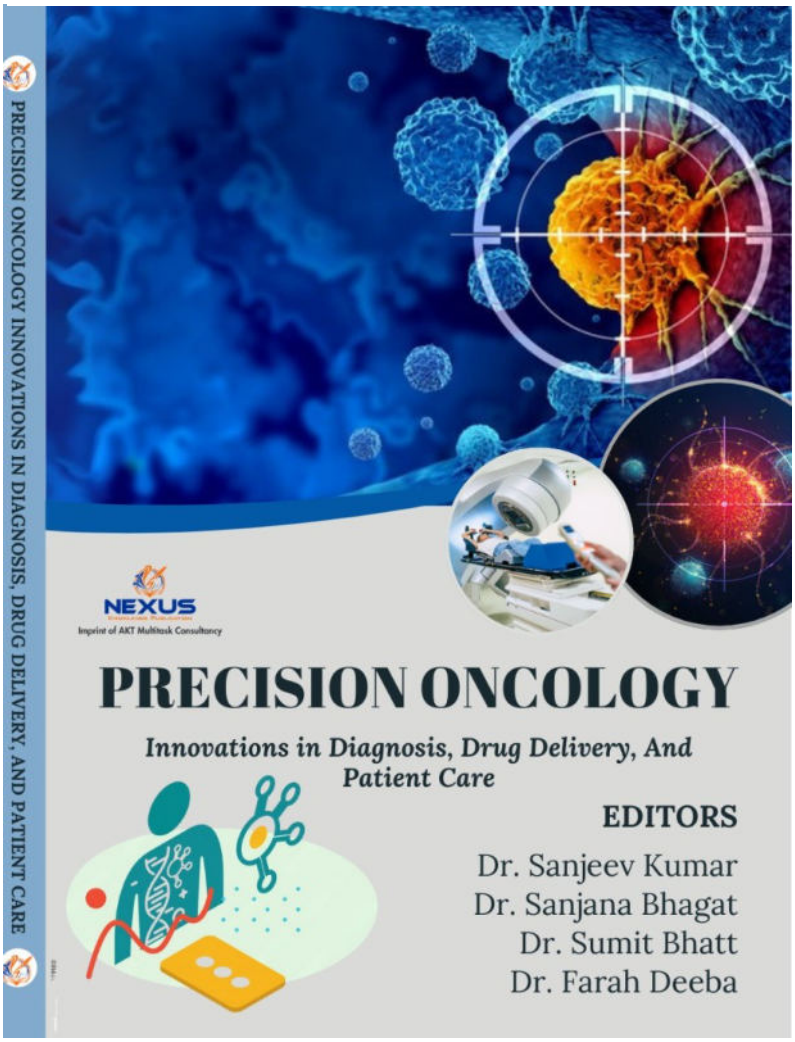
ISBN: 978-81-985724-3-1

NEXUS KNOWLEDGE PUBLICATION

https://nknpub.com/index.php/1

Precision Oncology: Innovations in Diagnosis, Drug Delivery, And Patient Care



Published By – Nexus Knowledge Publication

(Imprint of AKT Multitask Consultancy)

Bilaspur, Chhattisgarh, India, 495006

www.aktmultitask.com

Chapter- 10

HOLISTIC AND PATIENT-CENTERED PRECISION ONCOLOGY

Dr. RAKESH SAHEBRAO JADHAV (PT)
Principal & Professor
Dept: MSK PT, Dr. Bhanudas Dere College of Physiotherapy,
Sangamner Dist. Ahilyanagar (Maharashtra)
E mail: drrakeshsj@gmail.com

Dr. PREETI DAGDUJI GHODGE (PT)
Associate Professor
Neuro Physiotherapy
Wellness College of Physiotherapy, Dharashiv (Maharashtra)
E mail: ghodgepreeti@gmail.com

Dr. KALPANA KRISHNARAO JADHAV
Designation: HOD & Professor
Dept: Swasthavritta & Yoga
Yashwant Ayurvedic College, PGT & RC Kodoli,
Tal Panhala, Dist Kolhapur (Maharashtra)
Email: kalpanajadhav70@yahoo.com

Dr. MILIND MOHAN GODBOLE
Dean & Professor
Swasthavritta & Yoga
Yashwant Ayurvedic College PGT & RC Kodoli,
Tal Panhala Dist Kolhapur (Maharashtra)
E mail: milindgodbole@gmail.com

Dr. SONAL S. WAGH
Principal & Professor
Streerog & Prasuti Tantra
Dr. Bhanudas Dere Ayurved College, Sangamner
Sangamner Dist. Ahilyanagar (Maharashtra)
Email: sonaldere1@gmail.com

DOI 10.5281/zenodo.17199086

ISBN: 978-81-985724-3-1

Chapter 10…

HOLISTIC AND PATIENT-CENTERED PRECISION ONCOLOGY

Dr. RAKESH SAHEBRAO JADHAV (PT)
Principal & Professor
Dept: MSK PT, Dr. Bhanudas Dere College of Physiotherapy,
Sangamner Dist. Ahilyanagar (Maharashtra)
E mail: drrakeshsj@gmail.com

Dr. PREETI DAGDUJI GHODGE (PT)
Associate Professor
Neuro Physiotherapy
Wellness College of Physiotherapy, Dharashiv (Maharashtra)
E mail: ghodgepreeti@gmail.com

Dr. KALPANA KRISHNARAO JADHAV
Designation: HOD & Professor
Dept: Swasthavritta & Yoga
Yashwant Ayurvedic College, PGT & RC Kodoli,
Tal Panhala, Dist Kolhapur (Maharashtra)
Email: kalpanajadhav70@yahoo.com

Dr. MILIND MOHAN GODBOLE
Dean & Professor
Swasthavritta & Yoga
Yashwant Ayurvedic College PGT & RC Kodoli,
Tal Panhala Dist Kolhapur (Maharashtra)
E mail: milindgodbole@gmail.com

Dr. SONAL S. WAGH
Principal & Professor
Streerog & Prasuti Tantra
Dr. Bhanudas Dere Ayurved College, Sangamner
Sangamner Dist. Ahilyanagar (Maharashtra)
E mail: sonaldere1@gmail.com

ISBN: 978-81-985724-3-1

ISBN: 978-81-985724-3-1

Precision oncology has long been based on treating tumor biology with the help of molecular profiling, genetic sequencing, and biomarker-based therapies. Although this method has resulted in the development of specific drugs and enhanced survival rates, it tends to perceive the patients mainly in terms of their cancer. There is a danger that this reductionist focus will cause an overlooking of important aspects of patient care: individual values, comorbidities, and quality-of-life considerations. The second step toward precision oncology should then not be the application of molecular customization but a much more holistic concept that incorporates the biological complexity of cancer with the lived experiences of patients.

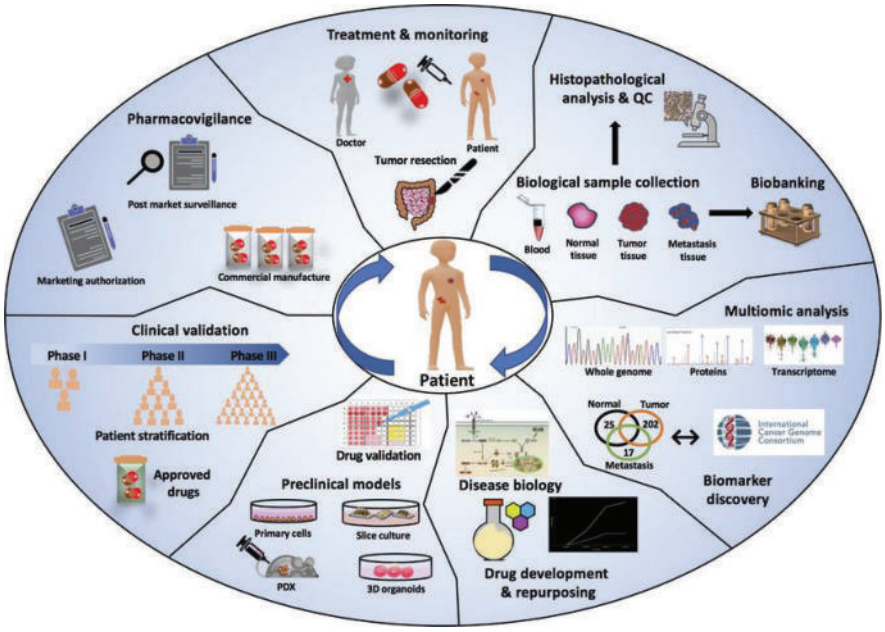


Figure 1: Holistic Patient-Centered Precision Oncology

Source: (https://www.researchgate.net/figure/Overview-of-precision-oncology-From-the-patient-to-the-development-of-novel_fig2_349601136)

Precision model is patient centered and incorporates the person in the centre of treatment planning. This implies that treatment plans are not only based on the nature of the tumors, but also functional conditions, ability to withstand treatments and life ambitions. As an illustration, a weak patient with progressive illness may consider independence and symptom management to be more important than vigorous interventions whereas a young patient may seek aggressive treatments to achieve a long-term remission. Psychosocial support, family dynamics and patient preferences are important to be included in the oncology decision-making process so that the treatments are not only that best suited to the person, but also the disease.

ISBN: 978-81-985724-3-1

Taking holistic precision oncology means a focus on interdisciplinary integration and digital health-tools to assist with continuous and patient-centered care. Wearables, remote monitoring systems, and mobile health applications can give real-time information about the symptoms, activity levels, and adherence to the treatment, which will give clinicians a more comprehensive picture of the patient well-being not limited by the hospital visits. The addition of psychosocial interventions, survivorship programmes and palliative care complement this framework to support the emotional, spiritual and social aspects of cancer care. Collectively, these approaches allow changing the oncology paradigm of disease-centeredness into a patient-centered ecosystem that is highly dynamic in its response to the needs of individuals.

Lastly, to achieve patient-centered precision oncology, healthcare systems need to be restructured and reshaped in terms of their culture. Not only should the clinicians be trained to incorporate the molecular and behavioral information to shared decision-making, but also the institutions need to adopt multidisciplinary models of care that connect oncology with psychological, rehabilitation, and primary care. Equitable access to molecular diagnostics, resources to support care, and digital health innovations are also crucial policies to promote inclusivity. The blending of biological accuracy and humanistic attention will not only prolong life but will make it more meaningful to the next generation of oncology as patients will be regarded as complete human beings and not disease vectors.

10.1. ROLE OF PATIENT PREFERENCES, LIFESTYLE, AND COMORBIDITIES

Role of Patient Preferences, Lifestyle, and Comorbidities in precision oncology highlights how the definition of personalization has to expand beyond tumor genetics on its own. Although molecular profiling and biomarker-based therapies have transformed the treatment of cancer, they can only treat the biological aspects of the condition. Personalization itself must be truly personal and it needs to be done within the context of complete patient, including not only physiological condition, but also psychosocial, economic, and cultural factors. The same tumor mutations can be interpreted differently by two people who have them based on their overall health, resilience and lived environment. Indicatively, the frailty score of a patient, comorbidity burden or psychological preparedness may determine whether a potentially useful therapy is tolerable or too harmful. Therefore these contextual factors must be incorporated in order to render treatment really patient-centered, and not merely disease-oriented.

The other important aspect is the contribution of lifestyle and daily functioning to treatment results and longevity. A history of smoking, exercise, nutrition, and psychosocial strength are the direct determinants of treatment tolerance, risk of complication, and recovery patterns. One patient who is physically well-conditioned and who has social structures in his favor might be able to tolerate intensive therapy more effectively, whereas another with unnutritious diet and frequent stress or with small social support can be challenged by even conventional protocols. In addition to physical strength, psychological strength and coping mechanisms frequently dictate compliance with multicomponent regimens and acceptance of long term therapies. Through this, lifestyle factors cannot be disregarded but rather be central in decision-making processes to enable clinicians strike a balance between medical advice and realistic outcome and quality of life expectations.

Lastly, patient values, and preferences should be incorporated in all the treatment planning stages especially where the choices would be based on a trade-off between survival and quality of life. A patient with severe comorbidities and with advanced age might reasonably seek comfort, autonomy, or meaningful time with their family than aggressive treatment that prolongs life at the cost of much suffering. In contrast, a younger, otherwise healthy patient would be ready to experience more toxicity in case it offers him/her an opportunity to have long-term remission or cure. The effect of neglecting these personal priorities can include over-treatment resulting in unneeded toxicity, financial and emotional overload, or under-treatment, which can be withholding potentially life-prolonging therapies. Both cases reduce patient satisfaction and deteriorate overall results. Oncology care can be made more equitable, ethical, and responsive to what actually matters to patients in their care path by systematically combining preferences, lifestyle factors, and assessments of comorbidity.

- **Key Components**

1. Systematic Assessment of Patient Context

Acknowledging the systemic review of the patient context is the basis of the holistic approach to cancer care, as it makes it impossible to make treatment decisions only based on the nature of the disease, but also on the health and functioning conditions of a patient and his/her life situation. This is initiated by a systematic review of the overall condition of the patient, which involves clinical as well as non-clinical elements. The Comprehensive Geriatric Assessment (CGA) is especially useful in older adults because it identically assesses cognitive function, mobility, nutritional condition, and social support systems. All these factors are good predictors

on the patient tolerance to treatment and reaction to therapy. Likewise, performance status scales (e.g., Eastern Cooperative Oncology Group (ECOG) scale or Karnofsky Performance Status (KPS)) are standard measures of physical functioning, and when clinicians evaluate patients regarding their tolerance to aggressive treatments, the scales enable them to determine whether patients are stable enough to continue the treatment or the treatment needs to be modified. Such formal instruments are used to personalize cancer treatment to balance the intensity of treatment with the functional reserve of the patient.

It is also crucial to evaluate comorbidities and vulnerabilities which might not be obvious. Such tools as the Charlson Comorbidity Index measure the weight of other diseases that accompany cancer, and frailty scores are used to determine patients who might be physically well but frail and more vulnerable to complications. Among medical and physical parameters, non-medical determinants of health are also found in systematic assessment. Health literacy, financial stability and social support need screening will help make sure that planning of treatment is based on realistic factors like comprehension of medical instructions, affordability of drugs, or access to treatment facilities. Through the combination of these clinical, functional, and social aspects, caregivers can develop practical, patient-focused treatment plans that increase adherence, better outcomes, and equity in cancer care.

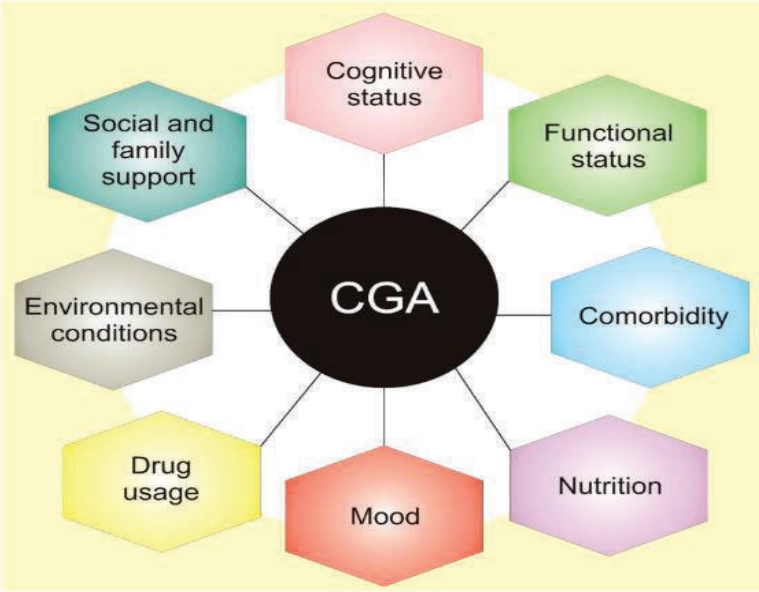


Figure 2: Comprehensive Geriatric Assessment (CGA)

Source: (https://www.researchgate.net/figure/Comprehensive-geriatric-assessment-CGA-is-an-organized-evaluation-method-to-provide-a_fig2_346542805)

ISBN: 978-81-985724-3-1

2. Patient-Reported Outcomes (PROs) and Goals Elicitation

Patient-Reported Outcomes (PROs) and Goals Elicitation are part and parcel of the process of making cancer care patient-centered, i.e. not just the biomedical aspect of the illness, but the lived experience, preferences, and priorities of patients. Regular treatment of cancer commences with a systematic examination of the general health of the patient alongside clinical examination and patient input. In elderly patients, such tools like Comprehensive Geriatric Assessment (CGA) come in handy especially since they offer an assessment of cognitive status, mobility, nutrition health and social support networks, which are highly significant in determining treatment options and general resilience. Moreover, the Eastern Cooperative Oncology Group (ECOG) and Karnofsky scales are another performance status scales that are still commonly used to predict the ability of a patient to withstand a therapeutic treatment. These measures, in combination with PROs, provide a more detailed perspective of the functional state of the patient, which guarantees that the treatment requests are based on physiological capacity as well as on patient-defined objectives.

In addition to performance and functionality, it is necessary to consider the context of the whole health of the patient and customize care. Such tools as the Charlson Comorbidity Index give a measurable value of the burden of coexisting diseases, whereas frailty scores reveal physiologic susceptibility that cannot be detected externally. These tools combined with patient-reported data on symptoms, emotional well-being, and quality of life can help clinicians to identify risk sooner and make changes to the treatment plan. In addition, the ideation of health literacy, financial and social needs screening into the assessment process will guarantee that practical obstacles like the inability to comprehend medical prescriptions, afford the treatment, or use healthcare facilities are properly tackled. This twofold approach to clinical signs and patient-reported outcomes helps to make shared decisions, promote realistic treatment expectations, and increase compliance, which leads to better patient survival and the quality of life in cancer care.

ISBN: 978-81-985724-3-1

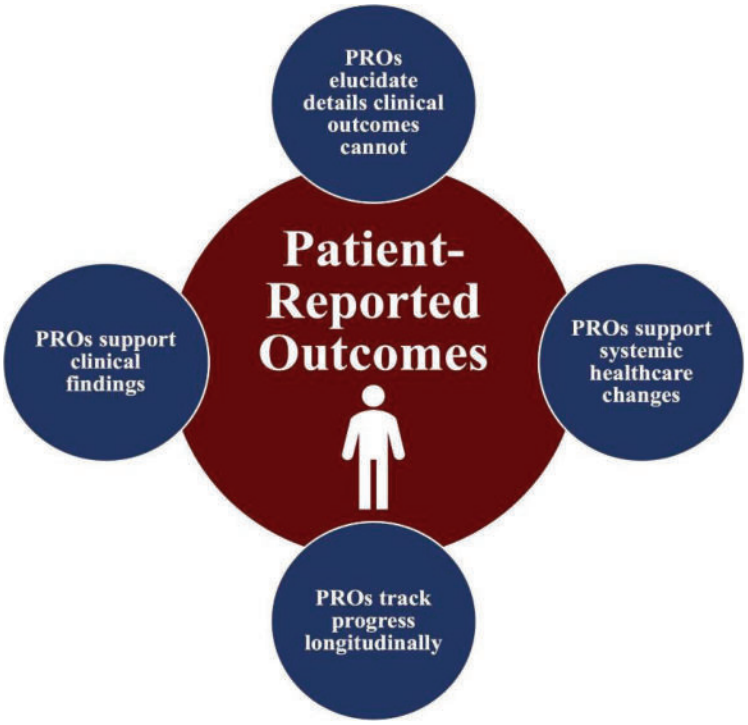


Figure 3: Patient-reported outcomes (PROs)

Source: (https://www.jprasurg.com/article/S1748-6815(23)00481-3/abstract)

3. Shared Decision-Making (SDM)

Shared Decision-Making (SDM) has become a fundamental part of the contemporary oncology practice that is no longer based on the paternalistic approach of care but is rooted in the collaboration between clinicians and patients. This is done through giving patients easy to understand balanced and accessible information regarding the absolute risks and benefits of different treatment alternatives. This does not necessarily involve only the standard aggressive treatment but also the less aggressive options like active surveillance, supportive treatment, or symptom management. Clinicians can enable patients to make decisions based on their own values, objectives, and risk tolerance, as well as their own understanding of complicated medical information by simplifying and clarifying complex health-related information. SDM builds trust, facilitates open dialogue, and makes sure that the care provided is not only warranted by the medical necessity, but the definition of quality of life as the patient defines it. Notably, it provides room to patients to share fears or cultural beliefs, or their own priorities that otherwise would have been hidden in a strictly biomedical practice.

ISBN: 978-81-985724-3-1

Another crucial branch of SDM is advance care planning, which is especially important with patients of advanced illness, serious comorbidities, or indeterminate prognosis. Structured discussions will help patients express their care preferences and define outcomes important to them, as well as make a record of decisions related to future interventions. Such documented preferences serve as a protection, as they guarantee continuity and the preservation of the values of the patient even in case the situation changes or the patient cannot make decisions in the future. Advance care planning is not a single discussion but a tendentious dialogue, changing flexibly with the health condition of the patient and his/her changes in objectives. It allows reducing uncertainty and avoiding unwanted interventions and assures both the patients and the family as well as enhances value-concordant ethically based care. Combined, shared decision-making and advance care planning increase patient autonomy, both therapeutic alliance and dignity in cancer care.

4. Lifestyle and Risk Modification

Lifestyle and Risk Modification has an essential role in the development of the long-term outcomes of cancer patients as it is complementary to medical treatment with proactive approaches that improve health and overall resilience. Lifestyle change interventions have a direct impact on treatment tolerance, complication rates and survival. As one example, smoking cessation has been demonstrated to enhance wound healing, decrease complications associated with treatment, and decrease cancer recurrence or secondary malignancies. Likewise, with structured nutritional care, it is indemnified such that the patient keeps up with respect to strength, immunity as well as energy reserves during therapy and therefore, enhances compliance and decreases treatment breaks. Dietary consideration does not only help in the alleviation of the side effects of weight loss or malnutrition but also helps the body to recover the energy of the chemotherapy, radiations, or surgeries. When incorporated into the treatment plan, these lifestyle measures serve as crucial adjuncts to biomedical interventions that maximize patient adherence to their own treatment and remain a solid reinforcement of patient participation in self-management.

Physical and psychosocial support is equally important, as both are used to complement functional and emotional aspects of survivorship. Specialized physical activity strategies, including mild to moderate work, and systematic rehabilitation interventions have the potential to greatly lessen cancer-related fatigue, boost cardiovascular and muscular strength, and functional recovery. Simultaneously, psychosocial interventions such as counseling, stress

management and peer support directly reduce depression, anxiety and distress, which are frequent but not well-known obstacles to adherence to treatment and quality of life. Psychosocial support is resilience-strengthening and improves coping strategies by empowering the patient to cope with emotional well-being as well as physical health. Combined, these lifestyle-based interventions shift the conventional paradigm of oncology care not only to a reactive model, which is based mainly on disease treatment, but to proactive orientation, which pays more attention to the management of health and prevention over an extended period, as well as to long-term well-being.

5. Multidisciplinary Care Planning

The concept of Multidisciplinary Care Planning has become a necessity in the contemporary cancer treatment because cancer treatment is far more than biomedical. Oncologists offer their essential competence in the areas of disease biology, staging, and treatment options, yet to provide effective cancer care, it is necessary to cooperate with professionals in various areas to cover the entire range of patient needs. The standard tumor boards, usually consisting of just oncologists, radiologists and surgeons, are now being enlarged to include representatives of geriatrics, palliative care, rehabilitation medicine, psychology, social work and pharmacy. This expanded involvement means that the treatment plans are not only being based on eradication of tumors but rather on the basis of a holistic view of the health status, functional ability and circumstances of a life that the patient is in. Through the development of highly orchestrated cooperation, multidisciplinary planning reduces the risk of suboptimal care delivery, improves provider communication, and provides coordinated plans that address the medical effectiveness and patient-centered priorities.

The above approach will make treatment decisions both biologically sound and functional. As an example, a geriatrician can review frailty, comorbidities, and cognitive well-being to know that aggressive interventions can be used or changes are necessary. Social workers can assist patients in practical barriers such as having financial pressures, transport challenges, or access to community resources hence enhancing adherence and limiting inequities. Equally, a psychologist can offer coping mechanisms to deal with anxiety, depression, or adjustment difficulties, and the rehabilitation professionals can increase mobility and living quality throughout and after the treatment. Pharmacists can assist in their part by making sure that medications are well managed and drug interactions are accommodated. The combination of this contribution constitutes an integrated plan of care that seeks not just to treat the tumor but

ISBN: 978-81-985724-3-1

the entire patient with the understanding that it has medical, emotional, social, and functional needs. This multidimensional model incorporates the elements of individualized oncology care, the maximization of the clinical outcomes and quality of life.

6. Clinical Impact and Measurement

Clinical Impact and Measurement patient-centered oncology transcends biomedical outcomes that are standard, including tumor shrinkage or overall survival. As important disease control indicators, these do not give a complete picture of the lived experience of treated patients. In a bid to fill the gap, clinicians should consider expanding evaluation metrics so as to incorporate parameters that capture safety, feasibility and daily functionality. As an example, detection of the toxicity rate is crucial to inform about the tolerance of treatment in patients and timely adjust the treatment to minimize the adverse effects and maintain the quality of life. Likewise, treatment adherence can be used in the evaluation of both the feasibility of prescribed regimens as well as the willingness and capacity of the patients to comply with the recommendations. Additional evidence of whether treatment enables patients to live with autonomy and dignity as opposed to biological outcomes is functional patterns, which include mobility, ability to live independently, and ability to remain at social roles.

Patient-level outcomes and system-level outcomes are also equally important, since they directly indicate patient values and system-level effectiveness. Quality of life (QOL) scores are theoretical insights into physical comfort, emotional well-being and social functioning that are standardized and have been validated, and assist clinicians in determining the overall effectiveness of therapy as seen by the patient. Indirect indicators of treatment safety, continuity and effectiveness in the management of non-acute complications are health-care utilization rates, such as hospitalizations and emergency visits. Lastly, the concordance rates, or the extent to which the preferences of a patient and the care provided to him comply with each other, perhaps the most significant indicator of patient-centered oncology because this demonstrates whether treatment really respects personal goals and values. Collectively, these extended measures enable clinicians to evaluate cancer care in a more integrated fashion, so that success is not solely defined by medical results, but also by the experience of the patient, his or her well-being, and satisfaction with care.

ISBN: 978-81-985724-3-1

10.2. PRECISION PALLIATIVE CARE AND SURVIVORSHIP PROGRAMS

In the environment of the precise oncology, palliative care is no longer associated with end-of-life treatment. It is now conceived as the early, integrated and patient-centered approach aimed at improving the quality of life throughout the cancer continuum. Unlike the reactive model, this model is proactive and aims at dealing with the physical, emotional, and social burden since the time of diagnosis. Patients repeatedly face a set of issues that can be grouped as pain, side effects of treatments, anxiety, role disruption, and financial stress, and unchecked, these issues may lead to poor adherence to treatment and poor treatment results. Incorporating palliative care at the early stages of treatment or during the period of high risk allows clinicians to reduce pain, encourage adherence to the treatment process and maintain harmony between medical and patient values and personal objectives.

In line with this, survivorship programs take the care past active treatment since, in many cases, cancer may have long-term impacts. The programs are geared towards surveillance and treatment of long-term sequence, such as late toxicity such as cardiotoxicity, infertility, neuropathy, hormonal disorders and cognitive impairment. Other psychosocial issues that are taken care of by survivorship care include fear of recurrence, employment reintegration, and financial strain. Survivorship programs are able to customize follow-up according to treatment history, comorbidities and lifestyle factors, meaning that precision medicine is not just focused on curing the tumor, but the entire patient over the long term.

Models of Delivery

1. **Early Integrated Palliative Care**

Early Integrated Palliative care is an active concept in the field of oncology which focuses on introducing palliative activities at the time of diagnosis or even early in the development of known advanced illness. It is not the usual model where palliative care is considered only at the end-of-life stages, but a combination of the management of symptoms, psychological support, and care planning is combined at the very beginning. The constant monitoring and early management of pain, fatigue, nausea, and other uncomfortable symptoms are beneficial to patients to increase the level of comfort and normal functioning. Through the incorporation of palliative care and the curative or disease-modifying therapies, clinicians will guarantee that they will treat the needs of the patients holistically, which will include not just physical but emotional, social, and existential aspects as well. This premature intervention creates a

ISBN: 978-81-985724-3-1

collaborative spirit where patients, families and health care teams get to make joint decisions assisting patients negotiate the complicated treatment options and match the care with their own values and preferences.

Clinical study results show that early comprehensive palliative care has salutary impacts on various outcomes. Patients have reported enhanced quality of life, less symptom burden and better psychological wellbeing and families have more support and reassurance during the care continuum. In addition to this, this model has also been linked to the decreased unnecessary hospitalization, emergency care, and intensive care that might not be in line with the objectives of a patient hence improving the sustainability and efficiency of care delivery. Notably, palliative integration in the early stage promotes goal-concordant care- where the treatment plans represent the patient values, preferences, and priorities-so as the interventions are warranted and contextual. Even some studies indicate potential survival advantages, presumably because symptoms are better controlled, there is less stress associated with treatment, and greater compliance with treatment. Altogether, early integrated palliative care is an example of a patient-centered evidence-informed care that fills the gap between treatment based on disease and holistic supportive care.

2. Co-Management Clinics

The Co-Management Clinics represent a team of multidisciplinary care delivery of cancer care such that oncology care is provided concomitantly with palliative care, rehabilitation, and primary care. Co-management clinics seek to avoid the discontinuity of care that patients usually feel as they move across several specialties to ensure that the services are integrated into a coordinated environment. Under this model, every team member brings his/her skills on board: the oncologists work on the disease-guided treatment, the palliative care experts handle the symptoms and offer emotional support, rehabilitation practitioners can improve physical functioning, and primary care providers can handle comorbidities and preventive health care. Such a team arrangement would make sure that patients get thorough, ongoing care on the physical and functional aspects of health, including the psychological and social aspects. Besides, co-management clinics enable immediate communication among the providers and allow making timely corrections to the treatment plans, as well as accommodate a smooth transition between care environments and improve patient safety and risk of medical errors or missed concerns.

The comprehensive system of co-management clinics also helps enhance the experience of patients through the stable system of support and eliminates the stress related to the work in complicated healthcare systems. Patients will enjoy integrated appointments, combined care plans, and multidisciplinary resources that will meet both short-term and long-term needs. Clinical interventions are provided along with emotional and functional support, which promotes resilience, autonomy, and treatment adherence. Research has shown that those models enhance patient satisfaction, decrease care gaps, and potentially have a positive impact on health outcome, as timely symptom management, rehabilitation, and follow-up are ensured. Moreover, co-management clinics also act as a safety net, especially with regard to vulnerable groups, by narrowing the gap between access to supportive services and by ensuring that patients have access to the full range of services that have the potential to lead to the best recovery and life.

3. Survivorship Care Plans (SCPs)

Survivorship Care Plans (SCPs) are patient-centered, structured documents that are designed to assist patients in their post-treatment phase of cancer care. The SCPs offer an in-depth account on the treatment history of the patient (surgery, chemotherapy, radiation, and other treatment), and so both the patients and medical professionals are well aware of what has been done. In addition to the description of the past care, SCPs anticipate possible delayed consequences of the treatment, describe the suggested screenings, and indicate the rehabilitation services, which can help the patient recover physically, cognitively, and emotionally. SCPs are a map to continued health care by pulling together this information to guide patients in their continued health care initiation to ongoing survivorship with clarity and confidence. Such plans also have the relevant contacts in case of emergency care and specialized services as their backup to ensure that the patients facing new or persistent health issues have a safety net.

Besides facilitating clinical continuity, SCPs enable patients to have an active role in health management. Patient-friendly summaries, which are often a part of electronic medical records, enable patients to read and consult their care plan effortlessly and enable them to self-manage and make well-informed decisions. Patient-centered SCPs allow providing recommendations that are applicable and will be implemented according to the needs of particular risks, lifestyle factors, and goals of the specific patients. Through the encouragement of involvement and awareness, SCPs assist survivors to become aware of the warning signs, follow-up schedules,

and supportive services as quickly as possible. This organized development is not only better health in the long term but is also better life quality because of the feeling of control, alleviation of anxiety about the unknown, and empowering the relationship between patients and their healthcare team in their survivorship period.

4. Risk-Stratified Survivorship

Risk-Stratified Survivorship is a discontinuity-based approach to post-treatment care in which cancer survivors are offered follow-up care according to their level of exposure to treatment and their likelihood of developing chronic complications. Taxonomic classification of survivors allows healthcare systems to have higher resources but at the same time, patient safety remains high. As an example, high-risk survivors (high-dose chemotherapy, pelvic radiation, or stem cell transplants) should be closely monitored by oncology teams. Such patients are more susceptible to late effects, such as dysfunction of organs, secondary malignancies or complex psychosocial problems and hence require frequent surveillance, diagnostics testing, and interventions. This pro-active strategy allows them to detect and control complications in the early stages of their development avoiding further advancement and enhancing the long-term results.

Conversely, the survivors of lower to moderate risk who have not received extensive therapies, or whose health has been stable in the context of primary care, can be safely provided at the primary care system with periodic involvement of the oncology expertise. Such shared-care model will relieve the oncology services of unnecessary burden, provide continuity in overall services, and make follow-up conveniently available to the patient near the home. Risk stratification is thus a compromise in patient safety and cost-effectiveness that guarantees specialized oncology resources are focused on the patients that require them the most without having others lose the watch. In addition, this model enhances sustainability of survivorship care particularly in the healthcare systems where survivor numbers are increasing. It enables patients to have more power, lowers the cost of healthcare, and can help in an equitable redistribution of care throughout the survivor population by personalizing the level of follow-up risk.

Core Activities

Precision palliative care and survivorship programs activities are extensive and are based on the multi-dimensional needs of cancer patients. Management of symptoms continues to be at the forefront and specific interventions have been identified in pain, fatigue, neuropathy,

ISBN: 978-81-985724-3-1

nausea, cachexia, and sleep disturbance. Physical and occupational therapy are some of the rehabilitation services that play important roles in restoring the mobility, independence and stamina of an individual following intensive treatments.

In addition to physical recovery, these programs deal with cognitive and sexual health complications as they are helping patients with the so-called chemo-brain, memory lapses, sex dysfunction, or body image. Emphasis is put on fertility and endocrine health issues, with fertility preservation as well as hormonal dysfunction in response to gonadotoxic therapies being counseled. Moreover, psychosocial and financial counseling Assists in mental well-being, the caregiver stress management, the return-to-work integration, and alleviation of financial toxicity, which has been increasingly identified as a factor in the overall quality of life.

Metrics and Evidence

The scientific literature has begun to list the quantitative advantages of early palliative care integration. Research indicates that it improves quality of life, increases patient and caregiver satisfaction, decreases avoidable hospital admissions and hinders futile but aggressive end of life care. It also enhances communication between patients, families and clinicians in a way that assists to make sure that the care plans are aligned with patient preferences and values.

It can also be observed that survivorship programs have a lot of benefits when put into practice on a systematic basis. Long-term complication morbidity including cardiac dysfunction, endocrine failure, and secondary malignancies have been shown to be risk-stratified with reduced morbidity by survivorship care. Patients who receive such programs record favorable functional recovery, which facilitates easier reintegration into work and everyday functions. There is also an improvement in mental health outcomes, and depression, anxiety, and fear of recurrence are reduced. Significantly, survivorship care is economical since the intensive resources are used on the most at-risk populations, whereas the lower risk groups are safely assisted in the context of community or primary care.

10.3. PSYCHOSOCIAL SUPPORT AND DIGITAL HEALTH TOOLS

Psychosocial care is an indispensable element of holistic cancer treatment, which involves combating psychological, social, spiritual and financial issues that a patient and his or her family encounter. Existing theories like cognitive behavioral therapy, mindfulness and meaning-centered therapy have been used to evidence-based therapies to control anxiety,

depression and existential distress and access to services like housing, transportation and financial institutions is accessed through social work. Spiritual care and peer support groups are a source of emotional comfort and lessening the sense of isolation, structured caregiver programs can prevent burnout, which protects both the well-being of the caregiver and the patient. Financial navigation is becoming known as a necessity because the medication of cancer is a costly affair that may adversely affect adherence, mental well-being, and the prognosis. Screening psychosocial needs with reliable instruments such as the NCCN Distress Thermometer on a regular basis can be utilized so that the psychosocial needs are treated with seriousness as the physical symptoms are.

Digital health tools increase the psychosocial and supportive oncology care through the possibility to monitor in real-time, provide interventions tailored to individuals, and provide access to a wider audience. Remote symptom monitoring and electronic patient-reported outcomes (ePROs) enable the rapid assessment of toxicity or distress and enhance communication and, perhaps, survival. Telehealth and virtual multidisciplinary teams deliver high-quality care in underserved communities and can engage in shared decision-making. Wearables, mobile applications, and passive digital biomarkers are used to monitor activities, sleep, cognitive ability, and adherence to treatment, and AI-based clinical decision support forecasts complications and proactive care. Nonetheless, the technologies are associated with such challenges as the digital divide, data privacy issues, integrating workflows, algorithmic bias, and equity gaps. To implement effectively, the digital tools should be designed with consideration to the users, strong data governance, clinician training, and ongoing assessment to ensure they benefit care without making disparities worse.

Psychosocial Care

The treatment of cancer is not only a complicated case of biomedicine but also a deep psychosocial process, which impacts not only patients but also their families. Effective management of cancer needs to focus on the psychological, social, spiritual, and financial aspects of illness as these are the crucial factors that can affect the health outcomes and quality of life in general. Oncology psychosocial support is multi-faceted, and it has many interconnected elements:

- **Psychological therapies:** Cognitive behavioral therapy (CBT), mindfulness-based stress reduction and meaning-centered therapy are evidence-based interventions that are very important in assisting the patient to deal with the psychological effects of

ISBN: 978-81-985724-3-1

cancer. These treatments are aimed at relieving anxiety, depression, insomnia and existential distress that often comes along with a serious illness. In addition to a positive impact on mental health, these interventions also increase treatment adherence, effective pain management, coping, and resilience to disease in general.

- **Social work services:** Cancer patients may face practical barriers, such as the difficulty in getting to the cancer centers, disability benefits, or job interruptions. Social workers in oncology are the key advocates, linking the patients to the community services, housing services and community support systems. Through his/her approach to these practical needs, the social worker assists in minimizing obstacles to care and enable the patient to devote more attention to his/her treatment and recovery.
- **Spiritual care:** A severe diagnosis is a serious diagnosis that can make patients and their families think about the meaning, mortality, and purpose. Emotional comfort, acceptance of the illness, and improvement of psychological well-being are achieved by access to spiritual resources such as chaplains or spiritual counselors and the emotional comfort they provide. Spiritual care is especially useful in end-of-life situations, where peace-building and reconciliation may dramatically enhance the living conditions of patients and their family members.
- **Peer support groups:** Interventions in the form of groups (engaging in-person or online) provide the patient with the chance to discuss experiences and coping mechanisms, as well as support each other. Membership in such groups helps alleviate feelings of isolation, makes shared fears and anxieties a regular occurrence and a feeling of belongingness to a group of people struggling with the same problems. Peer support tends to be a complement to professional care, enhancing emotional strength and social interrelationship.
- **Caregiver support and respite:** Family members are often overwhelmed with significant emotional, physical, and economic challenges when they support their loved ones during treatment. The prevention of burnout, protection of caregiver health, and the long-term sustenance of the caregiving role are impossible without structured caregiver programs, counseling services, and respite opportunities. Indirect benefits are extended to the patients through the support of the caregivers since properly supported caregivers have a better chance of delivering reliable and effective care.

ISBN: 978-81-985724-3-1

- **Financial navigation:** The problem of increasing cost of cancer treatment is a cause of financial toxicity, a clinical problem impacting decreased adherence to treatment, care delays, and increased psychological distress. Financial navigators assist patients in obtaining the insurance coverage, grants, co-core payment assistance, and charitable funds to reduce the economic burden of cancer care. The benefits of spending money successfully both increase compliance and success but also lessen the level of stress, which allows the patient to focus on recovery and holistic health.

➢ **Why essential:** Psychosocial distress (depression, anxiety, and financial hardship) is a measurable consequence that has not been managed: patients with uncontrolled psychosocial distress report greater symptom burden, high health-care use, decreased chemotherapy or radiotherapy adherence, and lower survival. To overcome this, it is recommended in best practice practices to screen distress routinely and systematically with validated instruments, like the NCCN Distress Thermometer or Hospital Anxiety and Depression Scale, followed by immediate referral to psychological, social or palliative services. This forward-looking strategy may make psychosocial needs receive the same level of urgency as the physical symptoms.

Digital Health Tools

Digital innovations are transforming supportive oncology care into continuous, real-time and more individualized. These technologies increase the scope of practice of clinicians, patient empowerment, and data-driven decision-making, which is part of cancer management.

- **ePROs (electronic patient-reported outcomes) and Remote Symptom Monitoring**: Patients regularly report their symptoms, side effects, and quality-of-life measures via mobile apps, web portals, or tablets in clinics. These data are directly integrated into electronic health records and clinical workflows, alerting oncology teams to early signs of toxicity or distress. Clinical studies demonstrate that ePRO monitoring reduces emergency room visits, enhances communication between patients and providers, and in some cases improves overall survival.

- **Telemedicine and Virtual Multidisciplinary Teams (MDTs)**: Tele-oncology platforms allow patients in rural or underserved regions to access high-quality cancer care without traveling long distances. Virtual MDTs bring together oncologists, radiologists, pathologists, and psychosocial experts across locations, enabling

collaborative treatment planning. Telemedicine also allows family members to participate in consultations, enhancing shared decision-making.

- **Apps, Wearables, and Digital Biomarkers**:
    - **Wearables** (e.g., smartwatches, fitness trackers) provide continuous, objective measures of activity, heart rate, sleep quality, and mobility, which can be correlated with treatment tolerance and recovery.
    - **Mobile apps** deliver digital CBT modules, mindfulness exercises, medication reminders, nutrition tracking, and survivorship education tailored to the individual's cancer journey.
    - **Passive digital biomarkers**—such as changes in typing speed, mobility patterns, or speech—offer early detection of cognitive or functional decline, enabling timely interventions.
- **Decision Aids and Personalized Education**: Digital tools now present individualized risk–benefit scenarios in interactive formats, helping patients visualize treatment trade-offs and long-term implications. These decision aids support shared decision-making (SDM), aligning therapy choices with patient preferences, values, and goals.
- **Artificial Intelligence (AI) and Clinical Decision Support (CDS)**: AI-driven predictive models can identify patients at high risk for complications, such as unplanned hospitalization, severe side effects, or relapse of depression. When transparently integrated into workflows, AI enhances proactive care planning. However, ethical use requires rigorous validation across diverse populations to avoid algorithmic bias and inequitable outcomes.

Barriers and Safeguards

Although digital health tools have enormous potential to offer, their implementation and performance are undermined by a number of practical and ethical issues:

- **Digital inequality:** Digital access to health solutions is not equal. The least connected populations, those with low levels of digital literacy, or low technical capacity, might be locked out of the benefits of digital interventions. This digital divide has the potential to support health disparities thus placing vulnerable populations at the disadvantage.

ISBN: 978-81-985724-3-1

Attempts to improve accessibility, including off-line capabilities or ease of use interfaces are essential to reduce this obstacle.

- **Data privacy and security:** Digital health tools are sensitive because they process personal health information that is highly sensitive and require a high level of data protection. It is required to comply with the set regulations, like HIPAA in the United States or GDPR in Europe, to protect privacy of patients and ensure trust. Violation or abuse of the information could devastate the trust of digital health programs.
- **Workflow integration:** implementing digital tools in clinical practice has the potential to destabilize workflows. Excessive transmission of alerts, notifications, or administrative tasks to clinicians, which is often called alert fatigue, may decrease compliance and decrease perceived usefulness of these systems. It should be able to integrate seamlessly with the current workflows in order to support sustainable adoption.
- **Algorithmic bias:** AI-based health technologies depend on data to train and in case of narrow, homogeneous or unrepresentative datasets, algorithms will fail some groups of people. This bias may enhance the presence of health inequities by providing non-optimal recommendations or interventions to underrepresented communities. Bias should be averted through constant surveillance and participatory data creation.
- **Equity issues:** Digital health technologies should be specifically created to reduce disparities and not intensify them, on top of being accessible and effective. Equity-based models can be characterized as interventions designed to meet the needs of disadvantaged groups, as well as the active monitoring of the results to make benefits distribution fair.

To resolve these, there are a number of strategies which have worked. Digital tools are made user-intuitive, relevant and practical, a process that involves user-centered design, which includes feedback of the patients, caregivers and clinicians. Sound data protection governance defines clear policies on the secure data handling, storage and sharing. Clearly-defined avenues of alerting about symptoms will aid in making sure that there is prompt clinical care and minimize risk. Also, the equity implications should be continuously evaluated in order to check whether the interventions actually decrease the disparities.

Lastly, a sustainable implementation requires clinician buy-in, which can be achieved by developing specific training, proving clinical value, and integration with current workflows. It

ISBN: 978-81-985724-3-1

is important to involve all stakeholders during the development and deployment process to make the digital health tools effective, trusted and equitable.

10.4. THE FUTURE OF PERSONALIZED CANCER CARE AND EQUITY CHALLENGE

Precision oncology is turning next to a biopsychosocial and adaptive model of care that incorporates both molecular precision and the realities of the lives of patients. This approach does not use only genomic or proteomic indicators but also psychological resilience, emotional well-being, daily functioning, and social determinants, including housing, income, education, and access to healthcare. Understanding that biology interrelates with lifestyle, behavior, and environment, therapies are now designed with increasing attention to tumor biology, as well as, individual needs. To supplement this, learning health systems are based on continuous data feeds of electronic health records, patient-reported outcomes, wearables, and clinical encounters to construct feedback loops refining care in real time. Adaptive trial designs such as basket, umbrella and platform trials can be used to generate knowledge faster, whereas N-of-1 strategies can enable continuous personalization on a patient level. Cross-sector integration also reinforces this paradigm by converging oncology and primary care, mental health and nutrition, housing and employment services- making survivorship and palliative care not a specialty, but a part of living. Collectively, these advances are a shift toward non-dynamic one-size-fits-all cancer care to dynamic, personalized ecosystems.

Nevertheless, equitable personalization in precision oncology is not that easy to achieve. Availability of such modern technologies as genomic sequencing, immunotherapies, and digital health technologies is still held in high resource facilities, where rural, low-income, and underserved populations stand a chance of being left out. Algorithms and dataset biases can also alienate a minority or an underrepresented group and the cost of new therapies can be so high that it becomes financially toxic, necessitating patients to ration or forgo care. There is also cultural and language barrier, which diminishes shared decision-making and participation in supportive programs that add to disparities. In the future, equity will need to be designed deliberately, clinical trials and algorithms should be designed to encompass diverse populations, health systems need to measure and report outcomes that are disaggregated by race, gender and socioeconomic status. Diversification of access channels by subsidizing genetic testing, telemedicine, community health navigators, and non-physician task-sharing may decrease the number of specialists that are in short supply. Change such as insurance

ISBN: 978-81-985724-3-1

coverage, survivorship and digital monitoring reimbursement and lessening out-of-pocket expenses matters, as well as community involvement to co-create culturally relevant and sustainable care. With such precision, oncology can truly become an inclusive system, with the state-of-the-art molecular understanding alongside the reality of every patient.

Biopsychosocial Precision

The next frontier in cancer treatment lies in integrating molecular precision with a biopsychosocial approach. While molecular precision focuses on detailed genomic, proteomic, and other biomarker-driven analyses to guide targeted therapies, a biopsychosocial framework expands the scope to consider psychological, behavioral, and social factors that significantly influence treatment outcomes. Psychological resilience, emotional well-being, and daily functioning are critical determinants of how patients tolerate and adhere to complex treatment regimens. Simultaneously, social determinants of health—including income, housing stability, education, and access to healthcare—directly shape the feasibility and effectiveness of precision therapies. By considering the patient's holistic life context, this approach ensures that clinical decisions are not solely based on tumor biology but are aligned with the patient's capacity to engage with and benefit from the prescribed care.

For instance, two patients with identical tumor profiles may require different treatment strategies based on their psychosocial circumstances. A patient with strong family support, financial security, and stable access to healthcare may tolerate aggressive multi-modality treatment and achieve optimal outcomes. Conversely, a patient with limited financial means, minimal social support, or unstable living conditions may benefit from a less intensive, more personalized treatment plan that balances efficacy with feasibility. This integrative methodology acknowledges the dynamic interaction between biology, behavior, lifestyle, and environment, emphasizing that successful precision oncology must address both the molecular characteristics of the disease and the real-world context in which the patient lives. Such a comprehensive approach promotes not only clinical effectiveness but also patient-centered, sustainable care.

Learning Health Systems

The concept of lifelong learning is starting to take over modern oncology in healthcare systems. Learning health systems (LHS) are intended to be self-improving and adaptive ecosystems where data produced in the course of standard clinical attention is constantly informative and improves future decisions. Electronic health records (EHRs), patient-reported outcomes

ISBN: 978-81-985724-3-1

(PROs), wearable devices, and the knowledge gained during clinical encounters are the major sources of information, which serve as the inputs to real-time analytics that assists clinicians in refining treatment plans. This data richness can be systematically captured and analyzed to allow health systems to see patterns and identify emerging risks, and to tailor interventions to the changing needs of various patient groups in response to their needs. This feedback loop of iteration is used to make sure that care recommendations are not fixed but are optimized dynamically based on the most recent evidence and patient experiences.

As an illustration, health systems learning can utilize the PRO data to identify early signs of heightened toxicity in particular groups of patients, allowing a change in dosing schemes or supportive treatment plans. This responsiveness, in turn, makes it possible to make personal adjustments that enhance safety and effectiveness. In addition to the treatment of each patient, the insights may be quickly generalized to the system-level, normalizing the best practices and improving the quality of care, in general. By doing so, each patient engagement will be a chance to generate actionable knowledge, establishing a self-reinforcing oncology network where treating an individual patient will be informed by the system-wide learning. Learning health systems would help transform oncology into more responsive, accurate, and fair by mediating between bedside evidence generation and real-time clinical practice.

Adaptive Trials and N-of-1 Strategies

Although traditional randomized controlled trials (RCTs) have long been the standard of testing an innovative new cancer therapy, they tend to be less capable of capturing the variability inherent at the individual patient level. Basket trials, umbrella trials and platform trials: Adaptive trial designs are more flexible and responsive methods of producing clinical evidence. In basket trials, patients are recruited on the basis of common molecular mutations, but not on tumor site, and therapies are tested in different types of cancer that have in common a biological target. Umbrella trials on the other hand compare several treatment modalities in a single cancer type, and determine which type of intervention is best in various molecular subgroups. Platform trials extend this flexibility by simultaneously testing two or more interventions those using the same protocol, adding new therapies and eliminating unproductive ones. These designs increase the rate of discovery, streamline resource utilisation and are more representative of patient heterogeneity in a real world setting.

N-of-1 strategies, which supplement adaptive trials, are based on the individual patient as an experimental unit. In such studies, treatment regimens are constantly readjusted with respect

to on-going biomarker surveillance, symptom observation, and therapeutic outcome. This method enables clinicians to optimise therapies on the fly and hence, maximise efficacy and minimise toxicity to the individual patient. Notably, N-of-1 trials, as well, can be used to gain information about micro-subpopulations that are either underrepresented or ignored in a large-scale trial and that can inform future research and general clinical guidance. Through the integration of adaptive trial designs with N-of-1 designs, precision oncology can advance to strongly individualized care and simultaneously produce knowledge that is relevant to individual patients and the broader cancer community.

- ***Cross-Sector Integration***

There is a growing awareness in the modern management of cancer that patient outcomes are not simply a part of clinical intervention; instead, social, economic, and environmental interventions are essential to recovery, adherence, and longer-term survivorship. Cross-sector integration is an attempt to connect oncology care with such complementary sectors as primary care, rehabilitation, mental health, nutrition, social work, housing and employment support. Through the development of a synchronized network of services, patients enjoy holistic care that deals with both medical and non-medical determinants of health. As an example, a breast cancer survivor who is at risk of losing a job can use early contact with occupational rehabilitation programs, which would guarantee financial security and maintenance of care. Likewise, a lung cancer patient with unstable housing can have social services that offer safe and stable living circumstances and consequently, facilitate compliance therapeutic and follow-up care.

This interprofessional model facilitates the care of the whole person in which survivorship and palliative services are integrated within ordinary life as opposed to visiting the clinic. When non-medical stressors (such as financial difficulties, housing, or nutritional deficiencies) are kept to a minimum, patients are more resilient, psychologically healthy, and able to comply with complicated medical regimes. The cross-sector integration facilitates not only the enhancement of clinical outcomes but also the creation of a more equal and sustainable cancer care system by considering the larger context of the patients lives. Finally, this model does not only emphasize the treatment of disease as an isolated phenomenon but aims at enhancing the quality of life, long-term health, and functional recovery of the patients.

ISBN: 978-81-985724-3-1

- **The Equity Challenges**

Lack of access to high accurateness apparatus, prejudiced algorithms, expensive treatment, and cultural or language issues cause significant inequalities in cancer care. Such challenges limit patient involvement in trials and their compliance with treatment regimens and, finally, clinical outcomes. Unserved populations then experience systemic disadvantage, so precision oncology becomes less available and discrepancies in survival and quality of life continue.

1. **Access to Precision Tools:** Some of the major recent advances in precision oncology, including genomics sequencing, immunotherapies, targeted medications, and digital health platforms, are largely limited to high-resource and urban medical institutions. The patients who live in rural or underserved communities or neighborhoods with low income often do not or cannot access these innovative interventions. These disparities are further enhanced by the absence of infrastructure, trained personnel and specialized facilities. Consequently, the patients in such environments might suffer late diagnosis, lack of treatment alternatives and lower survival rate. Precision oncology will not be a part of a universal standard of care unless intentional measures and initiatives to democratize access are implemented.
2. **Bias in Data and Algorithms:** Clinical decision-support systems and artificial intelligence (AI) have a tremendous opportunity to improve individualized cancer treatment. Most of these tools, however, are trained and trained on data sets that are imbalanced, with the minority communities, rural, and low socioeconomic groups being underrepresented. Such under-representation may cause systematic risk misclassification, incorrect predictions and less effective recommendations to underrepresented cohorts. Integrated into healthcare provision, these biases reinforce existing disparities by prioritizing the use of advanced tools to benefit the already represented populations in the data, as opposed to meeting the needs of marginalized populations.
3. **Financial Toxicity:** Precision oncology presents a serious obstacle to fair care because of its high cost. The expenses of genomic profiling, targeted therapies, regular monitoring, and supportive ancillary services can be excessive. Even insurance patients can have large out of pocket costs, leading to delayed care, rationing of care, or no therapy at all. Financial toxicity does not only decrease access to high-quality care but also increases stress, decreases compliance, and poor health outcomes. These economic

limitations must be tackled to make sure that precision oncology does not become an instrument of inequality against all groups but a source of meaningful returns.

4. **Cultural/Language Barriers:** Shared decision-making (SDM) is an essential component of effective cancer care and, therefore, it is based on effective and culturally competent communication. Low health literacy, low ability to use the dominant language of the health care system, or cultural distrust can result in patients being unable to comprehend complicated treatment choices or participate in care plans in their entirety. Such obstacles: these may diminish the involvement in clinical trials, restrict the use of survivorship and palliative care programs, and decrease the adherence to the recommended treatments. In the absence of culturally competent communication strategies, supportive programs, precision oncology might not come to or find a resonance with the populations that need it the most.

➢ **Moving Toward Equitable Personalization**

A clear emphasis on inclusivity, accessibility and fairness in cancer care on all dimensions is necessary to ensure equitable precision oncology is achieved. This includes putting in place measures to remove inequity in clinical research, care provision, and policy formulations, as well as proactively involving patients and communities in order to promote trust and intercultural sensitivity.

- **Design for Inclusion:** The clinical trial and data collection policies should be purposely structured to include patients who represent a wide range of populations based on race and ethnicity, geographical location and social economic status. This variety makes the findings to be general and relevant to other population subgroups. In addition to recruitment, predictive algorithms and models applied in precision oncology must be checked in these subgroups in particular to verify accuracy, avoid bias, and to ensure equity in treatment suggestions. Inclusive design also involves actively finding out impediments to participation, including logistical, financial or social ones, and working out specific approaches to address those.

- **Measure Equity:** The health systems must change their outlook on measuring outcomes in terms of simple aggregate outcomes including average survival rates or total toxicity. Rather, disaggregated reporting is necessary and that includes data stratified by gender, race, socioeconomic status, and geographic area. This method enables healthcare providers and organizations to detect the inequity in treatment

outcomes and prevent them. In addition, institutional incentives like funding, accreditation, or recognition can be associated with quantifiable equity-oriented interventions to promote systemic accountability and a long-term movement towards equitable care provision.

- **Close the Care Gaps with Widened Access:** As an important step to curb care disparities, it is essential to expand access to precision oncology. This may be done in a variety of ways: subsidized genomic testing ensures that patients do not get locked out of high-end diagnostics because of financial constraints; telemedicine can be extended into remote or underserved regions; community health navigators can simplify the complex care pathway; and the process of task-sharing with trained and skilled non-physicians can enhance capacity and scalability. Through these strategies, the health systems will be able to minimize the reliance on a small pool of professionals and to make more patients receive individualized treatment.
- **Policy/Reimbursement Reforms:** To have a fair measure of precision oncology, new policy and financing mechanisms are needed. Insurance coverage is to be extended to patient-reported outcome (PRO), survivorship care, rehabilitation, and digital health monitoring that have demonstrated to result in better clinical outcomes and patient satisfaction. Furthermore, reducing out-of-pocket payments are the key to preventing financial toxicity and providing equal care accessibility. Policymakers should take into account the models that can subsidize the high-cost interventions and implement preventive and supportive care as the part of the regular coverage, which can decrease disparities and encourage long-term health equity.
- **Community Engagement:** Culturally competent and trusted care is based on meaningful interaction with patients, caregivers and community organizations. Collaboration in the design of interventions with local stakeholders enhances chances that interventions are culturally relevant, acceptable, and can be sustained over time. Engagement of the community is also used to enhance the trust of patients in the healthcare systems, promoting adherence to treatment plans, and the delivery of care in ways that promote compatibility to the needs, values, and preferences of that community. Precision oncology can be brought to a more equal and patient-centered result by integrating communities into the design and implementation process.

ISBN: 978-81-985724-3-1

REFERENCES

1. Colomer-Lahiguera, S., Gentizon, J., Christofis, M., Darnac, C., Serena, A., & Eicher, M. (2024, June). Achieving comprehensive, patient-centered cancer services: optimizing the role of advanced practice nurses at the core of precision health. In *Seminars in oncology nursing* (Vol. 40, No. 3, p. 151629). WB Saunders.
2. Adi-Wauran, E., Krishnapillai, S., Uleryk, E., Saeedi, S., & Bombard, Y. (2025). Patient-centred care in precision oncology: A systematic review. *Patient education and counseling*, 108753.
3. Madu, C., & Mofiyinfoluwa, A. V. (2025). Patient-centered care in precision medicine and end-of-life care in neuro-oncology: The role of nursing in enhancing quality of life and treatment outcomes.
4. Mao, J. J. (2020). Oncology acupuncture: precision medicine meets patient-centered care. *Medical Acupuncture*, *32*(6), 405-407.
5. Sedhom, R., Bates-Pappas, G. E., Feldman, J., Elk, R., Gupta, A., Fisch, M. J., & Soto-Perez-de-Celis, E. (2024). Tumor is not the only target: ensuring equitable person-centered supportive care in the era of precision medicine. *American Society of Clinical Oncology Educational Book*, *44*(3), e434026.
6. Baird, A. M., Westphalen, C. B., Blum, S., Nafria, B., Knott, T., Sargeant, I., ... & Wong-Rieger, D. (2023). How can we deliver on the promise of precision medicine in oncology and beyond? A practical roadmap for action. *Health Science Reports*, *6*(6), e1349.
7. Anuyah, S., Singh, M. K., & Nyavor, H. (2024). Advancing clinical trial outcomes using deep learning and predictive modelling: Bridging precision medicine and patient-centered care. *arXiv preprint arXiv:2412.07050*.
8. Karimanal, H., & Bandaru, D. (2024). A review on integration of Precision Medicine in Oncology Practice. *Journal of Pharma Insights and Research*, *2*(3), 016-022.
9. El-Alti, L., Sandman, L., & Munthe, C. (2019). Person centered care and personalized medicine: irreconcilable opposites or potential companions?. *Health Care Analysis*, *27*(1), 45-59.
10. Marion, S., Ghazal, L., Roth, T., Shanahan, K., Thom, B., & Chino, F. (2024, October). Prioritizing patient-centered care in a world of increasingly advanced technologies and disconnected care. In *Seminars in radiation oncology* (Vol. 34, No. 4, pp. 452-462). WB Saunders.

ISBN: 978-81-985724-3-1

11. Sharma, R., Kannourakis, G., Prithviraj, P., & Ahmed, N. (2022). Precision medicine: an optimal approach to patient care in renal cell carcinoma. *Frontiers in Medicine*, *9*, 766869.
12. Giordano, F. A., Welzel, G., Siefert, V., Jahnke, L., Ganslandt, T., Wenz, F., ... & Nicolay, N. H. (2020). Digital follow-up and the perspective of patient-centered care in oncology: what's the PROblem?. *Oncology*, *98*(6), 379-385.
13. Panagiotou, O. A., Högg, L. H., Hricak, H., Khleif, S. N., Levy, M. A., Magnus, D., ... & Cogle, C. R. (2020). Clinical application of computational methods in precision oncology: a review. *JAMA oncology*, *6*(8), 1282-1286.
14. Siegel, C. A. (2018). Refocusing IBD patient management: personalized, proactive, and patient-centered care. *Official journal of the American College of Gastroenterology| ACG*, *113*(10), 1440-1443.
15. Haque, A. (2025). Convergence of Minimally Invasive and Personalized Surgery: A New Era in Patient-Centered Care. *Asia Pacific Journal of Surgical Advances*, *2*(2), 81-83.