Title:
Personalizing Treatment in Precision Oncology

Full Name:
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Name of the Institution:
Stanley Medical College

State:
Tamil Nadu

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
Problem statement: Despite advances in precision Oncology, a significant gap exists between molecular testing and its clinical implementation into Actual Patient care, particularly resource constraint settings. Many patients either do not undergo appropriate biomarker Testing or when tested the results are not effectively used in treatment decisions due to cost barriers, limited access to Targeted therapies, delayed turnaround times, lack of standardized workflows, and inadequate multidisciplinary coordination. As a result precision oncology often remains diagnostic rather than actionable, leading to suboptimal treatment selection, unnecessary toxicity, financial burden, and inequitable patient outcomes. To implement and deliver Time bound, Outcome driven, cost effective, precision oncology workflow that ensures every eligible patient undergoes rational biomarker testing as per Tiered system through Centralised Network, where every Molecular test report should be discussed in weekly Manual/virtual Structured Molecular Tumour Board after which Report documented and to treat as per one of the 3 pathways. Evidence based clinical decision within 7 days either treatment change for actionable biomarker driven , for non-actionable mutation to proceed with confirmed standard care or in case of limited access for the medications, immediately escalated and to assign one Dedicated care coordinator(DCC) to coordinate Oncologist, social worker, pharmacy and to discuss with Patient and patient Family (responsible attender) for same tumour type regarding medication access pathway activation through alternative routes (Government insurance schemes, Generic targeted drugs, Patient assistance programs, NGO or charity foundations, Clinical trial screening). Precision Oncology can be applied not only for screening (eg. BRCA 1 and BRCA 2 for Breast and Ovarian cancer risk) can utilize preventive strategies, treatment selection (eg. In case of lung cancer EGFR mutation, ALK rearrangement) to ensure maximal efficacy and minimal toxicity , prognosis (eg, Oncotype DX to help decide need for chemotherapy and recurrence risk) , monitoring (in case of colorectal cancer ctDNA to detect for early relapse and MRD), resistance detection(For example T790M mutation to switch to next line targeted therapy) and clinical trial matching(in case of novel therapies and experimental options) ensuring the right treatment for the right patient at the right time. This improves clinical outcomes ,minimize resource wastage and providing fair chances of cancer care delivery in resource constraint settings. This objective emphasizes clinical action over mere testing, no patient waiting, No result wasted. Most precision oncology diagnose correctly, but treatment execution after diagnosis should be fast accountable and affordable, closing all system gaps.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
Precision oncology aims to move beyond diagnosis, ensuring timely, evidence-based treatment. The workflow begins with oncologist-led triage, assessing patients by tumor type, stage, and clinical relevance to identify those eligible for biomarker testing.

Tiered reflex testing is performed on biopsy samples: Patient X, 62-year-old female with metastatic lung adenocarcinoma, EGFR positive, EGFR TKI started. Patient Y, 58-year-old female with metastatic colorectal cancer, KRAS positive, standard FOLFOX administered. Patient Z, hormone receptor-positive, HER2-negative breast cancer progressing on endocrine therapy, PIK3CA positive, actionable but limited access. All results are reviewed in a Molecular Tumor Board (MTB) Day7 and documented. Treatment decisions follow a 3-pathway model: Actionable & accessible—start targeted therapy. Non-actionable mutation, proceed with standard treatment. Actionable but limited access, immediate escalation and assign dedicated care coordinator (DCC) activates insurance schemes, patient support programs, NGOs, and clinical trials to ensure therapy begins within 10-14 days. One DCC assigned by tumor type, with weekly briefings. Integrating a DCC ensures to track patients, monitor testing timelines, document MTB decisions, coordinate with pharmacy, social support, rapid, timely initiation of evidence-based treatment, patient-centered care.

Full Name:
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Government Kilpauk Medical College (GKMC), Chennai

State:
Tamil Nadu

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
Precision oncology can be used to treat patients based on specific mutation, detect reason for disease progression, assess drug resistance and toxicities, screen hereditary diseases, and much more evolving.
Barriers in utilizing precision oncology are—availability, accessibility and affordability.
These tests require high end machines and manpower knowledge, which makes it difficult to be available beyond tier 1 cities.
The treatment cost is less than the diagnostic test (eg. Oncotype dx—costs around 3.2 lakhs—which predicts the persons requiring chemo. But the overall cost of adjuvant chemo costs less than 3.2 lakhs, leading to many patients taking chemo directly without doing the tests). Many times, the patients are not able to afford to the diagnostic tests. Many times, even if they afford to pay for the tests, they are not able to afford for getting treated with the high-end drugs for the guideline specified duration.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
To address the problem of accessibility, availability—tech companies can bring last mile delivery (covering even tier 2 and tier 3 cities) by making effective use of logistics. And reducing the TAT as less as possible. They can make use of courier companies on ad-hoc basis and sign an MoU to deliver their samples with urgent topmost priority under ideal storage condition.
For affordability issues- companies can use a tiered pricing system—doing tests at non-profit rates for poor patients, recovering cost from affordable patients. CSR activities can be encouraged for discounted pricing.
Process & workflow of precision oncology based MTB:
Main members are molecular pathologist, geneticist, treating oncologist, dedicated TB nurse, navigator, financial counsellor (having knowledge of expected costs of treatment).
Reports of the patient are sent few days prior to the meeting, so the specialist comes prepared with their doubts and formulate apt plan after proper discussion. The staff nurse and financial counsellor can act as a bridge between the physician and patient, who can express patients realistic expectations and their real affordability status. Plan should be taken, based on considering the financial toxicity also. It should be shared decision making. Emphasis should be given for clinical trial wherever possible.
Effectiveness of the tumor board is assessed periodically by assessing the response rates, dropouts, real world evidence of outcomes, patient reviews.

Full Name:
Foram Joshi

Name of the Institution:
Kidwai Memorial Institute of Oncology, Bengaluru

State:
Karnataka

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
Precision oncology means giving cancer treatment based on the specific features of each patient and their cancer. It uses information about genes, tumor type, environment, and lifestyle to choose the best treatment. This helps improve treatment results and reduce side effects. Instead of giving the same treatment to every patient, precision oncology focuses on giving personalized care. The main aim of precision oncology is to give the right treatment to the right patient at the right time. It helps improve survival, quality of life, and proper use of resources while reducing unnecessary treatment and toxicity.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
Instead of giving the same treatment to every patient precision medicine identifies appropriate treatment strategies extracting detail using genetic testing, molecular profiling, liquid biopsy, ctDNA analysis, and biomarker testing. This helps identify specific mutations and changes in the tumor so that treatment can be planned more accurately. Major utilization of precision oncology is mainly in recurrent /metastatic cancers, refractory cancers, and rare tumors where standard treatment options may be limited. It has also helped in the development of tumor-agnostic therapies where treatment is chosen based on mutation status rather than the site of cancer alone with available data from major basket trials.
Immunotherapy and targeted therapy are major parts of precision oncology. Biomarkers such as PD-L1, MSI-H/dMMR, TMB, EGFR, ALK, ROS1, HER2, and BRAF mutations help identify patients who are more likely to benefit from these treatments.
Precision medicine also plays an important role in organ preservation strategies, advanced radiation planning, minimally invasive and robotic surgeries, and monitoring treatment response using ctDNA and liquid biopsy. These newer technologies help improve survival outcomes, reduce unnecessary toxicity, and improve quality of life.
However, implementing precision oncology in daily clinical practice remains very difficult, especially in resource-limited countries. One of the biggest challenge is financial toxicity. Molecular testing, targeted therapies, immunotherapy are often expensive and remain out of reach of common man. Insurance coverage and Government funds and schemes usually do not cover the expenditure of these investigations and medication secondary to poor financial funding. In many centers, molecular laboratories, digital systems, and trained professionals such as molecular oncologists, genetic counsellors, and molecular pathologists are also not easily available. Moreover, the long turnaround times for reports further delay treatment decisions.
Another major challenge is lack of awareness among both patients and healthcare providers. Many patients are unaware of molecular testing and precision treatment options. Hence awareness regarding the available options and treatment strategies is crucial. Clinical trial access is another limitation because most trials are concentrated in urban tertiary centers, making participation difficult for patients from rural and underserved areas.
To overcome these barriers, there is a need for cost-reduction strategies such as use of biosimilars, generic targeted therapies, subsidized molecular testing, patient assistance programs, and better insurance coverage. Governments and institutions should support funding for molecular testing, especially in high-risk and metastatic cancers. Regional molecular testing centres services can improve accessibility in remote areas. Virtual molecular tumor boards can help smaller centres discuss difficult cases with experts from tertiary cancer centres.

Artificial intelligence can also play an important role in precision oncology. AI can help analyze molecular reports, imaging studies, pathology slides, and develop risk prediction models. It can reduce workload in crowded cancer centres, improve patient triaging, and support treatment decision-making. Electronic medical records can help track reports, treatment response, toxicity monitoring, and follow-up schedules more efficiently.

Every cancer centre should ideally have a molecular tumor board with a multidisciplinary team including medical oncologists, surgical oncologists, radiation oncologists, pathologists, radiologists, genetic counsellors, pharmacists, and patient coordinators. These teams can discuss molecular findings, identify treatment options, evaluate affordability, and guide personalized cancer care. Structured workflows for patient selection, molecular testing, treatment planning, and follow-up are important for successful implementation of precision oncology.

Regular training programs for doctors and healthcare workers are also necessary to improve understanding of molecular oncology and immunotherapy. Development of institutional standardized protocols is crucial with regular revision of SOPs based on institution data and experience is equally important.

In the modern era of molecular oncology, immunotherapy, artificial intelligence, and precision medicine, cancer care is rapidly changing. However, these advances will only be meaningful if they become accessible and affordable for all patients

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Full Name:
Dr. Sumit Agarwal

Name of the Institution:
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State:
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Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
Precision oncology in India must not be defined by expensive sequencing, but by intelligent selection, rapid interpretation, and equitable access to targeted therapy.
The goal is simple yet transformative:
Right test ⟶Right patient ⟶Right time ⟶Right treatment ⟶ Right outcome

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
Where Precision Oncology Truly Adds Value-
We should focus on "maximum clinical return per test"

- Frontline decision nodes:
  Lung (EGFR, ALK, ROS1, MET, RET), Breast (HER2, BRCA, PIK3CA), CRC (RAS, BRAF, MSI), Ovarian (HRD/BRCA)
- Immunotherapy enrichment: MSI-H/dMMR, PD-L1 (selective use), TMB (limited settings)
- Relapse/refractory setting: NGS-driven salvage (basket logic)
- Hematology: FLT3, NPM1, IDH1/2, BCR-ABL, MRD-guided therapy
- Germline testing: High-yield families (BRCA, Lynch)
- MRD/ctDNA: De-escalation/escalation tool (emerging but high future value)

Principle: Not universal testing-but strategic testing where it changes management.

2. Real-World Barriers (India-Specific)

- High cost with unclear reimbursement
- Delayed reports -->missed therapeutic window
- Over-testing without actionability
- Lack of genomic interpretation expertise
- Drug inaccessibility despite mutation detection
- Fragmented care (lab-->oncologist disconnect)
- Urban concentration of services
- Poor documentation of outcomes (no learning system)

3. Practical, High-Impact Solutions

A. “Test with Intent” Algorithm

Before ordering NGS:

- Will result change management?
- Is drug accessible (trial/standard/off-label)?
- Is patient fit to receive therapy?

Reduces wasteful testing by 30-40%

B. 72-Hour Precision Pathway

- Reflex molecular testing triggered at diagnosis
- Pre-approved gene panels by tumor type
- Parallel insurance/financial clearance

Ensures report before treatment decision, not after

C. Regional Genomic Hub Model

- One accredited central lab per region
- Satellite hospitals collect samples
- Digital report integration

Cuts cost by 40-60%, improves quality

D. “Actionability Sheet”

Instead of long reports:

- Tier 1: Standard of care
- Tier 2: Trial options
- Tier 3: Off-label

Cost + availability+ evidence level

Converts data-->decision

E. Drug Access Bridge

- Pharma + NGO + institutional pooled fund
- Early access / compassionate programs
- Trial navigation cell

Solves the “mutation found, drug not available” gap.

F. National Precision Oncology Registry (India-specific)

- Mutation patterns
- Treatment delivered
- Outcomes + toxicity

Builds Indian evidence, not Western extrapolation

4. Molecular Tumor Board (MTB):

Step 1: Case Selection

- Metastatic, refractory, rare tumors
- Unusual biology
- Discordant response

Step 2: Pre-MTB Data

- Clinical summary
- Histopathology
- Molecular report
- Prior treatments
- ECOG, comorbidities
- Financial feasibility

Step 3: MTB Composition

- Medical oncologist
- Molecular pathologist
- Geneticist
- Radiologist
- Pharmacologist
- Trial coordinator
- Palliative care expert

Step 4: Decision Framework

Each mutation categorized:

- Actionable (standard)
- Actionable (trial/off-label)
- Biologically interesting (no therapy)
- Non-actionable

Step 5: Output (Within 24 Hours)

- Ranked treatment options
- Evidence level
- Expected benefit
- Cost/access pathway

Step 6: Patient Integration

- Counseling (benefit vs cost)
- Shared decision-making
- Therapy initiation within 5-7 days

Step 7: Outcome Tracking

- Response (RECIST/MRD)
- Toxicity
- Progression
- Registry entry

Full Name:
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Regional Cancer Center (RCC), Trivandrum

State:
Kerala

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
To develop a precision-guided frontline treatment strategy for high-risk follicular lymphoma (FL) by integrating venetoclax with standard R-CHOP chemoimmunotherapy in patients with BCL2-driven disease biology. The primary objective is to improve depth of remission, reduce early disease progression (POD24), prolong progression-free survival, and personalize frontline therapy through targeted restoration of apoptosis alongside conventional systemic treatment.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):

- Follicular lymphoma is biologically characterized by dysregulated BCL2 overexpression secondary to the t (14;18) translocation, resulting in impaired apoptosis and persistent tumor survival. Although R-CHOP remains an established frontline treatment option for symptomatic or high-tumor-burden FL, a substantial proportion of patients experience early relapse and inferior long-term outcomes, particularly in the presence of high-risk clinical and molecular features.
- We propose a "Venetoclax-Integrated R-CHOP Precision Protocol" aimed at enhancing frontline therapeutic efficacy by directly targeting the anti-apoptotic dependency central to FL biology.
- Eligible patients include newly diagnosed advanced-stage FL requiring systemic therapy with strong BCL2 expression confirmed by immunohistochemistry and/or molecular testing. Baseline evaluation includes PET-CT imaging, bone marrow assessment, molecular profiling, cardiac evaluation, hepatitis screening, and tumor lysis syndrome (TLS) risk stratification.
- Patients receive standard R-CHOP every 21 days for six cycles. Venetoclax is incorporated using a carefully monitored weekly ramp-up schedule to a target dose of 400 mg daily, or 100 mg daily in patients receiving concurrent azole antifungal prophylaxis due to CYP3A4 interaction. Venetoclax is administered during chemotherapy cycles with integrated TLS prophylaxis, hydration, electrolyte monitoring, uric acid control, growth-factor support, infection surveillance, and antimicrobial prophylaxis.
- Response assessment is performed using interim and end-of-treatment PET-CT imaging. Patients achieving metabolic response proceed to maintenance rituximab with continued venetoclax-based maintenance in selected high-risk patients.
- All cases are reviewed through a multidisciplinary Molecular Tumor Board to optimize patient selection, toxicity management, molecular interpretation, and individualized treatment adaptation.
- This proposal integrates biologically targeted apoptosis restoration with established chemoimmunotherapy to create a scalable, precision-oriented frontline treatment framework for high- risk follicular lymphoma.

Full Name:
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VPS Lakeshore Hospital, Kochi

State:
Kerala

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):

- Implement routine biomarker and genomic profiling for all eligible cancer patients
  Deliver truly personalized, mutation-driven treatment plans to improve outcomes and reduce toxicity
- Integrate molecular tumor boards (MTB) as a mandatory step in decision-making
- Improve access to molecular diagnostics, targeted therapies, and immunotherapy through scalable systems
- Build AI-supported, data-driven oncology care with continuous outcome tracking and learning systems.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):

Solution explained with the help of case example:

A 62-year-old man, a chronic smoker, presents with hemoptysis. Imaging reveals a right upper lobe lung mass with mediastinal lymphadenopathy, and biopsy confirms non-small cell lung cancer (adenocarcinoma). In the past, treatment would have followed a uniform chemotherapy approach. However, in precision oncology, his disease is treated as a molecularly distinct entity, not just a histological diagnosis.

Tissue is sent for comprehensive molecular profiling, including EGFR, ALK, ROS1, BRAF, KRAS, MET, RET mutations, along with PD-L1 expression. When tissue is limited, a liquid biopsy (ctDNA) is also used. His report reveals an EGFR exon 19 deletion, a key actionable driver mutation.

This single molecular finding completely changes his treatment pathway. Instead of chemotherapy, he is started on osimertinib, a targeted EGFR tyrosine kinase inhibitor. Within weeks, he shows symptomatic improvement, reduced cough, and better performance status.

This decision is not made in isolation. A Molecular Tumor Board (MTB) reviews his case in a structured multidisciplinary discussion involving the medical oncologist, radiologist, pathologist, molecular biologist, and clinical team. The radiologist defines disease extent, the pathologist confirms histology and biomarkers, and the molecular expert interprets genomic alterations. Together, the team selects the most effective, least toxic, and most feasible therapy.

However, challenges exist. Initial delays in NGS testing, cost constraints, and limited access to molecular diagnostics in peripheral centers can slow down decision-making. To address this, systems such as regional genomic laboratories, tele-MTB consultations, and AI-assisted reporting tools are being integrated into cancer care pathways.

During treatment, the patient is closely monitored with imaging and, when needed, liquid biopsy for early detection of resistance mutations. Over time, he remains stable with good quality of life and minimal toxicity.

This case reflects the essence of precision oncology in lung cancer—transforming a standard diagnosis into a personalized molecular treatment journey that improves survival, reduces toxicity, and restores dignity to cancer care.

Full Name:
Reshma Abraham

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Manipal hospital, Bangalore

State:
Karnataka

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
How can precision oncology be effectively integrated into clinical cancer care by identifying key areas of application, addressing barriers to implementation, developing practical solutions, and establishing efficient molecular tumour board workflows and patient care coordination models?

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):

Areas in oncology where precision approach can be applied-

Targeted therapy based on driver mutations: Use of small-molecule inhibitors or monoclonal antibodies against actionable alterations such as EGFR, ALK, ROS1 etc

Tumour-agnostic therapy: Biomarker-driven treatment irrespective of tissue origin, including NTRK fusions, MSI-H/dMMR, high TMB, RET fusions, and BRAF V600E.

Immunotherapy biomarker selection: PD-L1, MSI/dMMR, TMB, and emerging immune phenotypes (Eg immune rich/ dessert) help identify candidates for checkpoint inhibitors.

Liquid biopsy and ctDNA: Plasma genotyping, resistance monitoring (e.g., EGFR T790M/C797S), and MRD assessment to guide therapy and adjuvant decisions.

Pharmacogenomics: DPYD, UGT1A1, TPMT, and NUDT15 testing to predict and reduce treatment-related toxicities.

Hereditary cancer testing: Germline testing guides targeted therapies such as PARP inhibitors and enables familial risk assessment.

Radiogenomics and theranostics: Molecular imaging and targeted radionuclide therapies such as PSMA-Lu177 and DOTATATE-Lu177.

Risk-stratified protocols: Multigene assays such as Oncotype DX and MammaPrint guide chemotherapy escalation or de-escalation decisions.

Barriers in uptake of precision oncology in clinical practice-

- Financial and access limitations: High costs of genomic profiling and targeted therapies, limited insurance coverage, and restricted drug availability in India.
- Limited drug accessibility: Actionable targets may not translate into treatment due to lack of local approval, off-label use restrictions, or limited compassionate access programs; clinical trials are largely confined to tertiary centres.
- Inadequate tissue for testing: Insufficient tumour material and depletion of biopsy blocks can limit comprehensive molecular analysis.
- Interpretation challenges: Difficulty in interpreting genomic reports and variants of uncertain significance (VUS) due to limited expertise and standardization.Lack of trained pathologists in molecular pathology
- Patient-related barriers: Low genomic literacy, concerns regarding germline findings and insurance discrimination.

Practical Solutions

1. Cost Reduction: a) Reflex NGS via standing orders at metastatic diagnosis (NSCLC, mCRC, ovarian, cholangiocarcinoma, CUP). b) Advocate insurance/government scheme coverage of NGS. c) Use biosimilars/generics where available and expand production of what is not available based on demand (gefitinib, imatinib).
2. Building a better workforce a) Fellowships in molecular oncology; ESMO/ASCO precision oncology certificates. b) Train nurses, pharmacists, include genetic counsellors (incl. tele-counselling)
3. Standardisation: a) Structured reports aligned with ESCAT/ESMO-MCBS. c) Population-specific databases (from Indian based companies).
4. Trial Matching & Registries: a) Automated matching tools for trials.
5. Network Models: a) Hub-and-spoke virtual MTBs (e.g., NCG Virtual Tumour Board, ESMO networks).

MTB & Care Coordination Workflow

1. Preparation: a) Flag eligible cases, circulate details in fixed performa 48–72h pre-meeting (histopath /IHC, NGS reports, imaging, prior therapies, germline, referring question in orderly manner).
2. Meeting Structure: a) Attendees (can happen in turns): medical/surgical/radiation oncologist, molecular pathologist, geneticist, bioinformatician, pharmacist, trial coordinator, trained nurse as navigator b) Format: clinical (3 min) → molecular (3 min) → discussion (5–8 min) → consensus. c) Weekly/biweekly, 60–90 min.
3. Decision Documentation: a) Record priority recommendation, evidence tier, alternatives, rationale. b) EMR upload within 24–48h;
4. Patient Navigation: a) Navigator as single point of contact; lay-language summary within 1 week. b) EHR alerts for biomarker-driven trial eligibility.
5. Quality Assurance: a) Log RECIST response, toxicity, PFS/OS into registry. b) Re-discuss at progression or new alteration on ctDNA/re-biopsy. c) Quarterly audits; assessing response rates and also if discussion required again.

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Tamil Nadu

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
To identify the clinical domains where precision oncology delivers the greatest benefit, map the real world barriers preventing its wider adoption, and propose a practical molecular tumor board framework that translates genomic data into actionable treatment decisions at the individual patient level.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
Precision oncology has moved from concept to clinical reality in several tumor types, and the areas where it has the strongest evidence base are worth naming clearly. In non small cell lung cancer (NSCLC), EGFR, ALK, ROS1, KRAS G12C, MET exon 14, RET, and NTRK alterations each have matched targeted therapies with survival data that conventional chemotherapy cannot replicate. In breast cancer, HER2 amplification, PIK3CA,ESR-1 mutations in HR positive disease, and germline BRCA status directly determine treatment sequencing. In hematology, NPM1, FLT3-ITD, IDH1/2, and BCR-ABL1 are not just prognostic markers they are therapeutic targets with approved agents built around them. These are the domains where a precision approach delivers unambiguous clinical value today. The barriers to wider adoption are well understood but rarely addressed honestly. Cost and access to next generation sequencing remain the primary obstacle in most Indian centres. Beyond cost, there is a significant interpretive gap sequencing a tumor is only useful if someone in the institution can correctly interpret a variant of uncertain significance, understand allelic frequency context, and distinguish a targetable driver from a passenger mutation. That expertise is concentrated in a small number of academic centres and is essentially unavailable at district or secondary care level.

The solution requires two parallel tracks. First, affordable panel based NGS using government subsidised or pooled institutional procurement needs to be made available through the NCG network with centralised reporting support. Second, every major cancer centre needs a functioning molecular tumor board that meets weekly, includes a molecular pathologist and clinical trialist alongside oncologists, and produces a documented actionable report within seven working days of sequencing. Without that structured interpretation layer, sequencing data remains an expensive document that changes nothing.

Full Name:
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State:
Tamil Nadu

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
A framework to personalize treatment in precision oncology

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
Personalizing Treatment in Precision Oncology Framework

1. Areas in oncology where precision approach can be applied:

- Targeted therapy selection based on tumor genomics and actionable mutations including EGFR, ALK, KRAS alterations
- Immunotherapy stratification using biomarkers such as PD-L1, TMB, MSI status for checkpoint inhibitor selection
- Pharmacogenomics-guided dosing to reduce toxicity and improve drug response especially in oncology drugs
- Early detection and minimal residual disease monitoring using liquid biopsy for relapse prediction and surveillance

2. Barriers in uptake of precision oncology in clinical practice:

- High cost of sequencing and limited availability as well as reimbursement policies in many regions especially in LMIC healthcare systems
- Lack of standardized interpretation of genomic variants across laboratories impacting reproducibility of results
- Insufficient clinician training in genomics and bioinformatics particularly in resource-limited hospitals
- Limited access to molecular diagnostic infrastructure in low-resource settings affecting rural cancer centers.

3. Practical solutions for addressing these barriers:

- Establish national genomic databases and shared variant interpretation platforms with centralized governance frameworks
- Expand insurance coverage and public funding for genomic testing across rare cancers
- Integrate genomics education into oncology training and continuous medical education including case-based learning
- Use AI-driven decision support tools for treatment recommendation standardization with validated clinical pathways

4. Proposed molecular tumor board workflow and care coordination blueprint:

- Case identification via pathology-confirmed advanced or refractory cancer diagnosis using electronic health records triggers
- Comprehensive molecular profiling with NGS, IHC, and germline testing including whole exome and RNA sequencing integration
- Multidisciplinary tumor board discussion including oncologists, pathologists, geneticists, bioinformaticians, with ethical and pharmacology experts
- Consensus treatment plan generation with evidence levels and clinical trial matching and patient preference incorporation
- Structured feedback loop for outcomes tracking and iterative protocol refinement supported by real-world evidence registries.

Full Name:
Jarfin I M

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Gleneagles Health City, Chennai

State:
Tamil Nadu

Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
To make precision oncology meaningful, affordable and actionable, so that molecular testing improves real patient outcomes rather than becoming an expensive report.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
Precision oncology is already relevant in lung cancer, breast cancer, colorectal cancer, ovarian cancer, prostate cancer, GIST, melanoma, thyroid cancer, sarcomas and hematological malignancies. It can guide targeted therapy, immunotherapy selection, hereditary cancer counselling, resistance testing and clinical-trial referral.
The barriers are real: high test cost, delayed reports, poor tissue quality, limited genetic counselling, confusion between actionable and non-actionable mutations, lack of drug access, and uneven expertise outside major centres. In India, the biggest tragedy is when a mutation is found but the patient cannot afford the drug.
Practical solutions include reflex testing for cancers where results change first-line treatment, smaller focused panels when broad NGS is unaffordable, validated labs, financial counselling before testing, and clear linkage to patient-assistance programs. Tamil Nadu can integrate molecular testing into tertiary government oncology centres and CMCHIS-supported pathways for selected indications.

A molecular tumour board should meet weekly or twice monthly and include medical oncologists, pathologists, molecular scientists, genetic counsellors, radiologists, surgeons, pharmacists and financial counsellors. The template should record diagnosis, stage, prior therapy, test type, mutation, evidence level, drug availability, cost, trial option and final recommendation. The patient should receive a simple explanation, not a confusing mutation list.
Roche can support ethically through affordable testing access, education, registry creation, and transparent support programs for eligible targeted therapies.
Precision oncology should not become medicine for the privileged. Its true purpose is to ensure that the right patient receives the right treatment at the right time, with honesty about benefit, cost and hope.

Full Name:
Mohamed Farook M

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Madurai Medical College

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Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
Integrating patient specific factors into current genetic and molecular testing to make a personalised decision

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
Problem statement - Current genetic and molecular testing in oncology often provides generalized risk assessments without adequately integrating patient-specific factors such as demographics, histopathology, performance status, comorbidities, and imaging findings. This fragmented interpretation limits truly personalized treatment planning and reduces the practical utility of precision oncology in routine clinical care. Consequently, clinicians face challenges in making individualized therapeutic decisions, leading to variable outcomes and missed opportunities for optimized cancer management
Proposed Solution -
1.Develop an integrated precision oncology platform combining molecular data with demographics, histopathology, imaging, staging, and performance status.
2.Generate personalized clinical decision-support reports instead of isolated genomic reports.
3.Establish multidisciplinary molecular tumor boards for integrated case evaluation and treatment planning.
4.Use AI-assisted systems to synthesize multimodal patient data and prioritize individualized treatment options.
5.Standardize reporting formats to include prognosis, expected treatment response, toxicity prediction, and clinical trial eligibility.
6.Integrate the system with electronic medical records and cancer registries for seamless workflow and follow-up.
7.Promote clinician training and tele-oncology collaboration to improve adoption across different healthcare settings.

Full Name:
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Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):

1. Our primary objective is to deliver the right treatment to the right patient at the right dose and time.
2. To eliminate the current high attrition rates (where up to 30% of patients fail to get results due to insufficient tissue) by implementing concurrent Tissue and Liquid Biopsy testing.
3. Ensure that precision medicine is economically sustainable and accessible.
4. Early Detection by implementing Multi-Cancer Early Detection (MCED) platforms.
5. Resource Prioritisation in LMICs and Implementing ancestry-aware bioinformatics to prevent artificial TMB inflation.
6. Resolving the "Clinical Utility Paradox" through Standardisation of Molecular Tumor Boards (MTBs), preventing over-interpretation by implementing the 2025 Tier IIE update.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):

1. Molecular Subclassification of solid, Hematologic Tumours and in evaluation of MUO. Targeted and Tissue-Agnostic therapies: TMB-H,MSI-H,NTRK,BRAFV600E,RET,MET,HER2,monitoring of ctDNA and MRD, Detection of tumour by Multi-Cancer Early Detection Platforms, Identifying germline BRCA1/2 or Lynch Syndrome for risk-reducing surgeries and chemoprevention, Personalized Immunotherapy and Neoantigen Targeting Vaccines, to Standardize Molecular Tumour Board Protocols (MTB).For Patient-Derived Tumour Organoids as tried in rectal cancer and Ex-Vivo Functional Testing tried in haematological malignancies.
2. Longer turnaround time and high Attrition Rates in the Diagnostic Journey mainly insufficient tissue and Tumour Biological Heterogeneity. 2025 AMP/ASCO/CAP update introduces Tier IIE, which is "oncogenic-but-not-yet-actionable" variants creating Dilemma, preserving the integrity of the VUS and preventing clinical over-interpretation. Molecular Tumour Board Operational Gaps, Financial Toxicity and Reimbursement Friction. Physician Genomic Literacy and dynamic nature of genomic databases create a cognitive overload, Regulatory "One-Drug/One-Test" Rigidity, Ancestral Bias in Genomic Databases: 75% to 80% of individuals in genomic databases are of European ancestry leading to higher VUS rates.
3. Rapid Turnaround Time by using liquid biopsy, Implementation of Ancestry aware Bioinformatics decreases false-high TMB classification in non-European populations, FDA's down classification of nucleic acid-based CDx from Class III to Class II reducing cost and time. Value-Based Reimbursement: ESCAT Tier I and NCT Level m1 had a significantly higher chance of reimbursement approval. Resource Allocation in LMICs: more oncologists and pathologists are to be recruited in the tier2 and tier 3 cities.
4. Phase I: Mandatory Baseline comprehensive NGS, Concurrent Tissue and Plasma Liquid Biopsy, Integrate MCED platforms like Galleri.

Phase II: The Standardized MTB Session: Evidence-Based Actionability Ranking, Adopt the 2025 Tier IIE update, Ancestry-Aware Bioinformatics, Incorporate AI models e.g., HEX, Giga TIME to convert standard H&E slides into virtual multiplex images.

Phase III: Clinical Implementation: Health systems must integrate genomic data directly into the Electronic Health Record. In resource-limited LMICs, health care systems should prioritize curative targeted therapies over high-cost, marginal-benefit palliative regimens.

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Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
We cannot wait for NGS costs to drop. A very practical fix is strictly adopting tiered testing algorithms

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
Precision oncology is finally moving away from just being a desperate last resort. We are actually using it right now, especially for neoadjuvant planning. Looking at complex GI cases, upfront genomic profiling is what basically tells us whether to take the patient straight to the OR for a surgery or to shrink the disease first with targeted therapy. But getting these molecular tests integrated into routine clinical practice is still incredibly frustrating. The financial roadblocks are just brutal. We also hit a massive wall when trying to decipher vague variants of unknown significance on these dense sequencing reports.
And we cannot wait for NGS costs to drop. A very practical fix is strictly adopting tiered testing algorithms. We really need to lean heavily on the ESMO-MCBS frameworks to justify funding only the purely actionable mutations. You essentially have to ignore the background genomic noise. Just sequence the specific targets that will actually alter our surgical approach or systemic strategy.
But having all this molecular data is completely useless if your Molecular Tumor Board is disorganized. Those sequencing reports have to be uploaded a few days prior to the meeting. This totally stops the medical oncologist from trying to interpret complex genetic panels on the go. During the actual discussion, you just have to maintain a strict protocol. The geneticist pitches the variant. Then the group instantly checks it against ASCO or NCCN criteria to see if a specific trial arm fits the patient. Finally, that targeted consensus must be logged into the system before the team breaks. Because if that actionable target isn't documented as a concrete plan, running that expensive sequencing was basically a waste of time.

Full Name:
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State:
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Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
To identify key areas in oncology where precision medicine can improve treatment selection, predict outcomes, and enhance patient care through molecular and genomic profiling.
To evaluate barriers to the adoption of precision oncology and propose practical, scalable solutions to improve access, affordability, and clinical implementation.
To develop a standardized Molecular Tumor Board (MTB) workflow that enables multidisciplinary decision-making, coordinated patient care, and effective integration of molecular diagnostics into routine oncology practice.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):

Precision oncology aims to deliver the right treatment to the right patient based on the molecular characteristics of the tumor rather than relying solely on tumor site or histology.

I. Areas Where Precision Oncology Can Be Applied

- Targeted therapy based on actionable mutations (EGFR, ALK, BRAF, HER2, BRCA).
- Immunotherapy guided by biomarkers such as PD-L1, MSI-H, and TMB.
- Selection of adjuvant and neoadjuvant therapies.
- Prognostic and predictive risk stratification.
- Monitoring treatment response and resistance using liquid biopsy and circulating tumor DNA (ctDNA).

II. Barriers to Uptake in Clinical Practice

- High cost of molecular testing and targeted therapies.
- Limited access to next-generation sequencing (NGS), especially in resource-constrained settings.
- Lack of awareness and training among healthcare professionals.
- Delays in reporting and interpretation of molecular results.
- Limited availability of clinical trials and targeted drugs.
- Challenges in integrating genomic data into routine clinical workflows.

III. Practical Solutions

- Develop standardized testing guidelines for common cancers.
- Improve insurance coverage and government support for molecular diagnostics.
- Establish regional molecular diagnostic laboratories to reduce costs.
- Conduct regular clinician education and training programs.
- Use digital platforms and AI-based tools to assist interpretation of genomic reports.
- Strengthen referral pathways for clinical trial enrollment.

IV. Molecular Tumor Board (MTB) Workflow and Patient Care Coordination

1. Patient identification based on advanced disease, rare tumors, or treatment resistance.
2. Molecular testing (NGS, liquid biopsy, or focused panels).
3. Collection of clinical, pathological, radiological, and genomic data.
4. Weekly MTB meeting involving medical oncologists, pathologists, molecular biologists, geneticists, radiologists, surgeons, and pharmacists.
5. Classification of actionable alterations and treatment recommendations.
6. Discussion of targeted therapy, immunotherapy, standard treatment, or clinical trial options.
7. Documentation of MTB recommendations in electronic medical records.
8. Follow-up assessment of outcomes and periodic review of treatment responses.

Full Name:
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Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
To establish a practical precision oncology framework that enables individualized cancer treatment through integration of molecular profiling, multidisciplinary decision-making, and optimized clinical workflows to improve treatment outcomes and reduce unnecessary toxicity.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):
Precision oncology can be applied across multiple areas including targeted therapy selection based on genomic alterations, immunotherapy selection using biomarkers, hereditary cancer risk assessment, treatment resistance monitoring, pharmacogenomic-guided therapy, and use of circulating tumor DNA (ctDNA) for disease monitoring and response assessment.
Major barriers include high cost of molecular testing, limited availability of genomic facilities, lack of trained professionals, challenges in interpretation of complex genomic data, unequal access to targeted therapies, reimbursement issues, and limited evidence for some rare genomic alterations.
Practical solutions include establishing affordable molecular diagnostic platforms, integrating next-generation sequencing into routine practice where appropriate, developing regional referral networks, providing training in genomic medicine, improving reimbursement policies, and creating partnerships between healthcare institutions, governments, and industry. Development of local genomic databases can improve interpretation of population-specific alterations.
A structured molecular tumor board (MTB) workflow should include patient selection, comprehensive clinical and pathological review, molecular testing, genomic data interpretation, treatment recommendation, and follow-up assessment. The MTB should involve medical oncologists, pathologists, geneticists, molecular biologists, radiologists, surgeons, and bioinformatics experts. Recommendations should consider evidence level, clinical relevance, drug availability, and patient preferences.
Continuous outcome tracking, registry development, and research collaborations can refine precision oncology approaches and ensure equitable delivery of personalized cancer care.

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Objective of your solution: (Briefly define the primary outcome of your solution to this challenge):
Mr. R, a 54 year old non-smoker, presented with metastatic lung adenocarcinoma. NGS revealed two co-occurring actionable drivers an EML4:ALK gene fusion and de novo MET amplification where blocking both at once risked toxicity. Our molecular tumour board faced a question with no precedents, which driver to target first, and how to know when to switch. We came up with an idea to do a baseline liquid biopsy, target one mutation first, repeat ctDNA to confirm its suppression, then address the second. The decision was sound, but it was made from core understanding of poly-clonality. There was no defined protocol for sequencing two drivers, and no structured record of how similar patients had fared. Precision oncology in India generates these decisions daily but does not compound on them.

Describe your solution / proposal: Provide a detailed account of your solution/ proposal to this challenge. You could type your solution/ proposal here. (Disclaimer: Solution/proposal should not exceed more than 300 words.):

I propose a Sequential-Driver Molecular Tumour Board protocol that turns one-off multi-driver decisions into a reproducible, auditable workflow.

1. It starts by catching the cases that need it. Every NGS report is tiered by ESCAT actionability, and any tumour with more than one actionable driver is automatically routed to the molecular board within 72 hours.
2. Its core is a defined sequencing algorithm for such unique situation, when two drivers cannot be blocked together without unacceptable toxicity: a baseline liquid biopsy ranks clonal dominance, the dominant driver is treated first, ctDNA is repeated at a fixed interval to confirm molecular suppression, and only on a pre-specified trigger (rising variant allele fraction or radiological progression) does therapy switch to the second driver.
3. Every such decision and its ctDNA-confirmed outcome is then captured in a standard template, so the protocol is refined by our own accumulating experience rather than lost to individual memory.
4. Because the limiting step in India is usually cost rather than science, each NGS recommendation is linked to Ayushman Bharat or state-scheme pre-authorisation, and tissue testing is paired with plasma ctDNA when tissue is insufficient.
5. Finally, a biannual audit compares the protocol's recommended sequencing against observed PFS and feeds the result back into the algorithm, so it improves with every cohort.

The workflow needs no new infrastructure, only NGS access and an EMR. It converts each difficult molecular decision into structured evidence the next tumour board can reuse.