration strategies.

Infrastructure for Medical Oncology

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> • Chemotherapy preparation room for providers • Chemotherapy dispensing and delivery rooms for patients • Equipment¹⁶ • Allied services from other fields (pathology and laboratory medicine, imaging, radiotherapy, surgery, palliative and supportive care) • Local evidence-based guidelines for medical oncology and hematology 	<ul style="list-style-type: none"> • Determine product selection for chemotherapies and as a minimum requirement use the WHO Model Essential Medicine List (MEML) Section 8: Antineoplastic and immunosuppressives; 8.2: Cytotoxic and adjuvant medicines^{5,6,7,11} • Use local and national protocols for the use of preoperative (neoadjuvant) and post-operative (adjuvant) chemotherapy for commonly seen cancers in local context^{5,12} • Equip preparation, dispensing and delivery rooms with appropriate equipment^{2,8,12,16} • Determine appropriate chemotherapy treatment clinical pathway which include: chemotherapeutic agents used, indications for use, dosing schedules^{1,12} • Establish chemotherapy preparation and dispensing and disposal procedures and techniques^{2,8,9,10,12} • Mechanism for quality control and the management of toxicities: <ul style="list-style-type: none"> • Providers using safe-handling of chemotherapy protocols^{2,8,9,10,12} • Patients and Providers aware of toxicities of chemotherapies^{2,8,9,10,12} • Link with allied services from other departments, such as availability of core diagnostic services^{5,12} (e.g., pathology for complete blood count), pharmacy services for dispensing drugs and service to manage toxicities (e.g., blood transfusions, microbiology laboratory) 	<ul style="list-style-type: none"> • Availability and Lead Time to acquire WHO MEML Cancer Medicines⁵ • Availability of procedures and protocols for safe-handling and administration of chemotherapy⁸ • Numbers of available equipment¹ • Percentage of monthly consumption to total chemotherapy agents¹ • Time it takes between diagnosis to start of chemotherapy⁷ • Number of rooms for chemotherapy delivery, dispensing and preparation⁸ 	<ul style="list-style-type: none"> • Proportion of patients' adherence to chemotherapy treatment completion¹⁰ • Mortality within 'last-dose' of chemotherapy or within 30 days of any dose of chemotherapy¹⁴ • Proportion of patients who remain disease-free from cancer after 5 years¹⁵

Health Workforce Medical Oncology

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> • Skilled personnel in medical oncology¹⁶ • Education and training programmes for specialists and ancillary staff in medical oncology 	<ul style="list-style-type: none"> • Availability of multidisciplinary and skilled personnel in medical oncology (physicians and nurses, etc.) to perform procedures at local and international standards • Availability of training and education strategy for all medical oncology and ancillary staff based on population and needs of city and/or facility • Availability of professional health-care managers and administrators to support medical oncology services • Existence of national plans and programmes for occupational provider safety • Existence of a core curriculum and continuing education programme in medical oncology • Determine presence of attraction and retention strategies for staff in medical oncology 	<ul style="list-style-type: none"> • Percentage full-time equivalent (FTE) staff in medical oncology • Density nurses, ancillary staff including operational managers, providing medical oncology at facilities in city • Density and distribution of medical oncology specialist health providers in city • Percentage of education and training programmes accredited for medical oncology, if any • Number of education and specialist training programmes (or equivalent) for medical oncology available in city • Number of education and training sessions available for all other health professionals in medical oncology (nurses, health-care managers) • Availability of continuing professional education programmes in medical oncology • Percentage of staff turnover in medical oncology • Level of provider job satisfaction in medical oncology 	<ul style="list-style-type: none"> • Proportion of patients' adherence to chemotherapy treatment completion¹⁰ • Mortality within 'last-dose' of chemotherapy or within 30 days of any dose of chemotherapy¹⁴ • Proportion of patients who remain disease-free from cancer after 5 years¹⁵

References

1. Dobish R, Shultz J, Neilson S, Raven A, Chambers CR. Worksheets with embedded checklists support IV chemotherapy safer practice. *Journal of Oncology Pharmacy Practice*. 2016 Feb 1;22(1):142–50.
2. WHO PAHO | Safe handling of hazardous chemotherapy drugs in limited-resource settings [Internet]. [cited 2016 Aug 1]. Available from: <http://www.bvsde.paho.org/bvsacd/cd49/88-119-p.pdf>
3. WHO | WHO model list of essential medicines: 19th list, April 2015. Available from: <http://apps.who.int/iris/handle/10665/70640>
4. Adams J., Bartram J., Chartier Y. WHO Essential Environmental Health Standards for Health Care [Internet]. 2008 [cited 2016 Sep 19]. Available from: <http://apps.who.int/bookorders/anglais/detart1.jsp?codlan=1&codcol=15&codcch=712>
5. WHO | Medicines for treatment of the following cancers – review – EML and EMLc [Internet]. WHO. [cited 2016 Sep 19]. Available from: http://www.who.int/selection_medicines/committees/expert/20/applications/cancer/en/
6. UICC Knowledge Summary | Treatment: Systemic Therapy- Chemotherapy for Breast Cancer [Internet]. [cited 2016 Sep 9]. Available from: https://www.fredhutch.org/content/dam/public/labs-projects/Science-Projects/bci2_5/pdf/UICC_Treatment_Chemotherapy_FA.pdf
7. Strother RM, Rao KV, Gregory KM, Jakait B, Busakhala N, Schellhase E, et al. The oncology pharmacy in cancer care delivery in a resource-constrained setting in western Kenya. *J Oncol Pharm Pract*. 2012 Dec 1;18(4):406–16.
8. Goodin S, Griffith N, Chen B, Chuk K, Daouphars M, Doreau C, et al. Safe handling of oral chemotherapeutic agents in clinical practice: recommendations from an international pharmacy panel. *Journal of Oncology Practice*. 2011;7(1):7–12.
9. Yodaiken RE, Bennett D. OSHA work-practice guidelines for personnel dealing with cytotoxic (antineoplastic) drugs. *Occupational Safety and Health Administration. Am J Health Syst Pharm*. 1986 May 1;43(5):1193–204.
10. Connor T, McLauchlan R, Vandenbroucke J. ISOPP Standards of Practice. Safe handling of cytotoxics. *J Oncol Pharm Pract* 2007; 13(Suppl): 1–81. *Journal of Oncology Pharmacy Practice*. 2007 Sep 1;13(3 suppl):1–2.
11. Strother RM, Asirwa FC, Busakhala NB, Njiru E, Orang'o E, Njuguna F, et al. AMPATH-Oncology: A model for comprehensive cancer care in sub-Saharan Africa. *Journal of Cancer Policy*. 2013 Sep;1(3–4):e42–8.
12. Jacobson JO, Polovich M, McNiff KK, LeFebvre KB, Cummings C, Galioto M, et al. American Society of Clinical Oncology/Oncology Nursing Society Chemotherapy Administration Safety Standards. *Journal of Clinical Oncology*. 2009 Nov 10;27(32):5469–75.
13. ACCC | A Model Rural Chemotherapy Program [Internet]. [cited 2016 Sep 8]. Available from: https://accc-cancer.org/oncology_issues/articles/MA14/MA14-A-Model-Rural-Chemotherapy-Program.pdf
14. Wallington M, Saxon EB, Bomb M, Smittenaar R, Wickenden M, McPhail S, et al. 30-day mortality after systemic anticancer treatment for breast and lung cancer in England: a population-based, observational study. *The Lancet Oncology*. 2016;17(9):1203–1216.
15. Guide to Chemotherapy [Internet]. Available from: https://www.nccn.org/patients/resources/life_with_cancer/chemo_guide.aspx
16. WHO List of Priority Medical Devices for Cancer Management. In Press. 2017.



Radiotherapy Framework for Cancer Care Services

Radiotherapy is a key component of cancer treatment that uses ionizing radiation and safe use of controlled doses of radiation to treat cancers. It is also important to relieve symptoms for incurable cancers. It is estimated that greater than 60% of new cancer cases require radiotherapy as an essential treatment modality in the management of cancer patients, either alone or in combination with surgery or chemotherapy, both for cure or palliation.

The rapid developments in medical imaging have produced a variety of techniques to deliver far more precision in dose delivery for essential treatments. Conformal radiotherapy (3D CRT) is the standard technology in low- and middle- income countries by delivering an optimised conformation to the target volume in three dimensions. More accuracy is now possible by using two new techniques, Intensity modulated radiation therapy (IMRT) and Image guided radiation therapy (IGRT), if there is capacity to upgrade to this technology, implementation may be desirable. It is important to note that the planning phase of delivering IMRT requires sophisticated software, skilled staff and medical physics support. For countries with a skilled workforce it could be a short transition period, however, for a country introducing radiotherapy, it may take several years.

It is also worth noting that in addition services such as specific technology requirements, specialised staff, workforce training and quality control plays an important role. Radiation safety and radiotherapy precautions guidelines and procedures should be available.

Infrastructure for Radiotherapy

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> • Facility readiness • Examination rooms • Shielded treatment rooms and suites • Radiotherapy, Brachytherapy, Simulation and Dosimetry Equipment¹¹ • Waiting area rooms • Computer planning workrooms • Local evidence-based guidelines for radiotherapy and radiotherapy risk/safety • Allied services from other fields (pathology and laboratory medicine, imaging, medical oncology, surgery, palliative and supportive care) 	<ul style="list-style-type: none"> • Determine facility radiotherapy decision and planning processes^{1,3,4}: <ul style="list-style-type: none"> • Clinical evaluation and assessment of patient (multidisciplinary evaluation of patient, tumor assessment and staging) • Therapeutic decision making • Prescription of treatment protocol • Treatment planning, simulation, imaging and technique • Treatment verification, monitoring and follow up evaluation • Availability of 3D radiotherapy equipment with capability to upgrading to IMRT equipment^{1,4,5} <ul style="list-style-type: none"> • Description of existing equipment procurement plans (teletherapy machines, simulators, sources, remote afterloaders, planning systems) <ul style="list-style-type: none"> • Radiotherapy equipment (cobalt units, linacs, X ray units) • Brachytherapy equipment (types of sources, machines for remote after loading) • Dosimetry equipment (chambers, electrometers, beam analysers, monitoring instruments) • Description of any institutional deficiencies in specific areas, such as quality assurance, radiation protection and maintenance. • Simulation equipment (simulators, CT simulators)^{1,4} • Quality control and assurance: <ul style="list-style-type: none"> • Availability and adoption of evidence based local standards for treatment^{1,3,4} • Availability of quality assurance programmes, specifically radiation protection standards^{1,4} • Determine if facility uses WHO radiotherapy risk profile, implement if unavailable³ 	<ul style="list-style-type: none"> • Percentage of radiation systems in the population or number of radiotherapy equipment in the city or facility¹ • Total number of cancer patients seen for radiotherapy consult per year^{1,10} • Total number of patients treated with radiotherapy per year^{1,4} • Time it takes between diagnosis to the start of radiotherapy treatment¹ • Radiotherapy Utilisation Rate (RUR) per disease site (proportion of new cases of cancer treated with radiotherapy)¹ • Number of treatment courses per treatment machine per year^{1,4,10} 	<ul style="list-style-type: none"> • Proportion of patients relieved of symptoms for incurable cancers⁸ • Proportion of patients with curable cancers disease-free from cancer recurrence after 5 years (in conjunction with surgery and chemotherapy)⁹

Health Workforce for Radiotherapy

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> • Skilled personnel in radiotherapy¹¹ • Education and training programmes in radiotherapy 	<ul style="list-style-type: none"> • Availability of multidisciplinary and skilled personnel in radiotherapy (physicians, nurses and physicist, etc.) to perform the following based on local and international standards^{1,3}: <ul style="list-style-type: none"> • Clinical evaluation and assessment of patient (multidisciplinary evaluation of patient, tumor assessment and staging) • Therapeutic decision making • Prescription of treatment protocol • Treatment planning, simulation, imaging and technique • Treatment verification, monitoring and follow up evaluation • Availability of professional health-care managers and administrators to support radiotherapy services • Existence of national plans and programmes for occupational provider safety • Existence of a core curriculum and continuing education programme in radiotherapy • Availability of biomedical engineering for the procurement, management of medical devices, and bunker installations^{1,3} • Availability of training and education strategy for all radiotherapy specialists and ancillary staff based on population and needs of city and/or facility^{1,11} • Determine presence of a core curriculum/continuing education for radiotherapy¹¹ • Determine presence of attraction and retention strategies 	<ul style="list-style-type: none"> • Percentage full-time equivalent (FTE) staff in radiotherapy • Density nurses, ancillary staff including operational managers, biomedical engineers providing radiotherapy treatment at facilities in city • Density and distribution of radiotherapy specialist health providers in city • Proportion of workforce training programmes for radiotherapy accredited, if any¹ • Number of education and specialist training programmes for radiotherapy (or equivalent) available in city • Number of education or training sessions available for all other health professionals (nurses, biomedical engineers, medical physicists, health-care managers)¹ • Availability of continuing professional education programmes¹¹ • Percentage of staff turnover in radiotherapy¹ • Level of provider job satisfaction in radiotherapy 	<ul style="list-style-type: none"> • Proportion of patients relieved of symptoms for incurable cancers⁸ • Proportion of patients with curable cancers disease-free from cancer recurrence after 5 years (in conjunction with surgery and chemotherapy)⁸

References

1. International Atomic Energy Agency. Planning national radiotherapy services: a practical tool. Vienna: International Atomic Energy Agency; 2010.
2. International Atomic Energy Agency. Radiotherapy facilities: master planning and concept design considerations. 2014.
3. WHO | Radiotherapy Risk Profile [Internet]. [cited 2016 Sep 18]. Available from: http://www.who.int/patientsafety/activities/technical/radiotherapy_risk_profile.pdf?ua=1
4. Jaffray DA, Gospodarowicz MK. Radiation therapy for cancer. Disease Control Priorities. Third Edition. 2015;239.
5. Atun R, Jaffray DA, Barton MB, Bray F, Baumann M, Vikram B, et al. Expanding global access to radiotherapy. The Lancet Oncology. 2015 Sep;16(10):1153–86.
6. Enwerem-Bromson N, Abdel-Wahab M. Expanding global access to radiotherapy: the IAEA perspective. The Lancet Oncology. 2015 Sep;16(10):1151–2.
7. Jaffray DA, Knaul FM, Atun R, Adams C, Barton MB, Baumann M, et al. Global Task Force on Radiotherapy for Cancer Control. The Lancet Oncology. 2015 Sep;16(10):1144–6.
8. Responding to the cancer crisis: expanding global access to radiotherapy [Internet]. [cited 2016 Jul 27]. Available from: <http://www.thelancet.com/commissions/radiotherapy>
9. Barton MB, Frommer M, Shafiq J. Role of radiotherapy in cancer control in low-income and middle-income countries. The lancet oncology. 2006;7(7):584–595
10. International Atomic Energy Agency. Setting up a radiotherapy programme: clinical, medical physics, radiation protection and safety aspects. Vienna: IAEA; 2008. 229 p.
11. WHO List of Priority Medical Devices for Cancer Management. In Press. 2017.



Surgical Care Framework for Cancer Care Services

Surgical care is a fundamental element for curative cancer treatment, palliation (e.g. surgical resection for relief of symptoms), diagnosis (e.g. biopsies), and reconstructive purposes. There are a variety of surgical cancer procedures available that have been proven effective in reducing surgical outcomes and risk. It has been estimated that of the 15.2 million new cases of cancer in 2015, over 80% require at least one surgical procedure.

Surgical care requires equipment, specialised staff and an appropriately trained surgical health workforce to carry out procedures. The use of comprehensive standardised practices, such as the Surgical Safety Checklist supported by WHO, has significantly improved the outcomes of surgical care and facilitated safe and efficient procedures for both patients and staff.

Infrastructure for Surgical Care

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> • Surgical facilities • Facility readiness • Surgical Equipment¹¹ • Local evidence-based guidelines for surgical care and safety • Allied services from other fields (pathology and laboratory medicine, imaging, medical oncology, radiotherapy, palliative and supportive care) • National Blood Plan 	<ul style="list-style-type: none"> • Determine list of surgical cancer procedures to be performed (Surgical procedures by complexity level available via Lancet Commission on Global Cancer Surgery (LCGCS)² • Equip surgical facilities with essential supplies and equipment to be able to perform selected procedures¹ • Determine status of national blood plan¹ • Determine status of perioperative services¹ • Determine if facility satisfies 10 point minimum pathology provision for cancer surgery (available from LCGCS)/ and implement if unavailable² • Quality control and assurance: <ul style="list-style-type: none"> • Determine if facility satisfies WHO safe surgery criteria; Implement if unavailable^{4,9} 	<ul style="list-style-type: none"> • Determine the current facility capacity¹ • Number and type of surgical procedures offered at facility¹ • Proportion of surgical facilities offering types of cancer surgery (list of major resections for cancer via LCGCS)³ • Time it takes between diagnosis to surgical intervention^{1,2} • Blood donation rate¹ • Number of PACU beds and facilities^{1,8} • Number of equipment relevant for cancer surgery¹ • Number of operating rooms in facility/ track number and distribution of surgical facilities in city¹ • Determine a facility and equipment checklist to score the quality and capabilities of existing facilities¹ 	<ul style="list-style-type: none"> • Surgical and anesthetic related morbidity and mortality (perioperative)^{1,8} • 30-day post-surgical mortality⁸ • Average length of stay of patients⁸ • Facility in-patient discharge rates¹⁰ • Percentage of surgical complications⁷ • Percentage of adverse outcome post-surgery⁷

Health Workforce for Surgical Care

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> • Skilled personnel in surgery¹¹ • Education and training programmes for specialists and ancillary staff in surgery 	<ul style="list-style-type: none"> • Availability of multidisciplinary and skilled personnel in surgery (physicians, nurses and medical physicist, etc.) to perform cancer surgical procedures based on local and international standards • Availability of training and education strategy for all surgery and ancillary staff based on population and needs of city and/or facility • Availability biomedical engineering for the management of medical devices and procurement • Availability of professional health-care managers and administrators to support surgery services • Existence of national plans and programmes for occupational provider safety • Existence of a core curriculum and continuing education programme in surgery • Determine presence of attraction and retention strategies for staff in surgery 	<ul style="list-style-type: none"> • Percentage full-time equivalent (FTE) staff in surgery • Density nurses, ancillary staff including operational managers, biomedical engineers providing surgery at facilities in city • Density and distribution of surgery specialist health providers in city • Percentage of education and training programmes accredited for surgery, if any • Number of education and specialist training programmes (or equivalent) for surgery available in city • Number of education and training sessions available for all other health professionals in surgery (nurses, biomedical engineers, medical physicists, health-care managers) • Availability of continuing professional education programmes in surgery • Percentage of staff turn-over in surgery • Level of provider job satisfaction 	<ul style="list-style-type: none"> • Surgical and anesthetic related morbidity and mortality (perioperative)^{1,8} • 30-day post-surgical mortality⁸ • Average length of stay of patients⁸ • Facility in-patient discharge rates¹⁰ • Percentage of surgical complications⁷ • Percentage of adverse outcome post-surgery⁷

References

1. Lancet Commission on Global Surgery - Implementation tools [Internet]. Lancet Commission on Global Surgery. [cited 2016 Sep 23]. Available from: <http://www.lancetglobalsurgery.org/>
2. Sullivan R, Alatise OI, Anderson BO, Audisio R, Autier P, Aggarwal A, et al. Global cancer surgery: delivering safe, affordable, and timely cancer surgery. *The Lancet Oncology*. 2015;16(11):1193–1224.
3. Global Cancer Surgery - Supplementary Appendix [Internet]. [cited 2016 Aug 1]. Available from: <http://www.thelancet.com/cms/attachment/2037362612/2051841608/mmc1.pdf>
4. WHO | WHO surgical safety checklist and implementation manual [Internet]. WHO. [cited 2016 Sep 23]. Available from: http://www.who.int/patientsafety/safesurgery/ss_checklist/en/
5. McFadyen C, Lankshear S, Divaris D, Berry M, Hunter A, Srigley J, et al. Physician level reporting of surgical and pathology performance indicators: a regional study to assess feasibility and impact on quality. *Can J Surg*. 2015 Feb;58(1):31–40.
6. Meara JG, Leather AJ, Hagander L, Alkire BC, Alonso N, Ameh EA, et al. Global Surgery 2030: evidence and solutions for achieving health, welfare, and economic development. *The Lancet*. 2015;386(9993):569–624.
7. Haynes AB, Weiser TG, Berry WR, Lipsitz SR, Breizat A-HS, Dellinger EP, et al. A Surgical Safety Checklist to Reduce Morbidity and Mortality in a Global Population. *New England Journal of Medicine*. 2009 Jan 29;360(5):491–9.
8. Weiser TG, Makary MA, Haynes AB, Dziekan G, Berry WR, Gawande AA, et al. Standardised metrics for global surgical surveillance. *The Lancet*. 2009;374(9695):1113–1117.
9. WHO | Global guidelines on the prevention of surgical site infection. 2016. Available from: <http://www.who.int/gpsc/ssi-guidelines/en/>
10. Health at a Glance 2015: OECD Indicators, 2015. DOI: http://dx.doi.org/10.1787/health_glance-2015-en
11. WHO List of Priority Medical Devices for Cancer Management. In Press. 2017.



Palliative and Supportive Care Framework for Cancer Care Services

Palliative and supportive care is an important element in cancer treatment that includes the symptom management from pain with the availability of pain medications and other distressing symptoms, but also efforts to enhance the quality of life, psychosocial care according to sociocultural context and to provide home-based care.

It is important that palliative care and supportive care are integral components of ongoing training to cancer care providers in addition to their core roles and responsibilities.

Infrastructure for Palliative and Supportive Care

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> • Facility readiness • Unit dedicated to palliative care • Equipment¹⁷ • Local evidence-based guidelines for palliative and supportive care • Allied services from other fields (diagnostic services, medical oncology, radiotherapy, and surgery) 	<ul style="list-style-type: none"> • Provision of supportive care services: <ul style="list-style-type: none"> • Determine presence of psychosocial support / social work activities across all other fields (diagnostics through surgery) for patients and families¹⁵ • Determine provision of dietary/nutritional services • Availability of home-based care¹⁶ • Institutionalisation of palliative care at cancer centre and align with WHO Resolution on Strengthening Palliative Care^{8,15,16} • Establish palliative care unit with appropriate number of inpatient beds and outpatient services⁹ • Provision of palliative care services at all levels of care¹⁶ which include: <ul style="list-style-type: none"> • Psychosocial support and social work • Pain and symptom management and relief • Availability of pain medications (e.g opioids)⁸ 	<ul style="list-style-type: none"> • Percentage of patients admitted for palliative care who have a screening for symptoms during the admission visit¹⁰ • Number of patients seen at outpatient clinics¹⁶ • Number of referrals to palliative care services¹⁶ • Number of palliative care beds¹⁶ • Percentage of family members reporting unmet need for emotional support¹ • Percentage of patients on chemotherapy in the last two weeks of life • Number of staff that do rotations at palliative care unit⁷ • Proportion of outpatients with pain assessed on either of the last two visits before death⁷ • Availability and affordability of essential medications, especially opioids⁸ 	<ul style="list-style-type: none"> • Days from admission to death³ • Proportion of advanced cancer patients and caregivers who get timely relief from pain^{9,16,17}

Health Workforce for Palliative and Supportive Care

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> • Skilled personnel in palliative care^{16,17} • Skilled personnel in diet and nutrition services • Education and training programmes for specialists and ancillary staff in palliative care 	<ul style="list-style-type: none"> • Availability of multidisciplinary and skilled personnel in palliative and supportive care (physicians, nurses and social workers, etc.) to perform procedures based on local and international standards • Availability of training and education strategy for all palliative care and ancillary staff based on population and needs of city and/or facility • Availability of professional health-care managers and administrators to support palliative care services • Existence of national plans and programmes for occupational provider safety • Existence of a core curriculum and continuing education programme in palliative care • Determine presence of attraction and retention strategies for staff in palliative care • Availability of oncology staff to have mandatory routine rotations at palliative care department⁷ 	<ul style="list-style-type: none"> • Percentage full-time equivalent (FTE) staff in palliative and supportive care • Density nurses, ancillary staff including operational managers, social workers providing palliative and supportive care at facilities in city • Density and distribution of palliative and supportive care specialist health providers in city • Percentage of education and training programmes accredited for palliative and supportive care, if any • Number of education and specialist training programs (or equivalent) for palliative and supportive care available in city • Number of education and training sessions available for all other health professionals in palliative and supportive care (nurses, social workers, health-care managers) • Availability of continuing professional education programmes in palliative and supportive care • Percentage of staff turnover in palliative and supportive care; • Level of provider job satisfaction 	<ul style="list-style-type: none"> • Days from admission to death³ • Proportion of advanced cancer patients and caregivers who get timely relief from pain^{9,16,17}

References

1. Maharaj S, Harding R. The needs, models of care, interventions and outcomes of palliative care in the Caribbean: a systematic review of the evidence. *BMC Palliat Care* [Internet]. 2016 Jan 22 [cited 2016 Jul 27];15. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4722788/>
2. Gómez-Batiste X, Caja C, Espinosa J, Bullich I, Martínez-Muñoz M, Porta-Sales J, et al. The Catalonia World Health Organization Demonstration Project for Palliative Care Implementation: Quantitative and Qualitative Results at 20 Years. *Journal of Pain and Symptom Management*. 2012 Apr;43(4):783–94.
3. Twaddle ML, Maxwell TL, Cassel JB, Liao S, Coyne PJ, Usher BM, et al. Palliative Care Benchmarks from Academic Medical Centers. *Journal of Palliative Medicine*. 2007 Feb 1;10(1):86–98.
4. De Lima L. Palliative care and pain treatment in the global health agenda: PAIN. 2015 Apr;156:S115–8.
5. Ferrell B, Paice J, Koczywas M. New standards and implications for improving the quality of supportive oncology practice. *J Clin Oncol*. 2008 Aug 10;26(23):3824–31.
6. Wright M, Wood J, Lynch T, Clark D. Mapping Levels of Palliative Care Development: A Global View. *Journal of Pain and Symptom Management*. 2008 May;35(5):469–85.
7. Hui D, Bansal S, Strasser F, Morita T, Caraceni A, Davis M, et al. Indicators of integration of oncology and palliative care programs: an international consensus. *Ann Oncol*. 2015 Sep;26(9):1953–9.
8. Earle CC, Park ER, Lai B, Weeks JC, Ayanian JZ, Block S. Identifying Potential Indicators of the Quality of End-of-Life Cancer Care From Administrative Data [Internet]. [cited 2016 Jul 27]. Available from: <http://jco.ascopubs.org>
9. Luckett T, Phillips J, Agar M, Virdun C, Green A, Davidson PM. Elements of effective palliative care models: a rapid review. *BMC Health Serv Res*. 2014 Mar 26;14:136.
10. Bruera E, Hui D. Conceptual Models for Integrating Palliative Care at Cancer Centers. *J Palliat Med*. 2012 Nov;15(11):1261–9.
11. Availability and Integration of Palliative Care at US Cancer Centers | Mar 17, 2010 | JAMA | JAMA Network [Internet]. [cited 2016 Jul 27]. Available from: <http://jama.jamanetwork.com/article.aspx?articleid=185543>
12. A proposed systems approach to the evaluation of integrated palliative care | BMC Palliative Care | Full Text [Internet]. [cited 2016 Jul 27]. Available from: <http://bmc-palliativecare.biomedcentral.com/articles/10.1186/1472-684X-9-8>
13. Seow H, Snyder CF, Mularski RA, Shugarman LR, Kutner JS, Lorenz KA, et al. A framework for assessing quality indicators for cancer care at the end of life. *J Pain Symptom Manage*. 2009 Dec;38(6):903–12.
14. Bingley A, Clark D. A Comparative Review of Palliative Care Development in Six Countries Represented by the Middle East Cancer Consortium (MECC). *Journal of Pain and Symptom Management*. 2009 Mar;37(3):287–96.
15. 67th World Health Assembly- Strengthening of palliative care as a component of comprehensive care throughout the life course [Internet]. Available from: http://apps.who.int/gb/ebwha/pdf_files/WHA67/A67_R19-en.pdf
16. WHO | Planning and implementing palliative care services: a guide for programme managers. 2016. Available from: <http://apps.who.int/iris/bitstream/10665/250584/1/9789241565417-eng.pdf?ua=1>
17. WHO List of Priority Medical Devices for Cancer Management. In Press. 2017.

Management of Cancer Care Services

Strong management underpins the success of any clinical facility.¹ Here, we provide a set of key principles to guide the delivery of a cancer care facility that operates efficiently, is accountable, delivers quality, safe care for patients, is financially sustainable and maintains strong ethical standards.²

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> Operational strategy & infrastructure Performance Management Continuous quality improvement 	<ul style="list-style-type: none"> An organised management structure with a leadership team that has the capacity to implement a strategic plan to deliver quality, safe patient care, and is accountable to the appropriate governing body.^{2,3} An operating budget for service delivery and managing resources (workforce, medicines, equipment – capital and maintenance, buildings, information management). An efficient financing system for collecting, recording and monitoring the facility's finances that ensures accountability and enables transparency. Data and information are used in the evaluation, monitoring and reporting on facility performance (operational processes, patient outcomes and workforce management including retention and succession management).³ A process for appropriate (national or global) accreditation for core cancer services is integrated into the strategic plan³ Access to continuous professional development and other opportunities (e.g. links with related organisations) to strengthen competencies of the leadership team.^{1,3-5} 	<ul style="list-style-type: none"> Clear roles and responsibilities are defined for the leadership team. The existence of up-to-date strategic and operational plans with measurable goals for the delivery of safe, quality cancer care, consistent with legislative requirements, and the national cancer control plan. Evidence of participation of staff, consumers, caregivers and representatives of key groups in the community in developing and reviewing the strategic plan; and policies and procedures to respond to conflicts of interest. Evidence of implementation of strategic and operational plans including sustainable financing mechanisms for the facility. A clear budget allocation for the delivery of services and management of resources.^{1,3} A policy and a set of procedures tailored and appropriate for each setting are set for fee levels and for managing fees for those patients who cannot afford to pay. A performance monitoring and evaluation plan is in place with the provision that the leadership team is collectively accountable for the performance of the facility. Regular evaluation and reporting of compliance to policies and procedures and facility performance. Regular evaluation of staff performance Achievement of appropriate accreditation standards. Maintenance of accreditation standards. Evidence of investment in improving competencies amongst the leadership team in: <ul style="list-style-type: none"> Fiscal management Using Information /Data Strategic Planning Maintenance Community Outreach Communication Human Resources 	<ul style="list-style-type: none"> A cancer care facility that <ul style="list-style-type: none"> Improves patient safety and quality of care Delivers efficiencies Improves integration of care across the patient care continuum Is accountable Supports community access Is financially sustainable Demonstrates ethical behaviour

References

1. Preker AS, McKee M, Mitchell A et al. (2006). Disease Control Priorities in Developing Countries (DCP2). Ch73. Strategic Management of Clinical services.
2. The European Observatory on Health Systems and Policies. (2016). Strengthening health system governance: Better policies, stronger performance. World Health Organization: Geneva.
3. Schyve PM. (2009). Leadership in healthcare organisations: A guide to joint commission leadership standards The Governance Institute: San Diego.
4. Aga Khan Health Service, Kenya Community Health Department Policy Brief No.4 Health Facility Committees: The Governance Issue. Best Practices in Community-Based Health Initiatives Health Facility Committees.
5. WHO. (2005). Making health systems work: Working Paper: Strengthening management in low-income countries. Department of Health Systems Policies and operation: Evidence and Information for Policy, World Health Organization: Geneva.

Quality of Cancer Care



Quality of Cancer Care

Cancer care is complex and has many potential risks. It requires decisions from a skilled, motivated and multidisciplinary team of health professionals committed to providing quality cancer diagnosis and curable and palliative treatments, which have the potential to be life-saving and improve the quality of life. This means having the right principles in place to make sure all the right steps are taken.

Without incorporation of quality assurance in core cancer services, patients will be unable to access the high quality cancer care services that meet their needs and expectations. By adopting people-centered, integrated and quality care, health systems will provide core cancer services that can function optimally to provide significant improvements to the cancer care of all people living in a city greater than a million.

Guiding principles that generate better cancer health outcomes across service delivery using evidence based practice can lead to improved access to care, improved cancer outcomes, better health literacy and self-care, increased satisfaction for patients with ethical and patient-centered care, increased job satisfaction for providers, improved efficiency, affordability, timeliness, accuracy, completeness, usability and safety of cancer care services.

Using evidence-based practice to improve health outcomes, ongoing monitoring of progress through specific and measurable performance indicators via information systems, can capture what's needed to ensure sustainable cancer care with long-term continuous development.

This module presents the four aspects of quality that should be available for cancer care which include:

- 1 **Ethics and Patient-Centered Care**
- 2 **Evidence-Based Protocols for Care**
- 3 **Data/Information Acquisition and Management**
- 4 **Safety and Occupational Hazards**

Ethics and Patient-Centered Care

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> • National or Organisational Professional Code of Conduct and Ethics • All skilled personnel 	<p>Ethics</p> <ul style="list-style-type: none"> • Determine presence of ethics related to institutional policies for each core cancer service (e.g. informed consent, advanced directives, end of life care, surrogate decision-making) conflict of interest, ethics of care distribution interventions, information on aggressive treatments)^{4,5,8,19,20} • Oncology professionals will uphold a professional code of ethics and conduct as defined by the appropriate governing professional organisation and their respective employers^{4,5,8,19,20} • Addressing patients' rights needs in adherence to local cultural contexts by offering^{1,3,14} <ul style="list-style-type: none"> • Effective communication regarding care that is culturally appropriate and understood by patient population • informed decision-making • privacy and confidentiality • continuity of care / coordination of care (e.g. among providers) • strategy to discuss patient financing for treatment • Addressing providers' rights by offering <ul style="list-style-type: none"> • key provider rights to decent work conditions • freedom of association; and due process to address issues in the workplace^{1,3} • A mechanism for ethics consultations should be available⁵ • A mechanism for peer-reviewed research ethics^{19,20} (i.e. organisational/institutional review board) <p>Patient-centered care</p> <ul style="list-style-type: none"> • Integrates “patients voice” in the medical record and care delivery by fostering patients' decisions on clinical outcomes^{4,5,14} • Commitment to patient safety, infection prevention, and quality care¹⁴ • Shared clinical decision making between individual patient, their family, carers and providers in the information exchange and deliberation stages and the identification of the person responsible for the final decision^{1,3,14} 	<ul style="list-style-type: none"> • Level of satisfaction of providers and patients with the treatment (gathers data on patients' experience throughout the health care delivery cycle)^{1,14} • Level of patient's knowledge about disease and outcome^{1,14} • Level of provider's knowledge about culturally sensitive patient-communication^{1,14} 	<ul style="list-style-type: none"> • Patients' and providers' treated with dignity and respect¹⁴ • Patients feel involved in their care¹⁴

Evidence based protocols for care

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> Nationally available protocols and/or standardised operating procedures for cancer care (diagnostics through palliative care) 	<ul style="list-style-type: none"> Use appropriate local/nationally developed evidence based protocols for cancer care^{4,19,20} Develop methods to adapt international guidelines (e.g NCCN, etc.) Plan for updating of evidence based care clinical practice and policy materials/protocols 	<ul style="list-style-type: none"> Percentage of patients treated according to available evidence based care^{1,4} 	<ul style="list-style-type: none"> Improved standards of cancer care leading to better health outcomes for patient¹

Data/Information Acquisition and Management

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> • All skilled personnel in healthcare management and cancer registry • Electronic information systems 	<ul style="list-style-type: none"> • Development of information systems and organisational culture that supports monitoring and evaluation^{4,5,6,14,19,20} <ul style="list-style-type: none"> • Availability of electronic medical record system for all core cancer services • Availability of an electronic Health Management Information System (HMIS) to track patient registration, appointment scheduling, admission/discharge/transfer, bed management and billing for all core cancer services • Availability of telemedicine capacity for all core cancer services • Availability of electronic pathology reporting to the hospital cancer registry, • Capability to do knowledge management^{14,19,20} (knowledge sharing and using data in decision-making) • Improve measurement, collection and reporting of cancer system (facility) performance^{2,4,5,6} <ul style="list-style-type: none"> • Cancer data capture • Synoptic reporting and defined data elements/discreet data capture • Stage capture rate: develop and collect stage specific cancer information in order to make sense of mortality and survival through a range of variables, including treatment • Establish prospective clinical pathways for each core cancer service to monitor centre/ facilities efforts^{2,4,5,6} • Develop standardised waiting times for all core cancer services^{2,4,5,6,12} • Status of current information linkages between cancer diagnostic services, the data system at the hospital and hospital cancer registry (if any), and the central population-based registry (if any),^{4,5,6} • Ensure that databases are analysed by data analysts who can provide valid interpretations⁶ 	<ul style="list-style-type: none"> • Turn-around metrics^{4,6} • Average waiting times for services^{4,6,14} • Percentage of data by core cancer service that is submitted to hospital cancer registry⁶ • Percentage of pathology reports submitted to hospital cancer registry^{4,5,6} • Percentage incident cancer cases in which a cancer was confirmed by pathological diagnosis⁶ • Percentage reports generated by each core cancer service^{4,5,6} • Percentage of data submitted from hospital cancer registry to central population-based registry (if available)⁶ 	<ul style="list-style-type: none"> • Production of regular or annual facility report to inform improvements needed for cancer care services^{1,14}

Safety and Occupational Hazards

 Inputs	 Processes	 Outputs	 Outcomes
<ul style="list-style-type: none"> • Availability of safety checklists for radiation exposure, occupational and environmental hazards, and safe surgery^{15,16,17,18} 	<ul style="list-style-type: none"> • Establish reporting of adverse events and identify ways to improve care and promote learning so that errors are less likely to be repeated for patients^{4,5} • Implementation of plan to capture information on patient and provider adverse events and incidents^{4,5,15} • Implement change strategies to create care environments that are less likely to result in harm for patients and providers^{4,5,9} • Providers work should take place in a safe and healthy working environment¹¹ • Conditions of provider's work should be consistent with worker's well-being and human dignity¹¹ • Providers work should offer real possibilities for personal achievement, self-fulfillment and service for society¹² 	<ul style="list-style-type: none"> • Percentage of hospital using patient and provider safety and occupational hazard protocols^{4,5,11} • Process map available to record patient incidents^{4,5} • Number of reported incidents¹⁵ • Rates of infection at facility¹⁵ • Adverse drug reaction rates for providers and patients^{15,18} • Error rates^{4,5,6} (related to order entry, medication, site identification, patient identification, radiologic-induced, hazard related to environment etc.) • Percentage vaccines for providers¹¹ 	<ul style="list-style-type: none"> • Safe delivery quality cancer care for patient and providers^{4,5}

References

1. EngenderHealth. COPE® Handbook: A Process for Improving Quality in Health Services. Rev. ed. New York: EngenderHealth; 2003[a].
2. Greenberg, A., H. Angus, T. Sullivan and A. Brown. 2005. "Development of a Set of Strategy-Based System-Level Cancer Care Performance Indicators in Ontario, Canada." *International Journal for Quality in Health Care* 17: 107–14.
3. Huevoz, C., and Diaz, S. 1993. Quality of care in family planning: Clients' rights and providers' needs. *Advances in Contraception* 9(2):129–139
4. IOM (Institute of Medicine). 2013. *Delivering high-quality cancer care: Charting a new course for a system in crisis*. Washington, DC: The National Academies Press.
5. IOM (Institute of Medicine). 1999. *Ensuring Quality Cancer Care*. Washington, DC: The National Academies Press.
6. Sullivan, T., W. Evans, H. Angus and A. Hudson, eds. 2003. *Strengthening the Quality of Cancer Services in Ontario*. Ottawa: Canadian Healthcare Association Press.
7. WHO | National Cancer Control Programmes: policies and managerial guidelines. – 2nd Ed.. 2002.
8. WHO | Global Health Ethics Key Issues. <http://www.who.int/ethics/publications/global-health-ethics/en/>. 2015.
9. Adams J., Bartram J., Chartier Y. WHO Essential Environmental Health Standards for Health Care [Internet]. 2008 [cited 2016 Sep 19]. Available from: <http://apps.who.int/bookorders/anglais/detart1.jsp?codlan=1&codcol=15&codcch=712>
10. Lipscomb J, Gotay CC, Snyder C. *Outcomes Assessment in Cancer: Measures, Methods and Applications*. Cambridge University Press; 2004. 682 p.
11. Global strategy on occupational safety and health conclusions adopted by the International Labour Conference at its 91st session, 2003. Switzerland: International Labour Office; 2004.
12. OECD, editor. *Cancer care: assuring quality to improve survival*. Paris: OECD; 2013. 155 p. (OECD health policy studies).
13. Gospodarowicz M, Trypuc J, Cruz AD, Khader J, Omar S, Knaul F. *Cancer services and the comprehensive cancer center*. Disease Control Priorities. Third Edition. 2015;195
14. WHO | WHO Framework on integrated people-centred health service. <http://www.who.int/servicedeliverysafety/areas/people-centred-care/en/>. 2016
15. WHO | Guidelines on patient safety [Internet]. Available from: http://www.who.int/publications/guidelines/patient_safety/en/
16. WHO | WHO surgical safety checklist and implementation manual [Internet]. [cited 2016 Sep 23]. Available from: http://www.who.int/patientsafety/safesurgery/ss_checklist/en/
17. WHO | Radiotherapy Risk Profile [Internet]. [cited 2016 Sep 18]. Available from: http://www.who.int/patientsafety/activities/technical/radiotherapy_risk_profile.pdf?ua=1
18. WHO PAHO | Safe handling of hazardous chemotherapy drugs in limited-resource settings [Internet]. [cited 2016 Aug 1]. Available from: <http://www.bvsde.paho.org/bvsacd/cd49/88-119-p.pdf>
19. IOM (Institute of Medicine). 2013. *Delivering high-quality cancer care: Charting a new course for a system in crisis*. Washington, DC: The National Academies Press.
20. IOM (Institute of Medicine). 1999. *Ensuring Quality Cancer Care*. Washington, DC: The National Academies Press.

Community Access and Integrated Care

Community access and integrated care in terms of both infrastructure and health workforce should be available to ensure any facility or centre is linked and engaged with other facilities, referral systems and communities within the city.



 Inputs	 Processes	 Outputs	 Outcomes
<p>Infrastructure</p> <ul style="list-style-type: none"> • Core Cancer Services Health Workforce • Community Health workforce (community health workers, NGOs) • Link to other facilities in other cities 	<ul style="list-style-type: none"> • Engaging communities¹ <ul style="list-style-type: none"> • Reduce barriers to access through enhanced connectivity across entire delivery chain from community to tertiary care • Community delivery care policy and systems • Integrate public, private, NGO providers into common national delivery framework; promote demand-driven partnerships with local NGOs • Patient education according to local literacy context • Engaging other facilities and referral systems¹ <ul style="list-style-type: none"> • Determine available transportation/distance between cancer facility and first-level facilities • Determine available transportation/distance to the cancer facility for the target population • Determine referral criteria for tertiary care /referral and counter-referral systems • Case management and multidisciplinary care within health system for cancer care 	<ul style="list-style-type: none"> • Proportion of population with 2-hour access to first-level facilities • Minimum number of procedures for referral 	<ul style="list-style-type: none"> • Increased access to cancer care services
<p>Health Workforce</p> <ul style="list-style-type: none"> • Core Cancer Service Health Workforce • Community Health workforce (community health workers, NGOs) • Link to other facilities in other cities 	<ul style="list-style-type: none"> • Availability of a mobilised network of health workers and groups¹, for <ul style="list-style-type: none"> • Informal care networks • Peer support and expert patient groups • Caring for carers programmes • Patient education • Health/patient navigators • Training of informal carers, patient navigators^{2,3} 	<ul style="list-style-type: none"> • Percentage full-time equivalent (FTE) staff of health workers and patient navigators 	<ul style="list-style-type: none"> • Increased access to cancer care services

References

1. WHO | WHO Framework on integrated people-centred health service.
<http://www.who.int/servicedeliverysafety/areas/people-centred-care/en/>.
2016
2. IOM (Institute of Medicine). 2013. Delivering high-quality cancer care: Charting a new course for a system in crisis. Washington, DC: The National Academies Press.
3. IOM (Institute of Medicine). 1999. Ensuring Quality Cancer Care. Washington, DC: The National Academies Press.

APPENDIX Methodology



The C/Can 2025 conceptual framework was developed partly from the Donabedian model which is a theoretical model that provides an outline for examining health services and evaluating quality of health care. The C/Can 2025 conceptual framework offers an opportunity to deliver an illustration of the inputs, processes, outputs and outcomes for the various elements in the core areas of practice. The C/Can 2025 conceptual framework and Donabedian model are paralleled in the adjacent table.

Donabedian Model vs. C/CAN 2025 Conceptual Framework

Donabedian Model	Definition	C/CAN Conceptual Framework
-	Resources (e.g. financial, equipment, etc.)	Inputs
Process	How programme organises goods and services	Processes (not a quantitative measure; describes activities needed)
Structure	Quantity of goods and services provided; direct product of programme activities/ processes (e.g. percentage of FTE staff)	Outputs
Outcome	Measure of the broader results achieved through the provision of goods and services and impact on the people participating in the program (e.g. patient outcomes)	Outcome

Donabedian, A. (1988). "The quality of care: How can it be assessed?". JAMA. 121 (11): 1145-1150. doi:10.1001/jama.1988.03410120089033. PMID 3045356

Abbreviations

Computed tomography (CT)

Conformal radiotherapy (3D CRT)

Full-Time Equivalent (FTE)

Image guided radiation therapy (IGRT)

Intensity modulated radiation therapy (IMRT)

Lancet Commission on Global Cancer Surgery (LCGCS)

Low and Middle Income Countries (LMIC)

Magnetic Resonance Imaging (MRI)

National Comprehensive Cancer Network (NCCN)

Non-Communicable Diseases (NCDs)

Positron Emission Tomography (PET)

Post-Anaesthesia Care Unit (PACU)

Sustainable Development Goals (SDGs)

Ultrasonography (US)

United Nations (UN)

Union for International Cancer Control (UICC)

WHO Model Essential Medicine List (WHO MEML)

World Health Organization (WHO)

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UNION FOR INTERNATIONAL CANCER CONTROL

62 route de Frontenex, 1207 Geneva, Switzerland

T. +41 (0)22 809 1811 **F.** +41 (0)22 809 1810

www.uicc.org