



# The Development of Quality Improvement Education Program of the National Cancer Grid – EQuIP- India (Enable Quality Improve Patient Care), and Its Impact on the Quality of Cancer Care in India

Nandini Vallath<sup>1</sup> R. Ravi Kannan<sup>2</sup> Shirley Lewis<sup>3</sup> Priyanka Augustine<sup>4</sup> Karl Lorenz<sup>5</sup>  
 Jake Mickelsen<sup>6</sup> Jenifer Mugesh Sundararaj<sup>7</sup> Praveen Kumar Shenoy<sup>8</sup> Kapil Malik<sup>2</sup> Rinisha Banik<sup>9</sup>  
 Sarbani Laskar<sup>10</sup> C.S. Pramesh<sup>11</sup>

<sup>1</sup> Department of Palliative Medicine, St. John's Medical College Hospital, Bengaluru, Karnataka, India

<sup>2</sup> Department of Surgical Oncology, Cachar Cancer Hospital and Research Centre, Silchar, Assam, India

<sup>3</sup> Department of Radiotherapy and Oncology, Kasturba Medical College, Manipal, Manipal Academy of Higher Education, Manipal, India

<sup>4</sup> Department of Medicine, Primary Care and Population Health, Palo Alto, California, USA

<sup>5</sup> Stanford School of Medicine, VA Palliative Care Quality Improvement Resource Center (QuIRC), Stanford, California, USA

<sup>6</sup> Strategic Programs and Process Improvement, Stanford Health Care, Palo Alto, Stanford, California, USA

<sup>7</sup> Department of Palliative Medicine, Christian Medical College Vellore, Tamil Nadu, India

**Address for correspondence** Nandini Vallath, MD, DNB, MBBS, Department of Palliative Medicine, St. John's Medical College Hospital, Bengaluru, Karnataka 560034, India (e-mail: nandini.vallath@stjohns.in).

<sup>8</sup> Department of Medical Oncology, Malabar Cancer Centre, Thalasseri, Kerala, India

<sup>9</sup> NCG E-Learning Portal, Tata Medical Center, Kolkata, India

<sup>10</sup> Department of Radiation Oncology, Tata Memorial Centre, Homi Bhabha National Institute, Mumbai, India

<sup>11</sup> Department of Surgical Oncology, Tata Memorial Centre, Homi Bhabha National Institute, Mumbai, India

Ind J Med Paediatr Oncol

## Abstract

### Keywords

- quality
- quality improvement
- methodology
- medical oncology
- cancer care
- education

**Introduction** Quality attributes in health care setting include safety, effectiveness, patient centeredness, timeliness, efficiency, and equity. Quality of care outcomes depend not only on the clinical interactions between clinicians and patients but also on the effective alignment and integration of team efforts, logistics, and care processes. The National Cancer Grid (NCG), with its mandate to facilitate and promote quality standards in patient care across India, facilitated quality improvement (QI) training as a key initiative in order to develop competencies within the clinical teams in QI methodology and to strengthen the quality of cancer care processes across cancer centers in the country.

**Objectives** The aim of the study was to describe the inception and evolution of the NCG-QI-Hub, its flagship QI training program, EQuIP India (Enabling Quality, Improve Patient Care) to the present model, to illustrate its journey to self-sufficiency and to share the outcomes of the completed projects.

**Materials and Methods** Following a pilot in 2017, the NCG-QI-Hub, in partnership with Stanford Medicine, initiated a mentored QI training program using A3 QI

DOI <https://doi.org/10.1055/s-0045-1806837>.  
 ISSN 0971-5851.

© 2025. The Author(s).

This is an open access article published by Thieme under the terms of the Creative Commons Attribution License, permitting unrestricted use, distribution, and reproduction so long as the original work is properly cited. (<https://creativecommons.org/licenses/by/4.0/>)

Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India

methodology and tools to address quality issues impacting cancer care settings. The trainees used the A3 method of thinking and experienced the plan-do-study-act (PDSA) cycle while improving the identified quality problem.

**Results** Between 2017 and 2024, 89 QI projects across different domains of cancer care (prevention, treatment, and palliation to survivorship) have been completed. The EQulP India training program has facilitated the creation of 10 institution-based QI training hubs that conduct in-house QI projects, with 45 national mentors and a growing community of over 300 professionals with competencies in using the methodological steps to conduct QI projects. Based on the follow-up survey done in 2022, more than 70% of alumni institutions continued to be associated with quality improvement project programs. The average project progress score (PPS) achieved at graduation of trainee teams of  $\geq 4.0/5$  was sustained across the years of conducting the educational program.

**Conclusion** EQulP India immersive QI training program has demonstrated that low-cost, structured QI training programs, contextualized to the institutional culture, are feasible and successful in improving the quality of cancer care. The venture has successfully built national-level QI mentorship capacity formation of institutional QI hubs and has thus triggered a QI culture across alumni NCG centers.

## Introduction

An important purpose of health care is to decrease the burden of disease and improve treatment outcomes including survival, functioning, and quality of life of people. Besides the clinician–patient interactions, high-quality care relies on integrating quality domains such as patient centeredness, safety, accessibility, affordability, effectiveness, efficiency, equity, inclusivity, and timeliness.<sup>1</sup>

Competencies in methodological quality improvement (QI), to navigate and refine a quality concern within clinical settings, are now recognized as a valuable core skill for health care professionals.<sup>2</sup> The American Society of Clinical Oncology (ASCO) offers QI educational programs for in-service oncology professionals. QI training is part of the residency training program in some parts of the world.<sup>3,4</sup>

The A3 way of thinking (► **Supplementary Fig. S1**, available in the online version) is a QI methodological approach that originated from the quality division of Toyota industries and has since been applied to solve health care-related quality issues. This methodology follows the plan-do-study-act (PDSA) cycle and uses sequential steps (tools) to define the problem, map processes, chart contributors, understand context, and analyze for root causes to reveal the main contributors to the problem. The key drivers and interventions are then derived and activated to solve the problem. The progress of each QI project may be monitored using the project progress score (PPS; ► **Table 1**). The pre-decided goal is recorded across the study period as a run chart to monitor the impact of QI interventions. Essentially, the methodology-based QI education enables an immersive experience of the PDSA cycle for the trainee team and facilitates a consensus-based action plan for improving the selected quality concern.<sup>5,6</sup>

The National Cancer Grid of India (NCG-India) was established in 2012 with the mandate of establishing uniform standards in patient care in prevention, diagnosis, treatment, and palliation of cancer to facilitate collaborative research and improve the quality of cancer care and survivorship.<sup>7</sup> The QI international learning collaborative of the NCG with Stanford Medicine has enabled equitable access to A3 QI methodological training to professionals involved in cancer care across hundreds of affiliated centers.<sup>8</sup> The training enables teams to identify and analyze quality concerns within their own settings, derive key drivers for change, test them, and experience improvement. QI education is evolving into one of the central strategies of NCG-India, to improve the quality of cancer care outcomes in the country.

This article describes the inception and evolution of the NCG-QI-Hub and its flagship QI training program, EQulP India (Enabling Quality, Improve Patient Care), to the present model, and illustrates its journey toward self-sufficiency. It provides an overview of completed QI projects with the domains covered and improvement achieved with links and references to NCG-QI resources.<sup>9</sup> This article analyzes the development of the QI education program of NCG-India.

## Materials and Methods

The program used systematic processes, beginning with a pilot cohort by the NCG-India, in collaboration with Stanford Medicine (2017), followed by the launch of the NCG-QI-Hub training processes, and monitoring outcomes using the PPS; ► **Table 1**). The methodological improvement of the training processes followed (2018–2020), culminating in the establishment of a QI educational program. An ethical clearance was not relevant as this study did not include data related to individual patients or their records.

This study on the NCG-QI educational initiative did not access funding. All those involved contributed pro bono. Also, this blended training program in QI was offered free of cost to NCG-affiliated cancer care institutions.

### **The Pilot Cohort (2017–2018)**

Based on the vision of the NCG to facilitate quality in cancer care, it partnered with the QI leadership at Stanford Healthcare, a pioneer in quality education programs to start QI training in India. After the initial expression of interest, a brief study on the feasibility, relevance, and acceptability of online education for QI sciences supported further engagement.<sup>10,11</sup> The collaboration began with a pilot in October 2017 and included the team from Stanford Medicine, palliative care leaders from India, and volunteer physician mentors from seven global universities within the United States and Australia.

The pilot batch consisted of seven pioneering palliative care teams from across India, who were deeply invested in integrating QI processes into their clinical programs. The training curriculum, the Palliative Care—Promoting Assessment & Improvement of Cancer Experience (PC-PAICE), utilized A3 thinking and methodology and was built upon the existing “Clinical Effectiveness Leadership Training” (CELT) and Realizing Improvement through Team Empowerment (RITE) programs of Stanford Medicine.<sup>6,12,13</sup>

The digital platform supported by Stanford Medicine hosted monthly live virtual sessions, where all stakeholders, including the teams, faculty, and mentors, attended. Each session taught a key QI concept and an A3 methodology tool for the trainees to apply to their quality problem before presenting their progress in the next live session. The assigned faculty mentored each team between live sessions and clarified questions related to their QI project. An in-person workshop conducted halfway through the program further familiarized the participants with specific aspects of QI science.

### **Evolution of the NCG-QI-Hub (2018–2020)**

Inspired by the experience, the alumni initiated a proposal through the NCG to activate QI education in India. This proposal led to a generous seed grant from the Tata Trusts that helped establish the NCG-QI-Hub in 2018, with the NCG e-learning portal as the learning platform. The newly activated NCG-QI-Hub maintained the international collaboration with Stanford QI leaders and worked alongside the global experts to launch the 2018 cohort and internalized the subtleties of conducting the program and mentoring clinical teams. The seven teams for the 2018 cohort came in by word of mouth from palliative care institutions. The faculty for the 2018 cohort included alumni of the 2017 cohort working with the international faculty team. The key curricular contents and pedagogy remained unchanged. However, progress of projects of three teams was poor, where one team did not achieve the mandatory PDSA cycle required for graduation and two teams had just begun to test interventions. The above observations of nonuniform progress across the teams were dissatisfactory to the NCG-QI-Hub team.

### **Methodological Quality Improvement of the QI Training Processes of the NCG-QI-Hub**

The Hub took upon the nonuniform progress as a quality problem and activated an improvement project focusing on its training processes. They applied the A3 methodological improvement framework itself to comprehend the key contributors to the problem from a systemic perspective. This resulted in strategies for improvement, which were implemented during the training of the 2019 cohort to enhance the uniformity and impact of the NCG-QI educational endeavor. The process of achieving improvement in the QI training processes is published in the journal *Cancer Research, Statistics, and Treatment*.<sup>14</sup>

The refined QI training program was named “EQuIP India: Enable Quality, Improve Patient Care.”

### **The Launch of EQuIP India Training Program “Enable Quality, Improve Patient Care”**

EQuIP India was activated with the 2019 cohort, which had four teams each from oncology and palliative medicine. Applicants to the program now required to have endorsement from their institutional leadership. The selection was done through a competitive process. The training schedule was shared early to ensure optimal attendance. The learning platform was moved to the NCG e-learning portal, and the project Extension for community healthcare outcomes (ECHO)-India team managed the virtual live sessions. The collaboration with Stanford QI leaders and international mentors continued.

As part of the improvement processes, the NCG-QI-Hub organized and facilitated regular mentor–trainee discussions and monitored their monthly project progress. The PPS of each project was announced live to motivate the next step. The in-person workshop was carefully designed and timed to help site QI projects move from planning to testing interventions. Other new features were formative evaluations, exit quiz, and one-on-one feedback from graduates.

### **Cohorts of 2021, 2022, and 2023**

With onset of COVID, the learning sessions for the subsequent three cohorts, including the application process, the QI intensive workshop, all teaching sessions up to graduation, and coaching of mentors, were delivered through the Zoom platform using “break out rooms” and “lobby” options for mentor–mentee discussions and team presentations. Online polling, quizzes, formative evaluation, and feedback were introduced. The graduation ceremony was also conducted online. The complete digitalization allowed teams from remote parts of India and from cancer centers outside of India to participate and graduate through EQuIP India.

### **Capacity Building of National Mentors**

Around this time, the EQuIP India systematized the annual online coaching to alumni interested in contributing as mentors. The mentor coaching curriculum was designed to ensure that the aspiring mentors learn the philosophy and purpose of mentoring, details of the A3 methodology, and application of the A3 tools (process map, fishbone diagram,

run chart, Pareto chart). The training was timed prior to the launch of future cohorts and used lectures, assignments, exercises based on exemplar projects, and discussions, led by educators from Stanford and the NCG-QI-Hub. The new mentors were then paired with experienced QI mentors in the subsequent EQuIP India cohort to learn from each other and master ground-level skills of mentoring.

## Results

### The Pilot Cohort

Each team from this cohort completed the PDSA improvement cycles, documented improvement in their selected quality concern, and achieved an average PPS<sup>11</sup> of 4.0/5.0 (► **Table 1**) at graduation.<sup>15–20</sup>

### Quality Improvement of the QI Hub Training Processes

► **Fig. 1** is the report of the A3 methodological improvement project initiated in 2018, when the nonuniformity of project progress was noted as a quality concern in the training processes of the NCG-QI-Hub. It depicts the sequential steps toward achieving improvement. The interventions derived through this project were implemented during training of the 2019 cohort, which led to a more uniform PPS of greater than 4.0/5.0 among teams.<sup>14</sup> NCG-QI-Hub has self-integrated methodical processes to constantly reflect on and fine-tune the quality of its training.<sup>21,22</sup>

### Other Significant Outcomes of the NCG-QI Training

- A total of 89 teams from across India have used the A3 methodology to complete QI projects across different domains of cancer care including prevention, treatment, and palliation to survivorship. The comprehensive list of QI projects completed and graduated between 2017 and 2024, along with their improvement goals, outcomes, and their graduation videos, is available on the NCG e-learning portal through the following link: <https://ncgeducation.in/mod/page/view.php?id=2756>. This list is also uploaded as ► **Supplementary Table S1** (available in the online

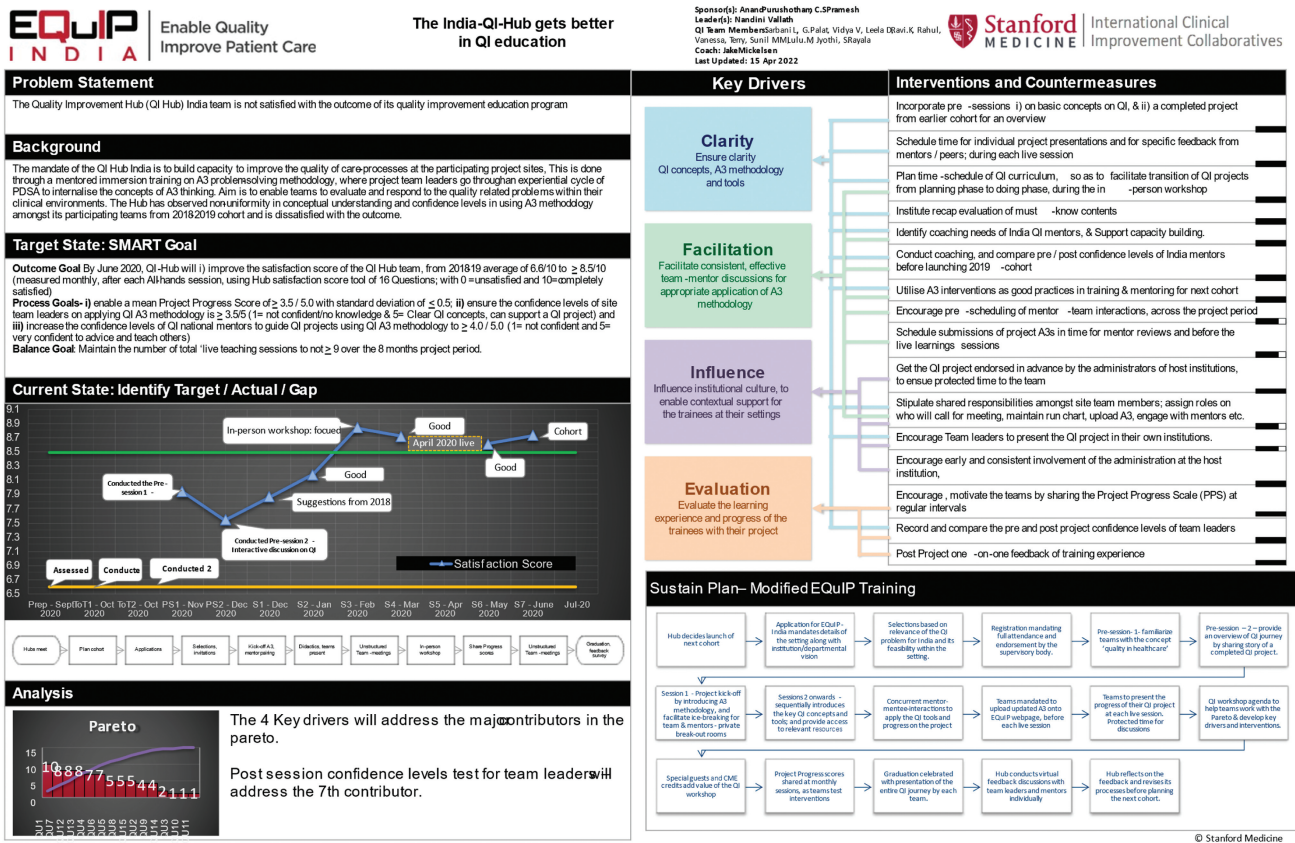
version). Additional 46 teams, who started training in 2024, will graduate by April 2025.

- This venture has created a growing community of over 300 professionals with QI methodological skills to analyze the cancer care quality issues they face in their day-to-day settings, apply solutions that are contextual to the setting, team, and administrative environment, and achieve improvement.
- Ten alumni institutions have activated in-campus QI hubs, with ongoing QI projects while continuing to lead and mentor improvement projects (► **Fig. 2**).
- EQuIP India coached its first set of 10 national mentors by the end of training of the 2018 cohort. India is now becoming more self-reliant in conducting QI training, and in mentorship, with 50 confident, experienced national mentors, who continue to engage with the training pro bono. ► **Supplementary Fig. S2** (available in the online version) depicts the results of the survey done in 2022 to document the interest and ongoing engagement of alumni with QI work.
- Four institutions have integrated key concepts of QI into the curriculum of staff training, hospital administrators, and their postgraduates.<sup>21,22</sup>
- The QI endeavors from India have resulted in peer-reviewed publications at the national and international levels.<sup>10,14–20,23–31</sup>
- QI has become a regular feature at the NCG annual meetings and annual conferences of the Indian Association of Palliative Care (IAPCONs 2018–23) and is also being offered as preconference workshops.
- The QI solutions of one center may likely be useful for other cancer care settings facing similar concerns. Hence, the NCG e-learning Platform is developing online resources including completed QI projects, quality measures/tools, derived from the various QI projects, grouped under their quality domain. The goal is to enable access to QI resources for interested institutions.
- The NCG webpage (<https://www.ncgindia.org/key-initiatives/quality-improvement>) and the NCG e-learning platform (<https://ncgeducation.in/mod/page/view.php?id=2756>) showcase the comprehensive list of EQuIP India

**Table 1** The scale used to monitor the progress of quality improvement projects

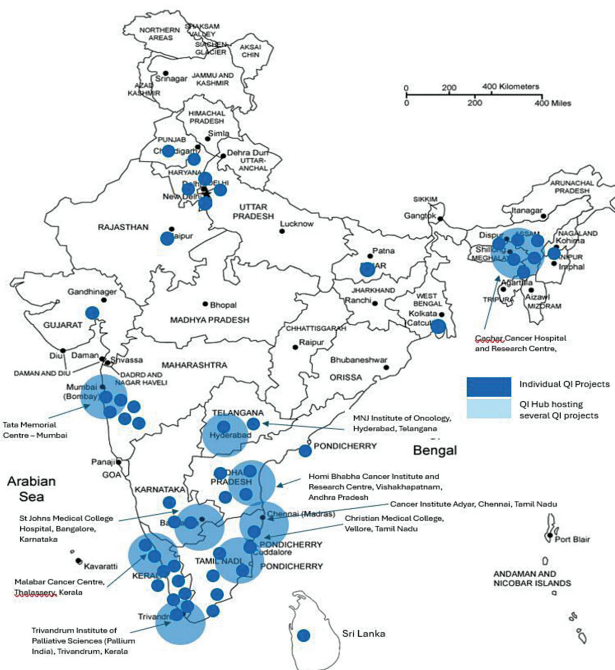
The project progress scale	
0.5	QI team formed, problem and background determined
1.0	Problem stated, and SMART goal articulated
1.5	Current state assessed with process maps and analysis
2.0	Key drivers and interventions identified
2.5	Interventions are being tested, but no measurable improvement
3.0	Initial test cycles have begun with evidence of modest improvement
3.5	Improvement data meets statistical process control (SPC) criteria, not yet at goal
4.0	Measures meet the SMART goal, with run chart improvement data meeting target
4.5	Results are sustained at goal, with sustain plan in place
5.0	Sustained improvement, leading performance in quality improvement at world/national levels





**Fig. 1** The A3 sheet depicting the quality improvement study done on the training processes of NCG-QI-Hub (2018–2019).

QI projects 2017 to 2023, the EQUP India training program, and details on other initiatives of the NCG-QI-Hub. The NCG webpage and the NCG e-learning portal can be accessed free, by registering at <https://ncgeducation.in/>.<sup>8</sup>



**Fig. 2** QI hubs and QI project sites across NCG-affiliated centers developed through the QI Education Program of the NCG-QI-Hub.

## Discussion

The NCG-QI endeavor attempted to address two fundamental questions: (1) Can a clinical team facing a quality concern in clinical settings be empowered to improve it? (2) Does an immersive blended training on QI methodology help teams achieve a tangible improvement in the quality of day-to-day cancer care?

Based on the outcomes, QI competencies do allow teams to derive impactful solutions and achieve a tangible improvement in the quality of cancer care, within their day-to-day settings. As the learners were full-time clinicians, the hub training processes required aligning, engaging, and ensuring ownership from the administration of respective institutions, right from the application process up to the graduation of project teams.<sup>21,22</sup>

The key principles of effective learning may be summarized as the following:

- Immersive practice-based learning:** Continuous learning and growth are accomplished when teams gain new knowledge, apply it directly to their daily work, and achieve outcomes. Learning to use QI tools through one's own project clarifies the key QI concepts effectively.
- Contextual training:** The curriculum becomes successful when it is designed and delivered with clear focus on the host settings and needs of the clinician learners, aligned with the contextual requirements of participating institutions in India.<sup>14,21,22,32,33</sup>

- **Committed mentorship:** Assigning mentors for each trainee team and fostering strong mentor–mentee interactions to ensure smooth communication and progress across the project period are vital.
- **Accountability and appreciation:** The environment of peer-to-peer learning, regular, specific reporting, and monitoring of the “project progress score” to measure the team’s performance motivate the learners to stay enthusiastic and active with their projects. This also helps achieve measurable progress during their QI journey.
- **The use of QI methodology as a consensus building tool:** Most of all, the learners appreciate the consensus building process beyond hierarchies, and the relevance of co-opting team members who are stakeholders in the problem at hand, as the most essential ingredient in the QI methodological process for effecting a “change.” Over the years, the training processes of the QI hub have also undergone systematic improvement based on the feedback from trainees and mentors.

Utilization of the virtual learning platform for several aspects of training makes it an economically viable program that allows participation of experts, mentors, and mentees from across the globe and across time zones. ► **Table 2** lists the advantages and disadvantages of conducting QI education entirely online, while ► **Table 3** lists certain “norms” that were found valuable in maximizing learning through digital platforms. To reap the advantages of both, the 2024 cohort utilizes the blended format, with online (key concepts, steps of A3 methodology, and postintervention follow-ups) and in-person (deriving key drivers/interventions, and to coach the mentors) components.<sup>21</sup>

Other expedient activities that evolved out of the NCG-QI-Hub activities are highlighted in the following sections.

**QICON 2023 and 2024**

The NCG-QI-Hub organized QI conferences in March 2023 and April 2024 at one of its hubs (St John’s Medical College Hospital, Bangalore), attended by invited alumni institutions.

The discussions and actions planned during these meetings, listed below, have added more depth and scope of its activities.

**Publication and Dissemination of QI Projects**

QICON 2023 held a panel discussion to familiarize the editors of major Indian journals in cancer care and palliative care to the concepts and scope of QI and to create a publishing space. This has resulted in the development of criteria and template to publish QI studies. The new publishing opportunities in Indian journals are now available for alumni to publish their completed QI projects and share strategies that resolved an important quality gap in cancer care trajectory.<sup>14</sup>

**Multicentric Quality Improvement Collaborative**

QICON 2023 led to a planned collaborative among some alumni institutions to select and improve a specific quality problem common to them and relevant to India. The aim of the Multicentric Quality Improvement Collaborative (MQuIC) is to compare and record the contributors, facilitators, challenges, and opportunities of QI on the selected problem in cancer care across institutions from different regions, contexts, patient population, and with varying footfall and resources. The MQuIC study hopes to find shared improvement drivers and interventions that work across settings. In 2024, the phase 1 of the MQuIC was launched with six diverse centers across India applying QI methodology to improve the common problem of unresolved pain of patients diagnosed with head and neck cancers, across their treatment phase. This problem has been selected for the pilot, based on recent guidelines that recommend early integration of palliative care in cancer care. Contextual solutions through this pilot may alleviate the often under-diagnosed, under-addressed pain of cancer and cancer treatment and address challenges of treatment adherence. The NCG-QI-Hub will analyze the outcomes of MQuIC to disseminate for other institutions to adopt and to develop a feasible framework for conducting multicentric QI studies in India.

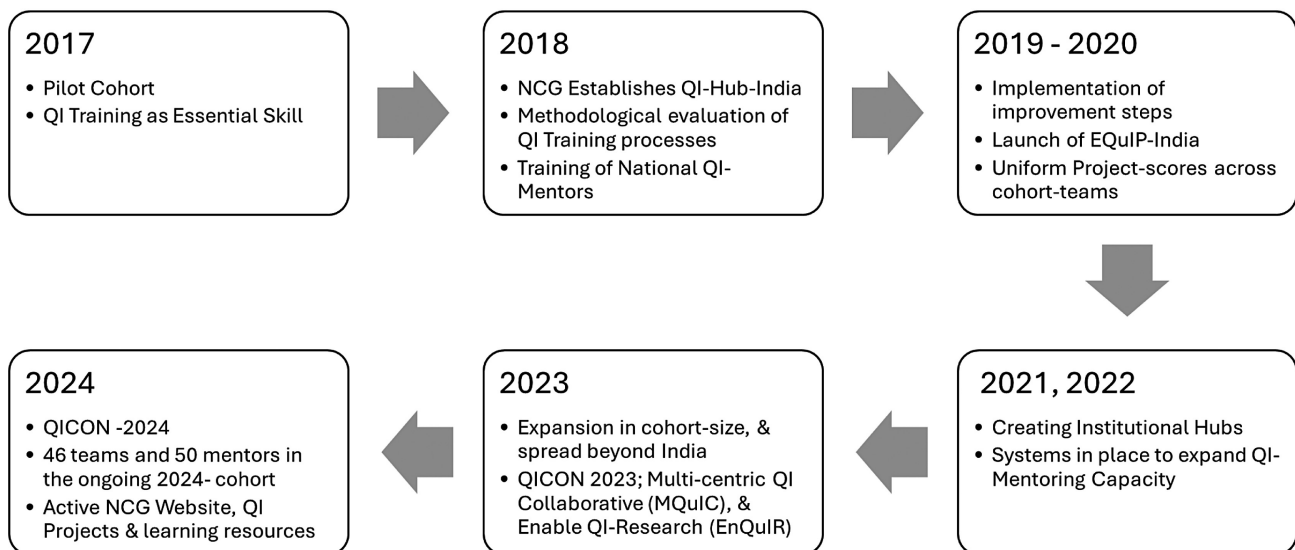
► **Fig. 3** presents an overview, with the timeline of the evolution of the NCG-QI-Hub.

**Table 2** Advantages and disadvantages of conducting EQuIP India program fully online

Advantages of a fully online EQuIP India	Disadvantages of a fully online EQuIP India
1. The annual cost of conducting the program reduced by INR 900,000/– 2. Saved the travel time of participants: organizers, mentors, and trainees 3. Online platform provided advantage of access to teams from various geographical location (including Sri Lanka) to participate 4. Permitted mentors from different time zones to engage actively with the live sessions of EQuIP India 5. Allowed for online coaching for capacity building of national mentors from across India 6. Online polling, quizzes, formative evaluation, and feedback were advantageous resources at play during the sessions 7. Records of didactic sessions could be stored for review as important learning resources	1. Lack of human connection impacted overall interactions, teaching, and learning. Even more so when videos are off 2. Without the natural personal interactions that happen in-person, the organizing team is perceived as remote and disconnected 3. Marginal acquaintance with the assigned mentors reduced the comfort of the trainee team to engage with their mentor and discuss the nuances of their project. Overall, the mentor–mentee discussions were reported as poor 4. Lesser scope for clarifying the contextual aspect of trainee setting, due to inadequate awareness and examination into the host clinical settings 5. Stability and strength of the Internet signal determined the coherence of the sessions, the receptivity, and attention of the participant 6. Some participants remained uncomfortable to interact online. The technical know-how to raise hands, activate audio, etc., dissuaded conversations 7. Competing distractions within their own “real” environment affected the trainee attention and interactions. Some trainees attended sessions while driving, from their clinical settings, or while engaged with other chores

**Table 3** Key norms that supported efficiency of the training program

- Establish a planning team:
  - An established QI board that drives the vision of the NCG-QI-Hub and the design of QI education
  - Regular virtual meetings to plan the EQuIP India training program
- Improve reliability and access to the learnings offered:
  - Preempt capacity; offer support to participants on using virtual platform and its features, prior to launching the program
  - Have contingency backup for didactic content and for net connectivity for untoward technical failures
- Attendance: At the start as an essential feature
- Encourage personal connections:
  - An ice-breaking presession at the start of the program to familiarize teams with each other
  - This included breakout session with their assigned mentors to support discussions, plan future modes of interactions, be it synchronous/asynchronous
- Feasible, reliable time schedule:
  - Sessions are best limited to  $\leq 75$  min, with didactic time not exceeding 25 min
  - Start on time, and end on time or early, with clear summary of the session and expected assignments
- Encourage participation and interactions:
  - Teams could log in as individuals or as teams (with the necessary audiovisual facilities)
  - Once logged in, video capability is encouraged, as it was found to positively influence the engagement
  - As a rule, wait time of at least 10 s were given after a question, before assuming no one wished to respond
  - Instructors also called on participant by name, to share thoughts, or to comment, as participants may have a hard time raising their hand especially on a virtual platform
  - Web-based services, such as Google Hangouts and WhatsApp, were successfully leveraged to supplement the training program. We use it for (1) the last mile planning of QI Board, (2) quick exchange of information/questions amongst QI mentors, and (3) team-mentor interactions to share progress and review of updated A3s
- Skillful moderation of the live session to ensure focus of learning on the QI methodology:
  - Clear instructions to presentations—for focused, brief, and SMART project reports
  - The assigned mentor encourages through a follow-up mentioning the highlights of the efforts, and cautions going forward
  - To ensure the focus of discussions stays on the QI methodological step, and to avoid transgression to clinical debates, especially from senior clinician-participants
- Minimize noise and maximize learning:
  - Minimize e-mail communications between sessions
  - The interim e-mails: (1) key learnings, resources, with what is expected before the next live session, and (2) a reminder mail, with the meeting link and preparatory resources

**Fig. 3** Timeline and overview of the activities of the NCG-QI-Hub: 2017 to 2024.

### SWOT Analysis of the QI Educational Initiative of the NCG-QI-Hub

At the national level, India has developed an autonomous, low-cost, practical, inclusive QI education program, “EQuIP India,” that achieves reliable training outcomes, with an average PPS of

greater than 4.0/5 at graduation of trainee teams. India now hosts a growing community of QI proficient leaders and trained QI mentors embedded across its cancer centers and institution-based QI hubs that facilitate in-house QI projects. This development is a valuable addition, given the multiple levels of QI required for improving cancer care in the country.



The QI training initiative by the NCG-QI-Hub has had an impact at several levels. In the absence of QI teaching within medical curricula in India, the EQuIP India educational endeavor is significant and has had a ripple effect of QI competency building over the 6 years of its operation through various strategies to mitigate barriers and challenges in QI implementation in concurrence with a recent review.<sup>33</sup>

*Since 2017, faculty and staff from Stanford University Medical Center have collaborated with India based palliative care and oncology centers in the learning and application of quality improvement (QI) methods. EQuIP India has been the most successful in their results and capacity building, in that they now own the learning locally, and have expanded beyond the 7 organizations involved in the first cohort to nearly 90 cancer survivorship/palliative care settings across the country. Other countries have not seen such rapid expansion and mastery. Stanford continues to use these principles learned from EQuIP India, to improve their QI training programs internally and externally in collaboration with institutions throughout the world.*

–Jake Mickelsen, Director, Improvement Team, Stanford Health Care

The four resource barriers in QI program implementation in low- and middle-income countries (LMICs) as reported by a recent review include (1) personnel equipped with QI-oriented skills, (2) time available for QI work, (3) research infrastructure, and (4) funding.<sup>32,33</sup> The unique blended training model of EQuIP India has responded to these challenges by enabling QI competencies among hundreds of clinicians through the networking strength and resources of NCG-India. It has facilitated and utilized the collaboration with established QI programs in high-income countries and created a sustainable model framework for other LMICs.<sup>27</sup>

The current model of EQuIP India requires 7 months on average to complete, from launch to graduation, which may not be a feasible time investment for many. Also, the number of trainee teams that may be selected is proportional to the availability of mentors committed during that period. Hence, other models of building QI competencies are being explored simultaneously. For example, a 2-day workshop for clinical faculty, with immersive learning of A3 methodological steps (Christian Medical College, Vellore), activated 20 QI projects from within the institution. This model of offering single-day workshops on key QI concepts has since become an innovative model to introduce QI competencies to health care professionals. The outcomes of such ventures are being studied.

## Conclusion

The value addition of QI education for a vast country like India has been incredible. The NCG-QI-Hub has found that QI capacity building is feasible through an immersive training program conducted methodically, and with reflective refinements. The future of the training seems assured with the

motivation and commitment of the national mentors to strengthen their core skills and to continue to engage at institutional and national hub levels. A blended learning approach for QI educational programs is effective where the need is vast and trainers and funding are limited.

The overarching objective of the NCG-QI-Hub to introduce the culture of QI across cancer centers in the country has been achieved by continuing to facilitate teams to comprehend QI methodology by applying the A3 tools and experience a PDSA cycle of improvement, enabling and expanding mentorship capacity, committed to QI education, activating more institutional QI Hubs, and disseminating QI efforts of institutions to a wider audience through publications and online platforms.<sup>22</sup> The NCG-QI-Hub has also explored different models of QI training, forayed into multicentric projects on shared concerns in cancer care, and is developing avenues to support conversion of QI projects to peer-reviewed publications.

Efficient management, systematic thinking, accountable training processes, contextual to the Indian health care culture, and the strength, quality, and commitment of QI mentors have been the foundational elements of the NCG QI initiative expanding to a long-term sustainable endeavor.

### Patient Consent

This study did not use case records, study participants or samples. No new interventions were done. Hence, Patient consent is not applicable.

### Funding

None.

### Conflict of Interest

C.S.P. is a board member of the “Union for International Cancer Control,” “ASCO International Affairs Committee,” and “IASLC Committee on Global Policy and Partnerships.” The rest of the authors report no competing interests.

### Acknowledgments

We thank our global collaborators for facilitating this endeavor: Michelle De Natale, Stanford Healthcare, Sydney; Sydney Dy, Johns Hopkins University, United States; Michael Rabow, University Of California, San Francisco, CA, United States; Karen Anderson, Edith Cowan University, Australia; Odette Spruijt, Peter Mac Callum Cancer Centre, Australia; Meera Agar, University of Technology; Arjun Gupta, John Hopkins University, United States; and Kavitha Ramachandran, Stanford Healthcare, United States.

We thank all the early adapters who force-multiplied this initiative. Rahul Krishatry, Naveen Mummudi, and Joyita Deodhar (Tata Memorial Hospital, Mumbai, Maharashtra); S.V.S. Deo and Sushma Bhatnagar (All India Institute of Medical Sciences, New Delhi); Vidya Viswanath, Priyanka Vemanamandi, Leela Digumurti, Raghunadharao Digumurti, Sumukhi Umesh, Thanuja P. Rawther, and Ravi Teja (Homi Bhabha Cancer Hospital and Research Centre, Vizag, AP); Leejia Mathew and Chitra Venkateswaran (Believer's Church Medical College Hospital, Tiruvalla,



Kerala); Mohammad Ishak Tayoob, Sunil Jilla, Spandana, Jean Jacob, and Gayatri Palat (MNJ Institute of Oncology); Thendral Edwin and Kalpana Balakrishnan (Adyar Cancer Institute, Chennai, Tamil Nadu); M.S. Biji, Geetha Muttath, and Joneetha Jones (Malabar Cancer Centre, Thalassery, Kerala); D.K. Vijaykumar and Dinesh Nair (Amrita Institute of Medical Sciences, Kochi, Kerala); Annie Jacob (Christian Medical College, Vellore); Ishita Gandhi and Reena Sharma (CanSupport, New Delhi); Latha Balasubramani and Parimala R. (GKNM Hospital, Coimbatore, Tamil Nadu); Devavarat Arya and Gaurav Chanana (Max Super Specialty Hospital, New Delhi); Asma Pathan and Karishma Sugandhi (Indrayani Hospital and Cancer Centre); Kahkasha and Burhanuddin Qayyumi (Tata Memorial Hospital, Muzaffarpur); Nagarjun Ballari and Sushmita Ghoshal (PGI Chandigarh); Rajashree K.C. and Jyothi Jayan Warriar (Thrissur Institute of Palliative Care, Kerala); Prince John and Ghooi (The Cipla Palliative Care and Training Centre); Sunilkumar M.M. (Trivandrum Institute of Palliative Sciences); Lulu Mathews and Terry Mize (Institute of Palliative Medicine, Calicut, Kerala); Adinarayanan S. and K. Gunaseelan, (JIPMER, Puducherry); Gini Gulati and Dhanshri Pradhan (CanKids, New Delhi); H.M. Iqbal Bahar (Cachar Cancer Institute & Research Centre, Assam); Shrikant Atreya and Shrikant Atreya (Tata Medical Centre, Kolkata, West Bengal); Priti Sanghavi, Shrenik Ostwal, and Bhavna Patel (Gujarat Cancer And Research Institute); and Anjum Khan Joad and Arati Hota (Bhagwan Mahaveer Cancer Hospital And Research Centre, Jaipur).

## References

- Mallath MK, Taylor DG, Badwe RA, et al. The growing burden of cancer in India: epidemiology and social context. *Lancet Oncol* 2014;15(06):e205–e212
- Pramesh CS, Badwe RA, Sinha RK. The National Cancer Grid of India. *Indian J Med Paediatr Oncol* 2014;35(03):226–227
- Jacobson JO, Quinn D, Gilligan T, et al. The ASCO quality training program: designing and implementing a medical specialty society-based quality improvement training program. *J Oncol Pract* 2014;10(03):203–205
- Yeung A, Greenwalt J. A framework for quality improvement and patient safety education in radiation oncology residency programs. *Pract Radiat Oncol* 2015;5(06):423–426
- Institute for Healthcare Improvement. Quality improvement essentials toolkit. Boston, MA: Institute for Healthcare Improvement. Accessed March 10, 2025 at: <https://www.ihp.org/resources/tools/quality-improvement-essentials-toolkit>
- Vallath N, De Natale M, Lorenz KA, Bhatnagar S, Mickelsen J. Development and progress of a collaborative learning model for quality improvement in the field of palliative care in India. *Indian J Palliat Care* 2021;27(02):189–196
- Pramesh CS, Badwe RA, Borthakur BB, et al. Delivery of affordable and equitable cancer care in India. *Lancet Oncol* 2014;15(06):e223–e233
- NCG. Quality Improvement Program - NCG. [Tmc.gov.in](https://www.ncgindia.org). 2022. Accessed March 10, 2025 at: <https://www.ncgindia.org>
- NCG. NCG e-learning portal: Log in to the site. [ncgeducation.in](https://ncgeducation.in). 2022. Accessed March 10, 2025 at: <https://ncgeducation.in/mod/page/view.php?id=2756>
- Kiss-Lane T, Spruijt O, Day T, et al. Palliative care clinicians and online education in India: a survey. *BMJ Support Palliat Care* 2018;9(04):e35
- Stanford Medicine. Quality improvement. Accessed March 13, 2025: <https://med.stanford.edu/faculty-training/clinical-quality-improvement.html>
- Larson DB, Mickelsen LJ, Garcia K. Realizing improvement through team empowerment (RITE): a team-based, project-based multidisciplinary improvement program. *Radiographics* 2016;36(07):2170–2183
- Clinical Effectiveness Leadership Training (CELT) Improvement Training Programs. 2022. Accessed March 13, 2025: <https://med.stanford.edu/faculty-training/clinical-quality-improvement/clinical-effectiveness-leadership-training.html>
- Vallath N, Mickelsen J, Sunilkumar M, et al. Enhancing the outcome of quality improvement education of the National Cancer Grid, India: an A3 methodological study. *Cancer Res Stat Treat* 2025; In press
- Viswanath V, Digumarti L, Raju NS, et al. Organising home-based palliative care services: a quality improvement project at the Homi Bhabha Cancer Hospital and Research Centre, Vishakhapatnam. *Indian J Palliat Care* 2021;27(02):197–203
- Sunilkumar MM, Thampi A, Lekshmi S, Harman SM, Vallath N. "Relax City Homecare team; protocols are ready for you": a quality improvement project conducted on behalf of the City Homecare Unit team at the Trivandrum Institute of Palliative Sciences. *Indian J Palliat Care* 2021;27(02):204–210
- Ghoshal A, Deodhar J, Adhikarla C, Tiwari A, Dy S, Pramesh CS. Implementation of an early palliative care referral program in lung cancer: a quality improvement project at the Tata Memorial Hospital, Mumbai, India. *Indian J Palliat Care* 2021;27(02):211–215
- Rayala S, Palat G, Mathews JJ. Impact of a longitudinal intervention to improve care coordination between a hospital and a hospice: a quality improvement project. *Indian J Palliat Care* 2021;27(02):216–221
- Edassery DE, Chittezhathu RK, Warriar JJ. Documentation of prognostication discussion. *Indian J Palliat Care* 2021;27(02):222–229
- Satija A, Lorenz K, DeNatale M, Mickelsen J, Deo SS, Bhatnagar S. Early referral to palliative care for advanced oral cancer patients: a quality improvement initiative in oncology center at All India Institute of Medical Sciences. *Indian J Palliat Care* 2021;27(02):230–234
- Herman DD, Weiss CH, Thomson CC. Educational strategies for training in quality improvement and implementation medicine. *ATS Sch* 2020;1(01):20–32
- Craig RL, Bittel LR. Evaluation of training. In: Craig RL, Bittel LR, eds. *Training and Development Handbook*. New York: McGraw-Hill; 1967
- Vallath N, Pramesh CS. EQUiP India: the National Cancer Grid quality improvement competency training initiative. *Indian J Cancer* 2023;60(02):149–151
- Standard Medicine. "Getting better at getting better": a Stanford-India partnership sparks a movement in improving palliative care. *Global Health* 2022. Accessed March 10, 2025: <https://global-health.stanford.edu/news/getting-better-at-getting-better-a-stanford-india-partnership-sparks-a-movement-in-improving-palliative-care.html>
- Ganesh A, Satija A, Lorenz K, et al. Factors affecting sustainability of quality improvement initiatives in palliative care: experiences from seven diverse palliative care institutions in India (S739). *J Pain Symptom Manage* 2020;59:551
- Giannitrapani KF, Satija A, Ganesh A, et al. Barriers and facilitators of using quality improvement to foster locally initiated innovation in palliative care services in India. *J Gen Intern Med* 2021;36(02):366–373

- 27 Lorenz KA, Mickelsen J, Vallath N, et al. The Palliative Care—Promoting Access and Improvement of the Cancer Experience (PC-PAICE) project in India: a multisite international quality improvement collaborative. *J Pain Symptom Manage* 2021;61(01):190–197
- 28 Lorenz K, Dy S, DeNatale M, et al. Epilogue: reflections from international mentors of the quality improvement training programme in India. *Indian J Palliat Care* 2021;27(02):235–241
- 29 Augustine P, Lewis S, Velu U, et al. P-57 Improving acute mucositis related pain in head and neck cancer patients receiving curative intent radiotherapy: a quality improvement study in the COVID era. *Oral Oncol* 2021;118:9–10
- 30 Srilatha B, Sundararaj JJ, Susithra DN, et al. Palliative care out-patients and improved documentation-what matters most? Quality improvement project. *BMJ Support Palliat Care* 2024;14(e3): e2950–e2953
- 31 Krishnatry R, Mummudi N, Laskar SG, et al. Improving patient wait times on the first day of radiotherapy treatment. *South Asian J Cancer* 2023. Doi: 10.1055/s-0043-1771408
- 32 Carbonell C, Adegbulugbe A, Cheung W, Ruff P. Barriers and challenges to implementing a quality improvement program: political and administrative challenges. *JCO Glob Oncol* 2024;10: e2300455
- 33 Pain D, MacDuffie E, Martei YM, et al. Barriers to implementing a quality improvement program in low- and middle-income countries: adequacy of resources. *JCO Glob Oncol* 2024;10: e2400114