A sophisticated adaptive system for primary healthcare

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Abstract

A sophisticated or complex adaptive system for primary healthcare would equip healthcare professionals with cutting-edge instruments and insights, improving patient care results and eventually creating healthier communities. The purpose of this study is to determine whether it is feasible to utilize the instrument to objectively assess the performance of healthcare teams working in a complicated sector and to assess how effectively the device can be used to suggest areas where interaction may be improved. Twenty members of a single palliative care team of doctors (n=20), each received a copy of The Complex Adaptive Leadership (CALTM) Organizational Capability Questionnaire (OCQ). On the items with low scores and the feasibility issues, there were group talks. Data analysis was subsequently followed by the calculation of statistical parameters (indicate, standard deviation, average, and summation value). To find differences within each group, the one sample T-Test was applied. The individuals in the subgroups' median scores varied from acceptable to extraordinary. The variation in the average values for each group was significantly different as indicated by the analysis's T-test (p< 0.001). Discussion in the group produced recommendations for quality enhancement, such as improved team member feedback techniques. The study's questionnaire turned out to be a beneficial instrument for evaluating the palliative medicine organizations' everyday operations and pinpointing areas in which improvements in quality could potentially be performed. Relevance in practice: The CALTMOCQ is a potential tool for assessing the performance of any healthcare team. A group discussion on the results of the Questionnaire might serve as a springboard for determining the objectives of efforts for quality improvement.

Keywords: Adaptive system, Complex Adaptive Leadership (CALTM), Healthcare, Organizational Capability Questionnaire (OCQ).

1. Introduction

Effective primary healthcare services are the foundation for fostering health, avoiding disease, and treating chronic illnesses in the ever-changing healthcare landscape. The demand for healthcare systems is increasing, which highlights the requirement for

innovative approaches. A sophisticated adaptive system is one such option that shows great potential in improving basic healthcare. The delivery of healthcare will be revolutionized by this revolutionary strategy, which blends modern technology, technological advances, and patient-focused principles to guarantee prompt, individualized, and cost-effective services (Liu *et al.,* (2021)).

A complex adaptive system for basic healthcare at its core utilizes the potential of big data and AI technologies to evaluate enormous volumes of information about patients. To provide an extensive and interactive patient profile, it incorporates digital health records, medical data, demographic identities, lifestyle information, and socioeconomic variables. The system adapts to the shifting requirements of patients, therapeutic success rates, and technological advances through ongoing learning. Healthcare professionals may make wise decisions by compiling and analyzing this abundance of data, providing more precise and individualized treatment strategies (Harrist *et al.,* 2019). The brilliance of this adaptive system resides in its capacity to recognize possible health hazards and take prompt action, limiting the development of small problems into life-threatening illnesses. The technology can alert healthcare workers to potential health risks through recognition of patterns and predictive analytics, enabling them to take an active role with patients and direct them towards preventative measures. As a result, patients enjoy improved medical results, lower rates of hospitalization, and overall higher quality of life (Buck *et al.,* 2020). Furthermore, the advanced system of adaptation encourages smooth information exchange and teamwork among medical professionals. Medical teams can collaborate more effectively and make organized judgments for challenging medical cases by enabling real-time data transmission. This improved level of cooperation eventually results in fewer medical errors and test duplications, lowering healthcare expenses and maximizing resource use. (Koh and Askell-Williams 2021). Any healthcare initiative must focus on empowering and engaging patients. The use of an advanced adaptive system makes patients take an active role in the management of their health. Patients can access their medical information, assess their advancement, and receive individualized health advice using user-friendly mobile applications and interfaces. Patients who are equipped with information and get immediate assistance are more inclined to change their lifestyles for the better and follow their treatment plans, which improves adherence to therapy and results in better health outcomes (Hodiamont *et al.,* (2019)) (Granat *et al.,* (2022)).This study investigates the viability of using a tool to objectively assess the performance of healthcare teams working in a challenging environment and assesses how well the outcome identifies opportunities to enhance teamwork. Burrows *et al.,* (2020) investigated and pinpointed important elements that either promote or inhibit the PA role-integrated optimization across several cases, in surgical, inpatient care, emergency department, and family physician environments, the investigation of PA benefits in various healthcare environments, the significance of role consciousness, oversight, and performance. Interactions characteristics, and role susceptibility (in the context of long-term viability and funding), were interconnected and dynamic loads. These findings demonstrate how the PAs' willingness to cooperate together and ability to establish their responsibilities given pre-existing essential regulations enables the development of inter-professional cooperative care that remains person-centered. They indicate the observations and opinions of medical professionals, healthcare providers, and other healthcare providers (such as nurses and administrators). Lamo *et al.,* (2022) presented empirical observations on technological issues from Mental Health via Adaptive Technology project after five years. The intent was to enhance psychological services by introducing cutting-edge technology for adaptive therapies with multidisciplinary investigation and development. They concentrated on the difficulties associated with psychiatric treatments offered over the internet, emphasizing software engineering, artificial intelligence, and

human-computer interface. They provided the key research findings, the created artifacts, and the project's lessons learned. Reference architecture has been used to build an internet-based framework for systems-level adapted psychological care offered in medical centers, and it contains the key discoveries from this project. Ogbuabor *et al.,* (2019) implemented the variations and characteristics affecting the efficacy of the FMCHP. This study has demonstrated the potential mediating role of the CASs phenomenon in modifying policies during the adoption of the free healthcare policy. The systemic analysis provided decision-makers with important tools to comprehend the processes and unexpected effects of changes in policy as low-resource countries with free healthcare programs move closer to UHC. During the implementation of the free healthcare policy, to create learning organizations that can respond to changes in policy, individuals must inspire commitment, cooperation, and interaction amongst individuals. Newton-Lewis *et al.,* (2021) proposed to place performance management into complex adaptive systems. This structure has been established to support those trying to enhance corporate and system effectiveness through improved monitoring. The study provides findings from research and instances of failures and successes to bolster this strategy. Pype *et al.,* (2017) presented the Complex Adaptive Leadership (CALTM) Organizational Capability Questionnaire (OCQ) to each participant of the hospice treatment group, (n = 15), as well as to the palliative care doctors there (n = 15). On the items with low scores and potential issues, there were group talks. Descriptive statistics (sum score, mean, and standard deviation) were used to analyze the data. To find variations within each group, the one sample T-Test was applied. Mean scores for both groups of individuals ranged from good to outstanding. Zhang *et al.,* (2018), a portable monocular camera and an IMU are used to suggest a unique heading estimate method. The suggested method addresses the problems of visual-based estimates, including erroneous prediction during image blurrings and lengthy calculations. Specifically, the suggested momentum-supported visual feature matching with neighboring proximity restrictions may guarantee estimation robustness and computing efficiency in the procedure of isolating the inliers within the prospective featured matches utilizing Sample & Consensus methods. The findings for the associated headings demonstrate the suitability of the suggested approach for estimating the contents of headings over time. Rezapour *et al.,* (2022) were conducted for insight into how the Covid-19 epidemic has affected the use of PHC. Between 2019 and 2021, a before-and-after investigation was done. The study explored 56 medical science universities across the nation. "SIB" is the name of the data that was taken from an electronic health record (EHR). As a criterion for rating the PHC, three key indicators were chosen: the proportion of real services delivered and the percentage of customer satisfaction. The three indicators were a weighted average of the essential services offered by (doctors, dentists, mental health specialists, midwives, and nutritionists). The data analysis and reporting processes employed SPSS 16 software and included both descriptive statistics and analytical statistics (Wilcoxon test). All analysed variables, with the exception of the level of percentage of customer satisfaction, showed a statistically significant difference between before and after the Covid-19 separation between the examined dimensions($P < 0.05$). Bucknall and Hitch (2018) presented a new complexity-based model for knowledge translation in healthcare, which was published. By highlighting the variety of variables present in complex systems, the Knowledge Translation Complexity Network Model (KTCNM) offered an alternative perspective. The paradigm promotes an integrative approach and emphasized the interdependencies among actions, interactions, and people. The selective implementation of more efficient tactics across all parties involved and levels of service may be enabled easier with additional development, encouraging redesign and innovation. Sturmberg *et al.,* (2019) investigated the idea that a person's inner system and outside surroundings communicate in an ordered structure to create their state of health. In order to

identify it's both top-down and bottom-up causal processes, the idea of health synthesizes the combination of qualitative and the quantitative evidence of interconnections and restrictions that are now available. As a result, in order to deliver successful care, they require strategies that collaborate individualization with state-of-the-art scientific methodologies to tackle the physiological functioning of the molecular networks, which together essentially cause both health and illness.

2. Materials and methods

The CAL™ organizational Capabilities Questionnaires

We utilize a team measuring instrument that follows the complicated science paradigm to assess how well healthcare organizations are operating in the zone of complexity. The "Organizational Capability Questionnaire" (OCQ) for "Complex Adaptive Leadership "(CALTM) created has undergone extensive validation in business teams and organizations. The results of the CALTM OCQ, which must be completed by teammates, offer a broad idea of how well a team can function as an autonomous unit in challenging circumstances.

Additionally, since the Questionnaire is a tool to be employed in a continuous method for superior development, it is not just the results in and of itself that are significant, but also the evaluation and discussions on the results. As a result, the CALTM OCQ may be suitable to assess team performance in healthcare organizations requesting extraordinary levels of versatility and adaptation in challenging situations. The Questionnaire consists of sixteen inquiries with a 10-point rating system. A higher number, calculated based on complexity principles, indicates greater team efficiency; the values range from 16 to 160. Danger zone: 60-100; good range: 100-120; excellent range: >120. The use of the Questionnaire was authorized in full, and the author retains full copyright and all other rights.

Participants

In our research, we have decided to concentrate on supportive home-care groups are an example of an ensemble that works in a complex environment.

There are now organized palliative home care teams worldwide to provide patients with specialized palliative care in their own homes, typically in partnership with conventional primary healthcare providers. According to published research, these organizations are providing excellent care with the goal of controlling symptoms in individuals, avoiding hospital admissions, using emergency rooms, and preventing hospital mortality. When significant issues arise with hospice patients at home, the group consults with General Practitioners (GPs). Each individual GP has a different style of working with the team because each and every patient's situation is different. Every action done by the team is supported by their expertise, indicating that they are not even though they can't forecast and forestall the complete pathway the persevering will exhibit, as in the plan and oversight region. We contend that terminally home care organizations can be classified as CAS because their typical work is located in the more complicated Region of the Diagram of Confidence and Agreement.

A residence of fifteen teams providing palliative care, these teams are made up of doctors who specialize in palliative care, nurses who specialize in it, psychologists, and organizers. Nurses attend to patients at their residences while medical professionals and psychiatrists support and coach the nurses throughout weekly team meetings where patient cases are discussed. Even though just one or two nurses examined a majority of clients, team sessions enable information and skill exchanges across all cases. The daily activity is

planned and organized with input from the secretary and organizers.

There were two participant recruitment groups. The most extensive palliative medical team was the initial group to get the Questionnaire responses, and all of the team members were invited to take part. This would help us understand the responses of the team members from various professions. Second, we intended to assess how members of one team's particular profession responded across several teams. The results will benefit us in understanding how teamwork affects answers rather than just professional discipline. To that goal, we made use of a practical sample of doctors who provide health care. At a meeting of physicians who specialize in palliative care, everyone present had been offered to participate in the study.

Data collection

During two separate events group 1's and group 2's educational seminar for doctors and regular team meetings the questionnaires were given out and secretly filled out by everyone who attended. In addition to answering the Questionnaires as a team participant, candidates were required to evaluate the daily activities of their team.

Following the completion of the Questionnaire, both groups engaged in a group discussion on various possible issues, including acceptance (How to accomplish individuals react to the Questionnaire? Utility (the amount of time needed to complete the Questionnaire), accessibility and comprehension of the inquiries, and flexibility (Is the Questionnaire designed for business teams appropriate to use in healthcare teams?). The groups also discussed how well each member of the team and the team as a whole performed. Each item was examined, and conversations were had about how responses made sense in light of the participants' regular jobs. An educated palliative care physician and the first author both took field notes during the debate of group 1 and group 2, respectively. The goal of the participant's purpose annotations was to record low-score areas that they had recommended as a place to begin group efforts to enhance quality in order to highlight the usefulness of the assessment as an audit tool. There were no guidelines for how field notes should be taken because no additional study of field notes was anticipated.

Analysis

Applying SPSS 22 program, descriptive figures were computed. Every respondent's median rating for all of the questions, the team's overall score, and the average and standard deviations for the entire sample of participants were calculated. To find variations in aggregate scores between each group that were statistically significant, the samples T-Test was performed.

3. Results

Participant

➢ **Group 1**

Three coordinators, three doctors, four assistants, and ten nurses, whose hospice care team was the biggest, all filled out the Questionnaire while they attended the team meeting (n = 20). The two team psychologists failed to attend the session or take part in it. Following an explanation of the Questionnaire's purpose, all respondents verbally consented.
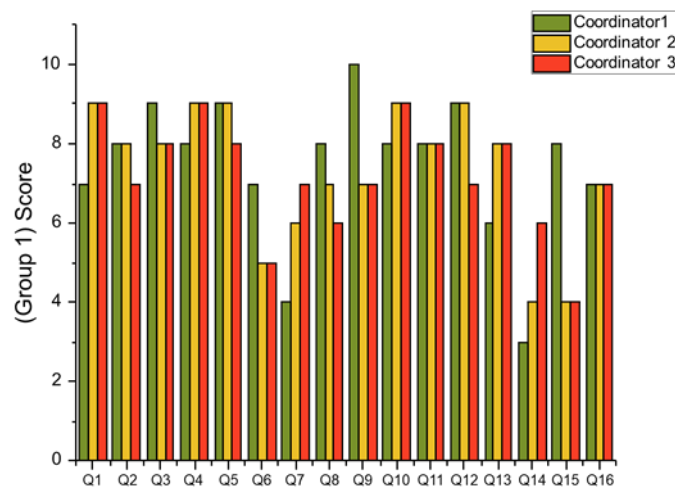
➢ **Group 2**

The 15 doctors in attendance at the educational event all consented to take part. Out of the 15 teams, these doctors comprised 13, with two teams having two doctors each. Following

an explanation of the Questionnaire's significance, each participant verbally consented.

Scores from questionnaires

➢ **Group 1**

The largest team's average total score was 126.6/160 (=good), with individual team members' scores ranging from 86 (Physician 2) to 155 (Secretary 1) and a standard deviation of 21.7 points. Physicians performed below the mean, whereas coordinators rated mostly the mean. Every single secretary outperformed the average. The scores given to the nurses ranged from below the mean to above it. Statistics show that there are statistically significant variations in the cumulative scores of the team members (p<0.001; t = 34.3; df = 15; 96%; CI = 113.6– 132.4). (Figure 1,2,3,4, and 5) has details about the scoring of the largest team members.

Figure 1: Scores on the difficulty test for the largest number of teams (coordinator) [group 1]
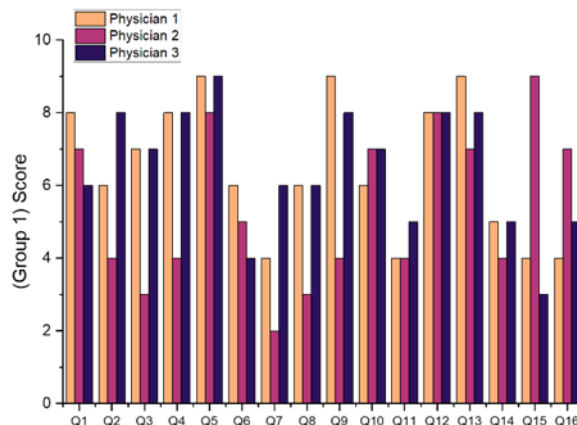
Figure 2: Scores on the difficulty test for the largest number of teams (physician) [group 1]

Figure 3: *Scores on the difficulty test for the largest number of team (secretary)   [group 1]*

Figure 4: *Scores on the difficulty test for the largest number of teams (nurse 1–5) [group 1]*

Figure 5: *Scores on the difficulty test for the largest number of teams (nurse 6–10) [group 1]*

➢ **Group 2**

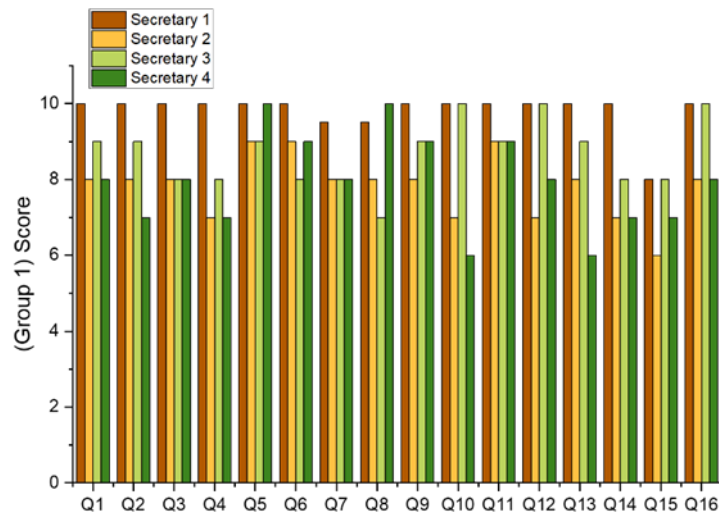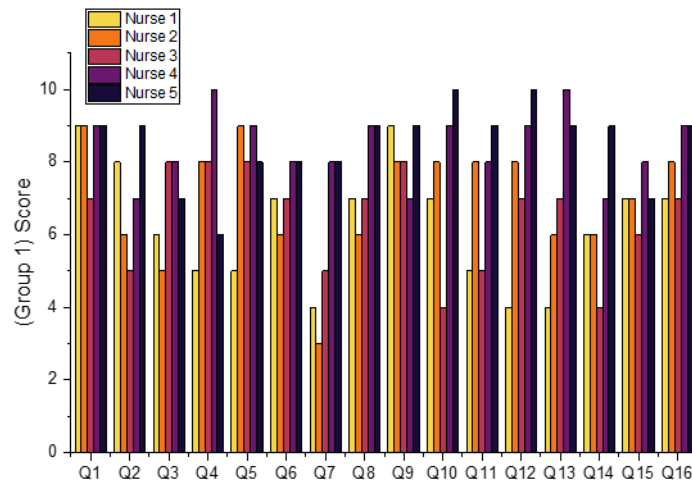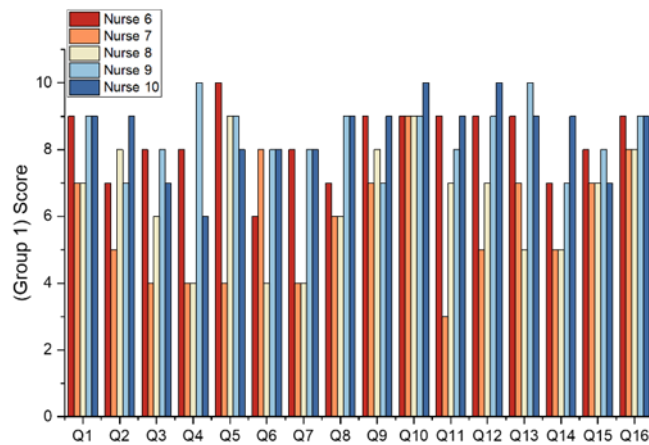The mean overall score for all physicians providing palliative care was 124.3/160 (= excellent), with a range of 62 (Physician 8) to 138 (Physician 6) and a standard deviation of 22.0. There are statistical substantial variations in the subjects' aggregate scores (p<0,001; t = 25.0; df = 15; 96% ;CI = 103.6-122.8). **(Table 1, 2, 3, and 4)** provides information on the results of the Questionnaire.

Table 1: Results on the difficulty questions for group 2 of terminal care physicians [each item 1-5;]

	Q1	Q2	Q3	Q4	Q5
1	10	8	9	9	8
2	9	7	10	6	9
3*	7	6	9	6	9
4	9	5	8	7	8
5	8	4	5	8	8
6**	9	10	8	8	9
7**	7	5	8	9	9
8	5	1	1	5	7
9	10	5	7	4	9
10	9	6	7	7	10
11	9	5	8	7	8
12	9	7	8	7	8
13	9	6	8	5	9
14	9	3	7	3	7
15*	10	4	6	8	10
16	9	7	10	6	9
17	5	1	1	3	7
18	9	5	8	7	8
19	9	8	8	8	9
20	9	5	8	7	8
Mean	8.6	7.3	8.3	8.5	10.6
(SD)	(1.4)	(1.9)	(2.1)	(2.0)	(0.9)

Table 2: Results on the difficulty questions for group 2 of terminal care physicians [each item 6-10]

	Q6	Q7	Q8	Q9	Q10
1	9	8	4	9	8
2	7	4	7	9	8

3*	8	5	7	6	8
4	7	6	7	8	7
5	7	7	8	5	7
6**	10	9	8	9	8
7**	7	6	7	8	8
8	7	1	5	3	9
9	8	4	8	9	8
10	8	7	8	8	9
11	8	4	8	7	7
12	7	5	8	8	7
13	7	6	8	8	8
14	4	3	8	8	4
15*	8	5	9	7	8
16	7	4	7	9	8
17	5	1	5	3	7
18	8	4	8	7	7
19	9	9	8	9	8
20	7	6	7	8	7
Mean	7.3	7.3	9.3	9.5	7.5
(SD)	(1.3)	(2.3)	(2.0)	(1.7)	(2.1)

Table 3: Results on the difficulty questions for group 2 of terminal care physicians [each item 11–16; total 16–160]

	Q11	Q12	Q13	Q14	Q15	Q16	Sum
1	3	9	9	8	3	8	122.0
2	6	9	10	7	6	7	121.0
3*	5	8	9	7	7	8	115.0
4	9	8	9	5	4	4	111.0
5	6	6	8	7	3	7	104.0
6**	8	9	9	8	8	8	138.0
7**	7	8	9	9	8	8	123.0
8	3	3	3	1	5	3	62.00
9	6	8	10	5	9	3	113.0
10	8	8	10	7	5	8	125.0

11	4	7	9	7	6	7	111.0
12	6	8	8	6	7	7	116.0
13	6	7	9	9	6	4	115.0
14	8	5	9	4	7	3	92.00
15*	5	9	10	6	9	5	119.0
16	6	9	10	7	6	7	121.0
17	3	3	3	1	5	3	56.00
18	4	7	9	7	6	7	111.0
19	8	8	9	8	6	8	132.0
20	9	8	9	5	4	4	111.0
Mean	6.0	8.4	9.7	6.4	6.1	6.0	124.3
(SD)	(1.8)	(1.6)	(2.7)	(2.1)	(2.0)	(2.9)	(22)

Table 4: Results on the difficulty questions for group 2 of terminal care physicians [each item 1–16; total 16–160]

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Sum
Coordinator 1	7.00	8.00	9.00	8.00	9.00	7.00	4.00	8.00	10.00	8.00	8.00	9.00	6.00	3.0	8.00	7.00	119.0
Coordinator 2	9.00	8.00	8.00	9.00	9.00	5.00	6.00	7.00	7.00	9.00	8.00	9.00	8.00	4.00	4.00	7.00	117.0
Physician 1	8.00	6.00	7.00	8.00	9.00	6.00	4.00	6.00	9.00	6.00	4.00	8.00	9.00	5.00	4.00	4.00	103.0
Secretary 1	10.00	10.00	10.00	10.00	10.00	9.50	9.50	10.00	10.00	10.00	10.00	10.00	10.00	10.00	8.00	10.00	155.0
Nurse 1	9.00	8.00	6.00	5.00	5.00	7.00	4.00	7.00	9.00	7.00	5.00	4.00	4.00	6.00	7.00	7.00	100.0
Nurse 2	9.00	6.00	5.00	8.00	9.00	6.00	3.00	6.00	8.00	8.00	8.00	8.00	6.00	6.00	7.00	8.00	111.0
Nurse 3	7.00	5.00	8.00	8.00	8.00	7.00	5.00	7.00	8.00	4.00	5.00	7.00	7.00	4.00	6.00	7.00	103.0
Secretary 2	8.00	8.00	8.00	7.00	9.00	9.00	8.00	8.00	8.00	7.00	9.00	7.00	8.00	7.00	6.00	8.00	125.0
Nurse 4	9.00	7.00	8.00	10.0	9.00	8.00	8.00	9.00	7.00	9.00	8.00	9.00	10.0	7.00	8.00	9.00	135.0
Nurse 5	9.00	9.00	7.00	6.00	8.00	8.00	8.00	9.00	9.00	10.0	9.00	10.0	9.00	9.00	7.00	9.00	136.0
Physician 2	7.00	4.00	3.00	4.00	8.00	5.00	2.00	3.00	4.00	7.00	4.00	8.00	7.00	4.00	9.00	7.00	86.0
Secretary 3	9.00	9.00	8.00	8.00	9.00	8.00	8.00	7.00	9.00	10.0	9.00	10.0	9.00	8.00	8.00	10.0	139.0

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Nurse 6	9.00	7.00	8.00	8.00	10.0	6.00	8.00	7.00	9.00	9.00	9.00	9.00	9.00	7.00	8.00	9.00	132.0
Nurse 7	7.00	5.00	4.00	4.00	4.0	8.00	4.00	6.00	7.00	9.00	3.00	5.00	7.00	5.00	7.00	8.00	93.0
Nurse 8	7.00	8.00	6.00	4.00	9.0	4.00	4.00	6.00	8.00	9.00	7.00	7.00	5.00	5.00	7.00	8.00	104.0
Coordinator 3	9.00	8.00	8.00	9.00	9.0	5.00	6.00	7.00	7.00	9.00	8.00	9.00	8.00	4.00	4.00	7.00	117.0
Physician 3	8.00	6.00	7.00	8.00	9.0	6.00	4.00	6.00	9.00	6.00	4.00	8.00	9.00	5.00	4.00	4.00	103.0
Secretary 4	8.00	8.00	8.00	7.00	9.0	9.00	8.00	8.00	8.00	7.00	9.00	7.00	8.00	7.00	6.00	8.00	125.0
Nurse 9	9.00	9.00	7.00	6.00	8.0	8.00	8.00	9.00	9.00	10.0	9.00	10.0	9.00	9.00	7.00	9.00	136.0
Nurse 10	9.00	8.00	6.00	5.00	5.0	7.00	4.00	7.00	9.00	7.00	5.00	4.00	4.00	6.00	7.00	7.00	100.0
Mean (SD)	8.3(1.2)	7.1(1.6)	8.0(1.9)	8.0(1.9)	8.3(1.7)	6.9(2)	6.7(2)	9.0(1.5)	8.1(2)	9.0(1.6)	7.1(2.2)	9.9(1.8)	7.6(1.8)	8.0(2.0)	6.8(1.3)	7.9(1.5)	126.6(21.7)

> **Comparison between Groups 1 and 2**

The averages for the overall sum of the groups are often consistent for groups 1 and 2, originating at 126.6 and 124.3 out of 160, respectively.

In the two categories, the query with the smallest mean score across all of the inquiries was asked 7 ("There is an efficient, clearly defined method for gathering continual feedback").

The two questions with the greatest average ratings in each group were question 1 ("People in the organization have a strong commonality of common purpose") and question 5 ("People are well prepared and competent to do their task").

> **Group discussion**

In both groups' discussion and reflection sessions, it was determined that the Questionnaire was an efficient approach based on all factors considered. Respondents agreed that completing the Questionnaire was a fun group activity, the questions were simple and easy to comprehend, and the Questionnaire could be finished in 30 minutes. Only 16 questions make up the Questionnaire, but before they could be replied to, participants had to think about their daily routines. The Questionnaire's perspectives had been considered relevant for medical teams.

All participating professions verified these issues. The same discoveries have been made in both group discussions. The team members' instinctive assessments of the team's performance were consistent with the group's scores on individual questions. During the conversation session, every aspect that appeared in the results was discussed, but the two extremes (highest and lowest) received the most attention. We now provide some samples of the highest and lowest scores to show the potential results of such a conversation.

Participants in the conversation noted that among the objectives of the initial consultation for each new patient, case was to inform patients and GPs of the team's goals. We all consciously share this primal movement as a result. High ratings for the claim that "people

are well qualified and skilled to do their work" reflect the team's status as industry authorities who are regularly sought out for guidance by healthcare professionals. Low scores on the statement "There is a functional, clarified process for constant feedback" contributed to the feeling of job isolation several participants reported. Since most contact with patients was made by the nurses alone, they frequently worked alone and indicated that they did not receive feedback on a daily basis. Additionally, some doctors who were supposed to supervise and counsel the nurses performed poorly on this test question (one doctor had a score of 1/10).

This resulted from the fact that they were essentially liable for the team's medical judgments and that they had no option to consult a colleague about challenging circumstances. Attempts to assess working conditions in order to improve continuous feedback systems have been inspired by these reflections. Illustrations of these activities include the commitment to make colleagues more accessible for debriefing following a challenging intervention and the routine scheduling of discussions concerning difficult cases involving patients during team meetings.

4. Discussion

> **General results**

According to the principles of intricacy science, this study is the first one to present, which provides a quantitative assessment of the daily operations of healthcare teams and experts. Establishing the degree of adaptability in healthcare teams as we did in our study might present possibilities for comparisons of the teams' accomplishment as a first basis for attempts to improve excellence and provides the body of research on supporting interprofessional healthcare organizations in offering excellent care, even though general descriptions of healthcare collaborates with complex responsive buildings have been released, giving us an inside look at the internal functioning of the teams. However, the Questionnaire needs to be further validated for validity and reliability for healthcare teams before it can be used as a quality indicator and added to the corpus of team evaluation tools. The application of the Questionnaire as a motivator to initiate interesting dialogues that lead to developing results in team behavior change needs further investigation in the discipline of healthcare.

The prediction has become difficult to relate this Questionnaire to the body of existing knowledge because the application of this Questionnaire in healthcare organizations has not yet been considered in the context of any other papers. Our findings can be used as a starting point for comparison assessments to gauge the degree of adaptation and internal organization in various teams. Teams that work in surgical centers or rooms for emergencies, to give two examples, are used for operations in difficult, chaotic circumstances.

> **Group 1**

The highest team ratings for everyone on the team show the lowest standard deviations for all inquiries. This shows that the team members' overall results are pretty similar despite their various occupations and assignments, and duties that go along with them. The fact that the standard deviations are fewer than two indicates that most teammates, regardless of their position or duty, believe that the team functions mostly in the same way. This may be explained by the frequent team conferences and the shared objectives and duties. Individual variations did exist depending on the profession at the same time. For instance, the team's secretaries all achieved greater than-average ratings, with two out of the three

assistants receiving the greatest scores among all team members. For instance, secretaries' excellent performance on questions 7 (the presence of feedback) and 14 (clear regulations of the organization) in contrast to their coworkers may be explained by the description of their tasks being clearly defined and by the relative lack of unexpected events in their current position compared to that of nurses. It is probable that both coordinators possess a thorough awareness of how the team functions, considering that the results were almost similar to the team's mean. This is important to their role.

➢ **Group 2**

While the scores of the individual members of this group exhibit minimal standard deviations across all questions, the responses to some questions exhibit considerable variation. Physician 8 reacted with a score of 1 to questions 2, 3, and 14, whereas the physicians who scored the highest responded with scores of 8, 10, and 9 to those same questions, respectively.

➢ **Comparison between groups**

Additionally, we can find areas that need development (low scores) or instances in which teams can serve as role models for best practices for others (high scores) through contrasting scores among groups as well as within the groups. As a result, the major goal and reward of taking this Questionnaire are not the results in and of itself but rather the conversations that follow. The Questionnaire can be used to discover cooperation behaviors across healthcare organizations and as a springboard for comprehensively discusses on the level of cooperation within the group functioning, as a statistically significant variance between groups is an optimistic signal.

The outcome yielded a very low median score (greater scores are preferable) for question 7 in both groups: "There is an efficient, clearly established system for receiving continuous feedback." This may be partly because many team members (physicians and nurses) work primarily alone and do not receive direct supervision from teammates, as described in the outcomes section. Successful feedback supply is understood to need direct observation. Teams may be unable to collaborate in pairs due to organizational constraints (such as a staff deficit). Other methods of offering feedback, such as case based conversations or chart reviews, might be investigated, nevertheless. This method of giving effective peer evaluation may promote group learning at work. This type of learning, also known as co-evolution, is a characteristic of CAS and may eventually result in improved patient care.

In all groups, the answers to questions 1 and 5"people in the organization have a strong commonality of common purpose" and "people are well equipped to do their work" were among the three with the greatest average marks. Given that patients and medical professionals frequently discuss their common sense of responsibility (providing end of life care to individuals at home), question 1 seems to make sense. The answer to question 5 is clear, given that palliative home-care teams serve as consultants for community nurses and physicians and are, therefore, aware of their areas of expertise. The high scores don't necessitate any modifications to the way the team works. An analysis of the factors that led to the high scores could have instead revealed the cause and inspired teams to deliberately repeat effective tactics. To communicate with working professionals, it could be helpful, for example, to reflect the "shared sense of common purpose" in a declaration of intent.

➢ **Group discussion and contemplation**

Participants learned about characteristics of effective teams during the group discussion

and reflection that they already understood instinctively yet have now been evaluated and described. As mentioned in the sections before it, in order to give the results of the questionnaire importance and significance and to enable teams to launch efforts to improve quality, the results must be presented in the context of the team's daily mission and operation. The team members' talks directly led to the quality development activities that targeted improved reporting possibilities, for example. This could foster a sense of ownership for the plans and make the execution a greater achievement than top-down approaches. As a result, we recommend that you go through every component score one at a time and allow everyone on the team to explain what they scored based on their individual practice. The things that are deemed to be significant obstacles in collaboration, the items with the lowest ratings, and major disparities between team member scores can all be used to prioritize areas for quality enhancement projects.

The research's strength is that it demonstrates how to use a solid theoretical framework in order to quantify the respondents' perceptions of the effectiveness of interactions among members of the healthcare team. Our findings indicate that the Questionnaire shows promise as a tool for pinpointing areas where team functioning could be improved.

Be aware of some restrictions. First, in groups 1 and 2, we simply included one team and one profession, respectively. Our results might be confirmed if the study were conducted again with additional groups and more professions. Second, because of the limited sample size and practicality as the study's main objective, we weren't involved in psychometric assessments of the replies. This needs to be done in upcoming studies with bigger sample sizes. Thirdly, the results of the Questionnaire have not been used to analyze or connect the teams' real performances. By doing this, the Questionnaire's use in suggesting possibilities for enhancement in quality might be further supported.

5. Conclusion

The complexity science questionnaire that was employed in our study provides a workable and prospective tool for assessing the daily activities of healthcare teams. In our study, palliative home care teams examined the Questionnaire to assess their performance and launch quality improvement activities. The intricate research Questionnaire that we used in our research has proved a practical and interesting tool for assessing the everyday activities of healthcare organizations. In our study, terminally home care teams analyzed the Questionnaire responses to audit their performance and launch quality enhancement activities. The study's Questionnaire is appropriate for interprofessional healthcare teams to utilize to assess their regular operations in an objective manner. Efforts for quality improvement can be launched by having a group conversation about the questionnaire results and noting any issue areas.

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