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Evaluating the Aspects of Integration in CARITAS - a Dementia Care Network

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Abstract

Objectives: The capability and capacity of the primary and community care (PCC) sector for dementia in Singapore may be enhanced through better integration. Through a partnership involving a tertiary hospital and PCC providers, an integrated dementia care network (CARITAS) was implemented. The study evaluated the process and extent of integration within CARITAS.

Design: Triangulation mixed-methods design and analyses were employed to understand factors underpinning network mechanisms.

Setting: The study was conducted at a tertiary hospital in the northern region of Singapore.

Participants: We recruited participants who were involved in the conceptualization, design, development and implementation of the CARITAS programme from a tertiary hospital and PCC providers.

Intervention: We used the Rainbow Model of Integrated Care-Measurement Tool (RMIC-MT) to assess integration from managerial perspectives. RMIC-MT comprises eight dimensions that play inter-connected roles on a *macro*-, *meso*- and *micro*-level. We administered RMIC-MT to healthcare providers and conducted in-depth interviews with key CARITAS stakeholders.

Primary and secondary outcome measures: We assessed integration scores across eight dimensions of the RMIC-MT and factors underpinning network mechanisms.

Results: Compared to other dimensions, functional integration (mechanisms by which information and management modalities are linked) achieved the lowest mean score of 55. Other dimensions (e.g. clinical, professional and organizational integration) scored about 70. Presence of inspiring clinical leaders and tacit interdependencies among partners strengthened the network. However, the lack of structured documentation, shared information-technology platform and centralized care coordinators hindered functional integration.

Conclusion: CARITAS has reached maturity in micro- and meso-levels of integration while macro integration need further development. Integration can be enhanced by assessing service gaps, increasing engagement with stakeholders and providing a shared communication system.

(257 words)

Key words: dementia, care coordination, integrated systems, mixed method, programme evaluation.

Article Summary

Strengths and Limitations of this Study

- The strengths of this evaluation included the use of a mixed-methods - drawing on both quantitative and qualitative methods to generate insights.
- Analyses by three coders minimized the bias of qualitative research.
- However, sampling of interview participants was conducted through the recommendations of a managerial staff and could have skewed the selection.
- Additionally, 48% of the participants did not complete the RMIC questionnaire which may limit the representativeness of the responses.
- Despite the limitations, the interviews largely validated the RMIC responses.

Funding Statement

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Competing Interests

Philip Yap is a key clinical leader of the CARITAS integrated dementia care network. The other authors declare that they have no competing interests.

Introduction

With ageing populations and more multi-morbidity, managing chronic and complex patients is a critical task for health systems. Care integration has been advocated as an approach to improving access to, quality and continuity of health services [1]–[4]. Integrated care involves coordination of care services across different levels and sites so that recipients of care experience continuity according to their needs and preferences. Recent studies on the effects of integrated care have been mixed. While some studies reported reduced hospital admissions, better quality of life and patient satisfaction [5]–[7], others showed little effect on hospital utilization or mortality [8]-[9] or increased nursing home admissions [10].

There are several explanations for such contrasting findings. First, there are inherent difficulties in evaluating integrated care with a reductionist randomized controlled methodology [11]. Compared to single interventions, care integration involves multiple components, layers and outcomes [11]. Thus, evaluation of such a complex approach needs to consider the context of the composite intervention and the interaction between different contextual factors beyond merely assessing one or few quantitative outcomes [11]. Secondly, the time needed to experience and assess outcomes in integrated care exceed the usual duration of most studies. Multiple or mixed methods enable more comprehensive data collection to evaluate the maturity and impact of integrated care. Thirdly, integrated care as a concept is ambiguous as it encompasses a range of meanings [2]-[3], [12]–[14]. The lack of a conceptual framework results in paucity of measures to assess the extent and quality of integrated care.

The Rainbow Model of Integrated Care (RMIC) was conceived to provide a comprehensive framework and taxonomy of integrated care based on principles derived from primary care [15]-[16]. An initial framework was developed from literature reviews, further refined and validated Delphi technique with international experts and practitioners of integrated care from 11 countries [15], [17]. RMIC comprises eight dimensions structured along macro-, meso- and micro- levels, which can be contextualized to any integrated care setting [18]. It has been adopted as a conceptual framework to evaluate integrated care from managerial perspectives [17], [18].

Beyond a conceptual framework, we also endeavour to understand *how* integrated care programmes achieve intended outcomes. Existing studies have outlined strategies to integrate person-centred services. Within a provider team, strategies include ensuring care coordination and continuity through regular team meetings [19], shared information and communication technology (ICT) system and effective data management [4], [20], strong leadership [4], and an organisational culture that supports accountability and shared decision-making [4]. Externally, communication between providers is crucial to achieve integration [4], [20]. Funding incentives for providers could also foster greater commitment and sustain success [4], [21]. Lastly, eliciting the preferences of individuals and fostering mutual trust and responsibility are crucial to achieving person-centered and integrated care [22].

We evaluated the process and determinants of integration in a dementia care network. Using the RMIC Measurement Tool (RMIC-MT), we evaluated the level and extent of integration. We also analyzed the contextual factors and workings that underlie integration, and identify strategies for improvement and scaling-up. The study adds to extant knowledge on integrated care systems for patients with complex needs such as dementia, and provide important insights for the design, development and implementation of integrated care programmes.

Methods

This study is the first phase of a mixed-methods evaluation of the CARITAS programme to examine the extent of integration in the network. The second phase which examines care recipients' experiences with the network and assess clinical outcomes will be separate. Domain Specific Review Board, National Healthcare Group (Singapore) gave study ethics approval [Ref. 2017/00904]. We used the SQUIRE checklist when writing our report [23].

RMIC Framework

RMIC structures integrated care along macro-, meso- and micro- levels. At the macro level, *system integration* refers to the linkages and visibility of the partnership formed between the healthcare system and external environment. At the meso level, *organizational integration* refers to network mechanisms between different organizations, and *professional integration* refers to partnerships between different professionals in the healthcare system. At the micro level, *clinical integration* refers to the coordination of patient care services across different professionals in the healthcare system. *Functional* and *normative integration* link the macro, meso and micro levels of integration. The former refers to key support functions and activities by which financing, information, and management modalities are linked. The latter refers to essential social and cultural factors (e.g., shared mission, vision and values) within the system. The RMIC also includes person-focused and population-based perspectives to guide better coordination of services across care continuum. *Person-focused care* reflects a bio-psychosocial health approach and considers personal preferences and needs, while *population-based care* requires healthcare be provided according to health profiles and needs of a defined population.

Intervention/Programme

CARITAS was established as a dementia care network in 2012 within Singapore's northern Regional Health System [18]. The acronym CARITAS signifies: comprehensive, accessible, responsive, individualized, trans-disciplinary, accountable and seamless care for persons with dementia (PWD) [24]. CARITAS aims to: (i) enhance the quality, capacity and efficacy of dementia care through vertically and horizontally integrated team-based care with regular case conferencing, partnerships between the tertiary hospital and primary and community care; (ii) increase the capability of primary and community care to care for PWD through regular training, shared care and case conferencing; and (iii) empower caregivers to care better for PWD through caregiver training programmes and a direct helpline. The model was developed based on the concept of integrated practice units (IPU). IPU embodies concepts of value-based care in organizing care around a condition and/or population, shared decision-making, regular team meetings, and responsibility for the full cycle of care for the condition [25]. Figure 1 depicts the CARITAS's logic model.

Study Design

We applied a triangulation mixed-methods approach to combine the insights obtained from administering RMIC-MT, conducting ethnographic observations and semi-structured interviews. Quantitative and qualitative data were collected concurrently and analysed separately, but compared and contrasted using triangulation.

Quantitative Data

Forty-nine healthcare professionals from CARITAS were invited via email to participate. A reminder was sent after three months. The questionnaire, averaging 30 minutes to complete, included a participant information sheet and consent, capturing demographics and the RMIC-MT. RMIC-MT comprised 62 items grouped into eight dimensions with each item rated on a 5-point Likert scale (from *never* to *all the time*). An additional option *(not sure/don't know)* was provided if participants felt inadequate to provide a response. Values from 0 to 100 were assigned to each point of the Likert scale and mean scores were computed across all dimensions and respondents. We excluded entries with >30% missing data from analyses. Higher scores indicated higher levels care integration. Descriptive data and mean score were computed using STATA v12.

Qualitative Data

To better understand the activities of CARITAS, researchers (MN, LH and IC) observed consultations and discussions (n=14) [26] in ambulatory clinics at the tertiary hospital, multi-disciplinary meetings, primary care clinic and tele-consultations. Observers were inconspicuous and did not influence the sessions. Field notes were recorded after each observation session using a guide (Appendix 1).

Additionally, we conducted semi-structured interviews with key stakeholders of CARITAS (n=17) to understand the programme workings and outcomes determinants. We included participants who were involved in the conceptualization, design, development and implementation of the programme. Those who had resigned were excluded. Participants were selected using purposive sampling [27] to have a mix of healthcare professionals from different settings and with different periods of involvement. Interview questions were developed based on the RMIC dimensions including care coordination (clinical integration), how professionals worked together (professional integration), financial and information management (functional integration) (Appendix 2). Interviews averaged 67 (range 42 to 93) minutes, were audio recorded and transcribed verbatim. Numbered identifiers were assigned to participants to protect their identities, with prefixes “T” (from the tertiary hospital) and “P” (PCC providers). After each interview, team members debriefed and created summary notes. Analysis was done inductively through thematic coding and deductively through classifying data into initial themes (NVivo v11). Team members (MN, LH and IC) developed a shared codebook to document the initial themes and definitions, which were iteratively refined into prominent themes. These final themes were subsequently organized according to the eight RMIC dimensions of integration.

Data Triangulation

Through rigorous discussions, qualitative themes were classified accordingly to provide insights on the quantitative results. The triangulated findings were subsequently presented to CARITAS stakeholders at a meeting to assess their validity. Feedback was used to refine the categorization of themes and interpretation of results.

Patient and Public Involvement

Patients and their family caregivers were not involved in the design and conduct of this phase of the study, which was focussed on evaluating the organization of CARITAS care network and extent of integration from care providers' perspectives. As such, the findings will primarily be disseminated to healthcare professionals and providers, not patients and their families. Findings are intended to inform care integration and delivery and will not directly result in any change to patient care.

Results

RMIC-MT

Forty-nine healthcare participants came from the tertiary hospital (24.5%), volunteer welfare organizations (VWO) (53.1%), a primary care provider (8.16%) and national agency (14.3%). Twenty-seven (55.1%) attempted the questionnaire, 2 (7.41%) did not complete and 12 (44.4%) had >30% missing data. Majority (66.7%) opted to be anonymous. The final analysis comprised 13 respondents (48.1%) from 7 organizations - tertiary hospital (38.5%), volunteer welfare organizations (30.8%), primary care provider (23.0%) and national agency (7.7%). Majority were tertiary hospital doctors (38.5%) with >1 year of involvement in CARITAS (84.6%) (Table 1).

Most dimensions achieved scores averaging 70/100 (Figure 2). Population-based care scored the highest (73.19), followed by professional (73.15), clinical (72.80) and organizational integration (71.93). Functional integration scored the lowest (54.94).

Ethnographic Observation and In-depth interviews

Based on the observation notes, a typical patient's journey (Appendix 3) was charted which provided initial understanding into the interventions available at CARITAS and how members worked across settings within the system. Doctors (37.0%) from the tertiary hospital (53.0%) with >4 years of involvement (58.0%) comprised the larger proportion of participants in the semi-structured interviews (Table 2). A small proportion of themes derived from in-depth interviews overlapped with those of observational notes, which described a patient's journey at various settings in the network. Themes regarding the background of the interview and reasons for their involvement in CARITAS were not classified into the eight RMIC dimensions. Relevant interview quotes corresponding to the RMIC-MT dimensions are summarized in Table 3.

Population-based care

This dimension scored highest as CARITAS was conceived specifically to address the growing burden of dementia in Singapore [28] and focused on building the dementia capabilities of primary and community care partners. PWD were admitted into the programme based on disease severity and extent of caregiver support. Stratification of patients, which enabled care to be delivered appropriately in primary and community care settings, resulted in better distribution of patients and care resources. Prior to CARITAS, primary care physicians lacked experience and expertise caring for PWD. The CARITAS team provided regular training, case conferences and teleconsultation via video conferencing to build competence of this group of community stakeholders. They appreciated the avenue for direct access to hospital dementia specialists for real-time advice. With increased capability and capacity of primary care for PWD, this freed up the tertiary hospital's resources to attend to patients with more complex and specialized needs.

Professional integration

This dimension assessed the presence of dedicated clinical leaders and mutual professional interdependencies. The leaders were described to be *"respectable, experienced, knowledgeable, always present and instrumental"* [ALL]. Members felt supported and understood when discussing patients which increased their confidence to care for PWD. It also enabled them to possess greater responsibility for their patients, resulting in a higher level of professional integration.

Additionally, community partners participated regularly at inter-disciplinary meetings where tertiary hospital referred patients to relevant community partners who would then update the team regularly on the patients. The opportunity for face-to-face communication served as a bridge between the tertiary hospital and community partners, and concurrently allowed partners to learn from each other. Consequently, strong interdependencies developed between community partners and hospital specialists, and the latter was able to tap on community resources such as home- and centre day-care services to complement hospital care. Community partners expressed that the team members were *"helpful to one another", "consistent",* *"committed"* and *intrinsically motivated"* [T001, P001, P002], hence fostering professional trust. They also reported that members received *"good support from the network"* and *"regular feedback among team members"* who *"had the same objectives"* and *"no competition mindset"* [T009, P006, P007]. Having a shared goal to improve care for PWD promoted a sense of accountability which enhanced professional integration.

Clinical integration

Members rated their performance on coordination, referral and follow-up of patients, involvement of patients in care planning and decisions, and if the network provided comprehensive services.

The structure of the CARITAS team was flat. Instead of the CARITAS lead directing unilaterally, team members took ownership of their patients and developed individualised care plans albeit through shared decision making. As a result, even when the lead was not present, discussions proceeded smoothly with each team member taking turns to update and discuss their cases. While diversity of opinions was encouraged, shared decision making was upheld and clinical integration maintained.

The strength of CARITAS laid in regular team meetings enabling two-way information flow and provision of a comprehensive range of services to address the multi-faceted needs of PWD and their caregivers. The relationships built through face-to-face meetings were invaluable in facilitating inter-professional exchanges and empowered members to manage more complex patients.

Furthermore, the integration of staff members across care settings allowed patients to expediently tap on a comprehensive suite of services from hospital-based interventions to community centre-based care and home-care, coupled with a phone helpline to cater to patients' ad hoc needs (Appendix 3). As a member expressed, *"It does help in terms of let's say we refer* *to the day care, the day care does try (…) to expedite some of the cases".* [T004]. By working in a coordinated manner, the integrated CARITAS service delivered comprehensive and continued care of a higher standard.

However, there were also factors impeding clinical integration. First, not all members, especially those from the community, could be present at every meeting. Unsurprisingly, members opined their objectives were not met when other partners caring for same patient did not attend meetings. Second, some members indicated the need for operational guides and protocols, particularly clearer criteria for referral to various services. While members with more years in the team appeared to have an implicit understanding of the criteria, newer members felt less confident and were concerned about inappropriate referrals.

Organizational integration

This dimension examined how well organizations collaborated to provide care and whether there was a shared understanding about care strategy. It also explored if there was effective leadership to connect across organizations. Having an influential clinical leader and the presence of a patient care workflow provided the foundation of organisation integration in CARITAS.

Since the inception of CARITAS, the clinical leader helped to form the network of organisations by enunciating a shared mission and aligning care goals. Despite team members coming from different care settings, the common vision to provide seamless care for PWD and their families with consistent bi-directional information flow enabled collaborative and integrated person centric care. There was tacit understanding of the workflow involving different member organizations with clear delineation of roles. Therefore, each member understood his work scope and responsibilities, empowering smooth operations and team integrity.

However, over time, staff turnover and change in the leadership of partnering organisations with attendant shifts in priorities have negatively impacted organisational integration. As a result, some members were less inclined to attend weekly meetings or only attended when they needed to discuss their cases. There were also been instances of decreased participation in learning opportunities such as case-based learning and continuing education initiatives.

Normative integration

We examined if members understood the vision and mission of CARITAS and if their desire and ability to work together. Although senior members were generally clear on the initiative's objectives, newer members were less able to do so. They shared that the objectives were not consistently conveyed; a member remarked *"because when I join that time, nobody tell[s]me what is the objective of Caritas network"* [P001] and another shared, *"we remind what is the vision and yah I don't think we do enough especially when people move on"* [P005].

Another issue lay in the primary care team not being able to participate regularly at team meetings. Information concerning patients from primary care was often provided by hospital team members who had learnt about the issues during the real-time video conferencing support for the primary care team. The reduced face-to-face interaction implied diminished opportunities for bonding and forging of a shared identity, and had impeded normative integration.

System integration

Systems integration assessed the presence of a favorable socio-economic and political milieu for advancing CARITAS as a viable model of integrated care. Given the thrust to advance quality care for older persons in the country, CARITAS presents a working model of integrated care for PWD and their families who often present with complex medical and social needs. With increased community-based resources to enhance care for older adults, CARITAS' ability to tap on these resources demonstrates its ability to synergise with the healthcare system at large to secure continuity and scalability. However, as the main focus has been day-to-day patient care, CARITAS has yet to prioritise efforts to increase awareness of its work and to translate to other regions.

Person-focused care

This dimension assessed the degree of patients' needs being explicit in care delivery, and patients being educated and involved in planning and organising of care. The CARITAS team adopted a biopsychosocial care approach and emphasized individualised relationship centred care across the disease continuum. As a member remarked, *"there is the same team who knows the patient, to be taking care of them as the primary team (...) We really get to know them, how to care for them and what are the reasons why they have certain behaviours before we can really give proper advice or treatment"* [T001]. The holistic and individualized approach was shared by another member who elaborated, *"we will look at things like the type of dementia, existing symptoms, the needs that they have in terms of both physical and psychological…and the impact on their social circles. Then we will study their families or their support network (...)* [T002]*"*

However, while the patients received person centred care, they lacked awareness of CARITAS as an integrated care team and how they benefited from the services afforded by the network's partners. They knew little of which agencies were in the network and how the hospital partnered them to deliver care. Engagement with the family caregiver support group dwindled with time as only a small number of caregivers regularly attended these sessions out of a large repository of caregivers in the network.

Functional integration

Functional integration investigates the extent financial and other incentives are used to improve teamwork, coordination and continuity of care. Functional integration had the lowest score which could be attributed to staff turnover, the financing system favouring tertiary care, and the lack of a shared platform for documentation.

Significant staff turnover, especially among community partners affected the stability of the team. Manpower shortage in community care compromised partners' attendance at weekly team meetings which in turn impacted care. Moreover, new staff lacked experience and skills in managing more complex problems and needed time to become proficient with the workings of the CARITAS.

Funding for CARITAS was channelled primarily to the tertiary hospital which shaped the notion that leadership and management was concentrated within tertiary care instead of being distributed across care settings. The initiative was perceived to be driven by the hospital which embraced accountability and setting of key performance indicators. As such, other partnering organisations tended to assume less accountability which compromised functional integration.

The absence of a common IT platform for structured information sharing between hospital and community partners also impeded functional integration. As team members caring for the same patient could not access each other's records, much time was spent during meetings to update members about patients' progress instead of discussing how best to improve care. The lack of shared documentation of previous and ongoing services for patients also risked duplication of services.

Discussion

This study assessed the process and extent of integration of the CARITAS dementia care network. We adopted a mixed-methods approach by triangulating the RMIC-MT with in-depth interviews and ethnographic observation. All but one RMIC dimension achieved a mean score of ~70/100 - highest for population-based (73.19) and lowest for functional integration (54.94). Qualitative findings revealed contextual factors that strengthened or hindered the integration of CARITAS. Notably, the presence of inspiring clinical leaders, having quick access to and close guidance from the tertiary hospital increased community partners' knowledge, skills and confidence in care delivery. The closely-knit inter-disciplinary and cross-institutional partnership also facilitated the common goal of person-centred care for the patient-caregiver dyad. However, less than optimal inter-organizational stakeholder engagement, lack of structured process documentation, shared IT-platform and centralized case management compromised the degree of integration.

The determinants of care integration within CARITAS are consistent with published literature. Salutary scores across professional, clinical and organizational integration could be attributed to knowledgeable and inspiring clinical leaders, regular face-to-face meetings and a comprehensive range of services for PWD and caregivers. These factors have been shown to facilitate the development of integrated care and its components [29]–[31]. Competent leadership in the sharing of clinical expertise, providing guidance on patient care and establishing a culture that facilitates accountability and shared decision-making [4], [32]-[34] contributed to the readiness and commitment of team members to implement changes towards integrated care [34]. Working across healthcare disciplines has been shown to enable shared decision making and formation of care plans for patients with complex needs [33]-[34], contributing to improved clinical outcomes and patient satisfaction [19]. Furthermore, having a comprehensive range of services afforded for both customization and generalisation of care to meet varied needs.

A few factors unique to CARITAS impeded its endeavour of seamless care. The primary care team operated rather independently from the rest of the partners which compromised care continuity and information flow. Also, the absence of a common IT documentation and care planning platform [4], [20], hindered information exchange between care providers. Information sharing is important to integrated care programmes without which less expedient ways of communication are inevitable [34].

Integrated care programmes evolve with time and some dimensions mature more quickly than others [35]. Integration often begins at micro (e.g. clinical integration) and meso levels (e.g. professional and organizational integration) before progressing to a macro level (e.g. system integration) [36]. Dimensions such as functional and normative integration which establish connectivity across the micro, meso and macro require significant time to stabilize [37]. Moreover, integration may start from the primary organization spearheading the initiative first before becoming established in other member agencies. It is thus conceivable that CARITAS performed better in dimensions such as clinical integration while the areas of functional and normative integration are still a work in progress.

There are ways to enhance the more mature dimensions of integration of CARITAS and augment the less developed ones. Addressing existing service gaps can refine the CARITAS model. First, extending telephone helpline beyond office hours can improve responsiveness to needs. Second, wider and deeper engagement to better understand caregiver needs will help develop targeted caregiver support services. Third, to improve functional integration, the network can adopt a centralized IT infrastructure for documentation, communication, and case coordination, all of which help standardize care delivery [37]. Fourth, the network could organize formal and informal processes and activities to facilitate cross-organizational understanding and collaboration. They can serve to reiterate the objectives of the team, communicate key performance indicators, discuss strategies and align goals. These efforts can have positive effects on system and normative integration which are often harder to achieve. Finally, initiatives to engage users, increase visibility and scale up the initiative should be prioritized. CARITAS can take advantage of its strong leadership to connect with more organizations and continuously engage community stakeholders to garner longer-term support.

The strengths of this evaluation include the use of a mixed-methods - drawing on both quantitative and qualitative methods to generate insights. Analyses by three coders also minimized the bias of qualitative research. However, certain limitations should be considered. Sampling of interview participants was conducted through the recommendations of a managerial staff and could have skewed the selection. To mitigate bias, participants were reminded that their responses would be anonymized, and efforts were made to capture the opinions of participants from each component of CARITAS. Additionally, 48% of the participants did not complete the RMIC questionnaire which may limit the representativeness of the responses. This could be attributed to the length of the questionnaire (62 items), which took respondents 48 minutes on average to complete whereas respondents who did not complete averaged only 4 minutes on the questionnaire. It is likely that staff turnover had resulted in several new staff with <1 year of CARITAS experience who felt inadequate to provide valid responses. Still, despite the reduced sample, the interviews largely validated the RMIC responses.

Conclusion

The findings reveal that integration in CARITAS has attained maturity on micro (clinical integration) and meso levels (professional and organizational integration), with potential for improvement on the macro level (functional, system and normative integration).

Future studies could extend the RMIC to patient-caregiver dyads. This will help provide more holistic assessments which can lend valuable insights to assist programme planners, implementers, funders and policy makers in the conceptualization, implementation, monitoring and evaluation of integrated care initiatives for patients with complex needs. Lastly, evaluation results of the clinical outcome and experience of CARITAS' service users will be reported in another publication.

Author Contribution

Ha NHL and Chan IWX collected, analysed, interpreted the data and wrote the manuscript. Yap PLK initiated the study, provided suggestions on the study methodology, helped interpret the findings and revised the manuscript. Nurjono M and Vrijhoef HJM conceptualized the study, provided guidance for data collection, analysis and suggestions to enhance the manuscript. Nicholas SO contributed to data interpretation and revised the manuscript. Wee SL conceptualized the study, supervised data collection, analysis and interpretation of result, and revised the manuscript. All authors approved the final manuscript.

Data Sharing Statement

Dataset of the study is not available to protect the identities of the study participants.

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Supplementary Materials

Three appendices are provided at the end of the article as supplementary materials.

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Table 1. Demographic characteristics of RMIC-MT respondents (n = 13)

Variables	N (%)
Profession	
Doctor	5 (38.5)
Nurse	3 (23.0)
Allied Health	3 (23.0)
Administrator	2 (15.5)
Work Setting	
Tertiary hospital	5 (38.5)
Primary care provider	3 (23.0)
Voluntary Welfare Organization	4 (30.8)
National agency	1 (7.70)
Years of Involvement	
<6 months	0 (0.00)
6 months – 1 year	2 (15.4)
>1 year	11 (84.6)

Table 2. Demographic characteristics of respondents for qualitative interviews (n = 17)

Variables	N (%)
Profession	
Doctor	6 (37.0)
Nurse	3 (19.0)
Allied Health	4 (25.0)
Administrator	3 (19.0)
Work Setting	
Tertiary hospital	9 (53.0)
Primary care provider	2 (12.0)
Voluntary Welfare Organization	5 (29.0)
National agency	1 (6.00)
Years of Involvement	
<1 year	3 (18.0)
1-2 years	1 (6.00)
2-3 years	3 (18.0)
3-4 years	0 (0.00)

4-5 years	6 (29.0)
>5 years	4 (29.0)

Table 3: Summary of Key Themes across Eight Dimensions of the RMIC-MT

Dimension	Key Themes	Quotes
Population-based care	CARITAS was developed to better care for increasing needs of PWD and caregivers in Singapore	*The objectives of CARITAS were:* • *"Provide **holistic dementia care**"* [T006, P002, P004] • *"**Manage PWD well in the community**"* [T004] • *"Provide **seamless delivery of care** for patients"* [P003] • *"To **bridge that medical and social care integration gap*** [P007]
	Classification of patients was based on a biopsychosocial model and the need for caregiver support	• *"(...) The clinical part is important. The biological part, **the type of dementia, the stage of dementia**, you know (...) And another key component is **who the person with dementia really is** (...) and the other part that next comes in will be in terms of their **care giving capacity**, their desire to care, as well as their*

		resources, what they can actually give to the patient." [T001]
	Family physicians were not keen to look after PWDs as it is a complex condition that requires specialised expertise and resources	• *"Because dealing with dementia patient* ***took a lot of time*** *…not just the patient, also the caregiver and family, and sometimes the maid. So, there are* ***many many issues to take care in the PWD****. So, I won't say there are many family physicians who have a keen interest to look after them"* [P004] • *"The problem with polyclinic is that the doctors there are* ***majority of them are not very keen*** *to see dementia patients... That's not what they are made up for (…)"* [T004]
Professional integration	Clinical leaders in the network were dedicated, inspiring, knowledgeable and respectable	• *"Experienced and knowledgeable", "Committed and passionate", "Persistent", "Visionary", "Have clear direction and goal", "Influential in getting partners together", "Instrumental in setting up network", "Believes in collaboration", "Always present"* [ALL]
	Mutual interdependencies existed between professionals in the network	• *"Helpful to one another", "Share the same objectives", "Willing to participate", "Committed", "Have no competition mindset", "Intrinsically motivated","Regular feedback among members of the team"* [T001, T004, T003, P001, P002, P006, P009]

Clinical integration	Service providers worked closely with one another to provide a range of services to clients	• *"We co-manage a client then I usually only able to do a monthly visit for this client but because the client is already in severe dementia stage, she wouldn't able to verbalise a lot for herself. The caregiver may not be able to give so much information.* ***Because of CARITAS nurse****, her commitment to step in to monitor the medical care for the client on a fortnightly basis - that actually* ***helped a lot for me*** *to flow back the information to other caregivers that are not staying with the client (…)* [P006]*"*
	Care was expedited	• *"So, through this Caritas programme, (…) I can say that okay, no need to wait for appointment.* ***I can straightaway get connection with this doctor*** *okay to* ***discuss this case straightaway in the next meeting****"* [P002] • *"They will just give us a call; say this client needed some attention. So instead of waiting,* ***we even do assessment way before*** *that, before even the* ***referral comes in****".* [P001]
	Not all partners were always present at meetings	• *"(…) Because every Tuesday must go except public holiday... So* ***sometimes not all the stakeholders are there****. Not all, not all because this is the thing maybe I feel. Maybe I say work related or other commitment they not able to attend".* [P002]

	Cases were not discussed when partners were not around	• *"I: I'm just wondering when you discuss patients and cases at the MDM, what if the community partners are not present?* *R:* ***We (will) not discuss until they are around***. *(…)* [T007]
	Protocols for care process and criteria for recommendations to services were not documented formally, while they seemed to be understood by the working team	• *"I: Is this workflow documented?* *R: If you talk about the clinical diagnosis, I will say yes (…) But with regards to the person (..). that* ***definitely there is no standard way of going and doing that*** *(…)* ***this is by and large not documented*** *(…)"* [T005]
Organizational integration	Before initiation of the network, an influential clinical leader was able to link up with various organizations and those in leadership positions	• *"So of course, then with Dr Y, because he is actually* ***very well known in the north*** *and then he with that background,* ***is able to garner gather a lot of people into the network***. *Yeah, that's why with the team on board, that's why it's very successful (…)"* [P004]
	There was a workflow for patient care linking various organizations	• *"(…) In terms of all clinical diagnosis there is always criteria to fulfil and things like that,* ***which stage of dementia*** *and all that. Okay*,**..** *with regards to the person,.. second part, as in* ***who the person is***

	together, despite not being documented formally	*(…) the emotional needs, the psychological needs, look at the life story of this person and all. (…)”* [T005]
	Less involvement from senior management among partners’ organizations	• *“I: Yah I think it’s very important like to have a clear vision and also shared vision but it’s not easy like to get people.* • *R: Actually if you ask, I have this network would you like to come? They say sorry I have no time then this is not their priority right. So, ah, I don’t think we’re talking about competent.* ***I’m talking about the management interest*** *(…) ”* [P005]
Normative integration	CARITAS’ objectives were not clearly and consistently conveyed to community partners, especially new staff over time	• *“Because when I join that time,* ***nobody tell[s]me what is the objective of Caritas network*** *”* [P001] • *“We remind what is the vision and yah* ***I don’t think we do enough*** *especially when people move on”* [P005]
	Some original intent waning over time	• *But to be honest I think* ***some of the intent has been lost through the time****. So right now, with the quarterly meeting, we are not as structured I feel, versus previously (…) ”* [P005]
	Primary care’s engagement was separate from that of	• *“Actually I have discussed with Dr. Y* ***whether we can get our staff to join in their Tuesday meetings*** *– (…) but so far I’ve* ***not been able to really uh get it done*** *lah”* [P005].

	other community partners	• _“**Polyclinic has not fully been brought into the network yet**. They are still having their own dealing issues and their own things taking on so many dimensions (...)”_ [P008]
System integration	Increase in media advocacy on aged care issues	• _“The government is giving a lot of money to the media to advertise on **projects that help to educate people on what dementia is like**, so that they can seek help earlier on, help make neighbours a little bit more friendly, to look out for each other.” [T002]_ • _“I think over the past few years, there have been **a lot more TV coverage** on elderly people and the condition itself”_ [T002]
	Increase in government funding and support on aged care	• _“(...) **The directions of the Ministry of Health is towards to have an aging in place**. We have a(n) active aging action plan. Yah so all these things are actually helping (...)”_ [T006] • _“In terms of care provision it becomes a lot easier…there are **a lot more schemes, subsidies and policies** that can help support certain care provision (...) the **government is pumping a lot more funds into the voluntary welfare organizations** that help to provide elderly sitting services”_ [T002]
Person-focused care	Adopt a biopsychosocial team-based approach	• _“(..) so we look at it from **a biopsychosocial perspective**. The biological and psychological changes and the impact on their social circles. Then_

		we will study their families or their support network (…) [T002]*"* • *"There is **<u>the same team</u>** who knows the patient, to be taking care of them as the primary team (…) We **<u>really get to know them</u>**, how to care for them and what are the reasons why they have certain behaviours before we can really give proper advice or treatment"* [T001]
	Clients not aware of CARITAS network or how the hospital worked with community partners	• *"I: Do you think they (caregivers) are aware that YP is part of this bigger network? R: Emm… **<u>I think some of them do but not all of them</u>**". [P004]* • *"I: Um, do patients and caregivers know that they are part of this Caritas network? R: **<u>I don't think so they know about this Caritas network</u>**. I think **<u>majority will say "what's Caritas?</u>**". Not say which lah, but **<u>even our own staff will ask you what's Caritas like?</u>** (…) So, so **<u>I don't think they know very much about this network itself lah</u>**."* [T009]
	Only a small group of caregivers regularly attend caregiver support sessions	• *"(…) Caregivers, okay support group is always like that. **<u>Twenty people sign up, fifty percent won't come</u>**."* [T008]

Functional integration	High staff turnover among community partners	- *"We **<u>had reach[ed] our peak for our clientele</u>**. So we have **<u>a lot of cases to manage</u>**. .. Most of the Case Manager, Case Worker, **<u>we don't have the time</u>** to actually attend or we will just rotate to attend as in every month (…)"* [P006] - *"I think considering I'm quite pro-active but my priority is my work, is my organization, my client which **<u>every day to day I already swamped with it</u>**. So this on top of it ah **<u>I don't think I want to extend that additional hours</u>** to go and organize anything **<u>for the Caritas</u>** lah.* [P001]
	Channelling of finances to tertiary hospital reflect the notion that care is prioritised in hospital over community	- *"There is a shared care so they do provide us **<u>the financial support the FTEs</u>** we need to build this team…The finances for CARITAS is to the medical team so they provide us with FTEs for us **<u>to employ</u>** additional because you know in the wards and all to care for dementia you sometimes need **<u>additional manpower</u>**, like music therapist, drama therapist, other therapists to engage them right"* [T001] - *"I: In some of the programmes, let's say if we were to be funding a particular service provider, **<u>it should factor in the time that they are taking to go and attend case discussion</u>**.* *R: **<u>No, that's never the case</u>**."* [P005]

	Lack of IT platform for information sharing	• *"If we miss the meeting…and want to catch up [on] what is going on about the patients...* ***Centralized electronic information is important****. And…if we document clearly the goals of care…of each patient in the system, then the whole team…can work towards that target."* [T006] • *"A while ago they tried to come up with a system… called CCMS… so that we can share information. …I think that* ***it never took off****. Nobody even really bothered using the service…"* [T004]
	Lack of sharing of performance indicators	• *"Because I think is very subjective just go by feeling to see whether it we have actually done better or not. (...) Yah, so* ***I'm not so sure whether we actually done better, stay the same or getting worse****?. So* ***currently there's no progress update on all these that is going on****"* [T006] • *"I think these are the things that* ***KPI's achievement*** *of how are we progressing and things like that* ***should be communicated across the team member*** *that only we know we are doing well..."* [P005]
	Inadequate training for community partners	• *"R:* ***Sometimes the staff got training but sometimes*** *how they feel that the theory is theory* ***when you do really encounter experience with the clients right, they feel it's difficult*** *not easy as you say because sometimes as (they also) human beings they also will*

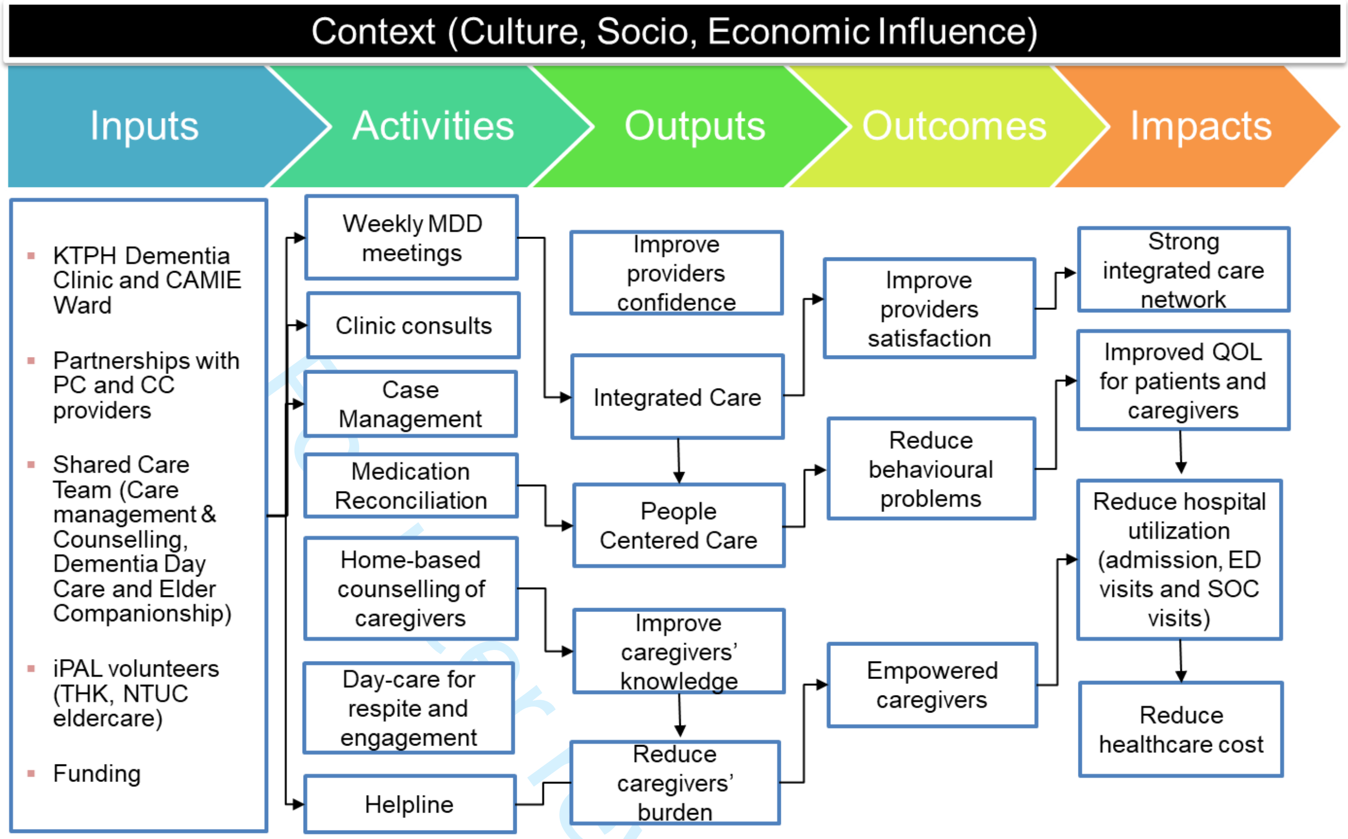
		be a bit frustrated. (…) Sometimes it's easier said then [than] done. So ***<u>theory part is theory but when practical part ah, it's not easy</u>***" [P002]

<u>Legends:</u>
Participants were given identifiers numbering 001 to 017, with "T" referring to participants from the tertiary hospital and "P" referring to those from primary and community care providers.

<u>Abbreviations:</u>

CARITAS: Acronym of the integrated care network (Comprehensive, Accessible, Responsive, Individualized, Transdisciplinary, Accountable, Seamless)
PWD: Persons with Dementia
MDM: Multi-disciplinary Meeting
FTE: Full-time Equivalent
IT: Information Technology
CCMS: Common Case Management System
KPI: Key Performance Indicators

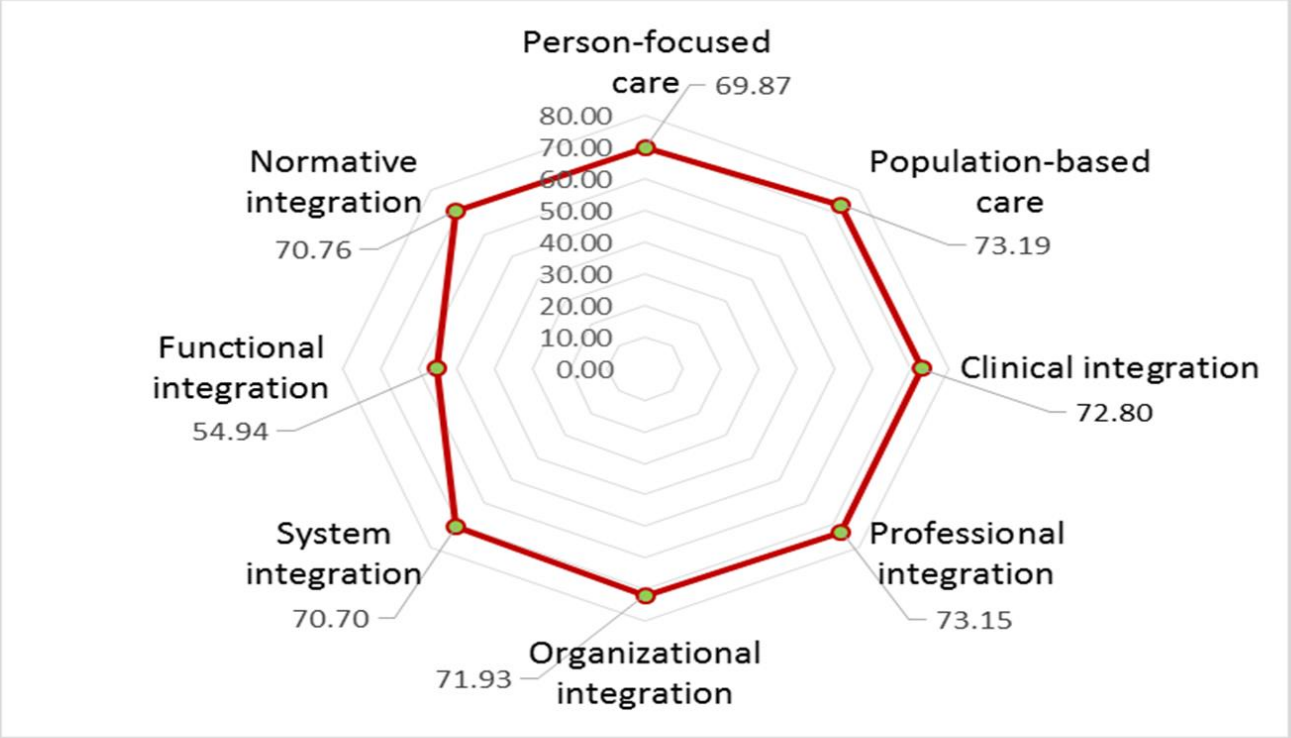
Figure 1. A Logic Model of CARITAS



Legends:
KTPH: Khoo Teck Puat Hospital
CAMIE: Care for the Acute Mentally Infirm Elders
PC: Primary Care
CC: Community Care
iPAL: Integrated Pals for Active Living

THK: Thye Hua Kuan
NTUC: National Trades Union Congress
MDD: Multi-disciplinary Discussion
QOL: Quality of Life
ED: Emergency Department
SOC: Specialist Outpatient Clinic

Figure 2. Scores of RMIC's Eight Dimensions of Integration



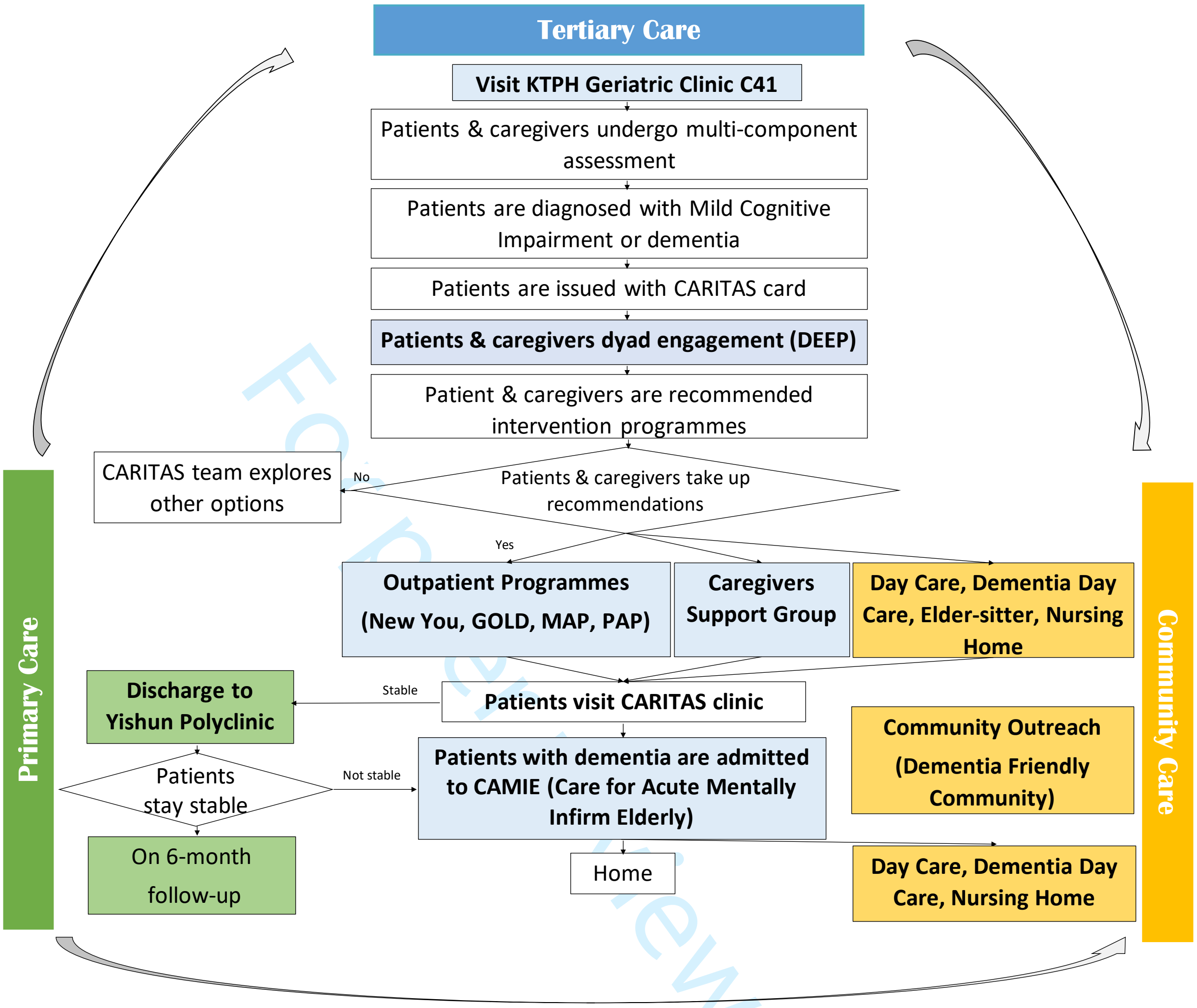
Appendix 1. Ethnographic Observation Template

Participant ID:	**Observer:**	**Visit type:**
Program enrolled:	**Date of observation:**	**Setting:**
Team member:	**Observation start time:** **Observation end time:**	**In attendance:**
Delivery of Information		
What are the activities carried out?		
Interactions between healthcare providers and clients (patients and (or) caregivers)		
Healthcare provider’s effort to build rapport (observed relationships between providers and clients):		
Healthcare provider’s effort to engage clients (involvement of clients in their health and social conditions):		
Healthcare provider’s effort to empower clients (E.g. providing relevant information and skills to improve clients’ self-efficacy and ability to make informed decisions):		
Clients' responsiveness (Clients’ responses and extent of engagement to healthcare providers and intervention):		
Other Notes:		

Appendix 2. Outline of an Interview Guide with Key Stakeholders in CARITAS

Topic	Questions
Introduction	1. How are you involved in the CARITAS network? 2. How has your experience been working in the network?
Components of CARITAS	1. Could you help me understand more about the various components of CARITAS? (e.g. weekly multi-disciplinary meeting, referral to community partners, outpatient follow-up, inpatient ward, polyclinics, etc) 2. How do you follow up with patients? How do you design care plans? 3. How is information exchanged? How is the network financed?
Experience of working together	1. What do you think is the objective of the network? 2. How do you work together to provide different aspects of care in the network? 3. How has the partnership across organizations been like?
Experience of being in the network	1. What do you think are the factors that contributed to the success of the programme? What are your challenges? 2. What are some aspects you felt have changed over the years? How did you adapt? 3. How do you think patients and family members have benefitted from the network?
Evaluation	1. How can CARITAS be improved? 2. How does CARITAS compare with other integrated care programmes you have worked with or are familiar with? 3. Do you think that CARITAS should be scaled up or expanded?

Appendix 3. A Typical Patient's Journey in CARITAS



Legends:
KTPH: Khoo Teck Puat Hospital
CARITAS: Acronym of the integrated care network (Comprehensive, Accessible, Responsive, Individualized, Transdisciplinary, Accountable, Seamless)
DEEP: Dyad Engagement and Enrichment Programme
New You: Activity-based programme for early stage dementia
GOLD: Activity-based programme for mild cognitive impairment
MAP: Music and Activity Programme
PAP: Physical Activity Programme

Reporting checklist for quality improvement study.

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		Reporting Item	Page Number
Title			
	#1	Indicate that the manuscript concerns an initiative to improve healthcare (broadly defined to include the quality, safety, effectiveness, patientcenteredness, timeliness, cost, efficiency, and equity of healthcare)	1
Abstract			
	#02a	Provide adequate information to aid in searching and indexing	3
	#02b	Summarize all key information from various sections of the text using the abstract format of the intended publication or a structured summary such as: background, local problem, methods, interventions, results, conclusions	2-3
Introduction			
Problem description	#3	Nature and significance of the local problem	4

Available knowledge	#4	Summary of what is currently known about the problem, including relevant previous studies	4-5
Rationale	#5	Informal or formal frameworks, models, concepts, and / or theories used to explain the problem, any reasons or assumptions that were used to develop the intervention(s), and reasons why the intervention(s) was expected to work	5
Specific aims	#6	Purpose of the project and of this report	5
Methods			
Context	#7	Contextual elements considered important at the outset of introducing the intervention(s)	6
Intervention(s)	#08a	Description of the intervention(s) in sufficient detail that others could reproduce it	6-7
Intervention(s)	#08b	Specifics of the team involved in the work	7-9
Study of the Intervention(s)	#09a	Approach chosen for assessing the impact of the intervention(s)	7-9
Study of the Intervention(s)	#09b	Approach used to establish whether the observed outcomes were due to the intervention(s)	7-9
Measures	#10a	Measures chosen for studying processes and outcomes of the intervention(s), including rationale for choosing them, their operational definitions, and their validity and reliability	6
Measures	#10b	Description of the approach to the ongoing assessment of contextual elements that contributed to the success, failure, efficiency, and cost	7-9
Measures	#10c	Methods employed for assessing completeness and accuracy of data	7-9
Analysis	#11a	Qualitative and quantitative methods used to draw inferences from the data	7-9
Analysis	#11b	Methods for understanding variation within the data, including the effects of time as a variable	7-9
Ethical considerations	#12	Ethical aspects of implementing and studying the intervention(s) and how they were addressed, including, but not limited to, formal ethics review and potential conflict(s) of interest	5-6
Results			

	#13a	Initial steps of the intervention(s) and their evolution over time (e.g., time-line diagram, flow chart, or table), including modifications made to the intervention during the project	9, 25, 26,
	#13b	Details of the process measures and outcome	9-16, 27-35
	#13c	Contextual elements that interacted with the intervention(s)	9-16, 27-35
	#13d	Observed associations between outcomes, interventions, and relevant contextual elements	9-16, 27-35
	#13e	Unintended consequences such as unexpected benefits, problems, failures, or costs associated with the intervention(s).	9-16, 27-35
	#13f	Details about missing data	9
Discussion			
Summary	#14a	Key findings, including relevance to the rationale and specific aims	16-17
Summary	#14b	Particular strengths of the project	19
Interpretation	#15a	Nature of the association between the intervention(s) and the outcomes	17-18
Interpretation	#15b	Comparison of results with findings from other publications	17
Interpretation	#15c	Impact of the project on people and systems	17-18
Interpretation	#15d	Reasons for any differences between observed and anticipated outcomes, including the influence of context	17-18
Interpretation	#15e	Costs and strategic trade-offs, including opportunity costs	n/a
Limitations	#16a	Limits to the generalizability of the work	19
Limitations	#16b	Factors that might have limited internal validity such as confounding, bias, or imprecision in the design, methods, measurement, or analysis	19
Limitations	#16c	Efforts made to minimize and adjust for limitations	19
Conclusion	#17a	Usefulness of the work	18-20
Conclusion	#17b	Sustainability	18-20
Conclusion	#17c	Potential for spread to other contexts	18-20

Conclusion	#17d	Implications for practice and for further study in the field	18-20
Conclusion	#17e	Suggested next steps	18-20
Other information			
Funding	#18	Sources of funding that supported this work. Role, if any, of the funding organization in the design, implementation, interpretation, and reporting	3

Notes:

- 13a: 9, 25, 26,
- 13b: 9-16, 27-35
- 13c: 9-16, 27-35
- 13d: 9-16, 27-35
- 13e: 9-16, 27-35 The SQUIRE 2.0 checklist is distributed under the terms of the Creative Commons Attribution License CC BY-NC 4.0. This checklist was completed on 30. March 2020 using https://www.goodreports.org/, a tool made by the EQUATOR Network in collaboration with Penelope.ai

BMJ Open

A mixed-method evaluation of CARITAS - a hospital-to-community model of integrated care for dementia

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Primary Subject Heading:	Public health
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Keywords:	GERIATRIC MEDICINE, Public health < INFECTIOUS DISEASES, HEALTH SERVICES ADMINISTRATION & MANAGEMENT

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A mixed-method evaluation of CARITAS - a hospital-to-community model of integrated care for dementia

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Abstract

Objectives: The capability and capacity of the primary and community care (PCC) sector for dementia in Singapore may be enhanced through better integration. Through a partnership involving a tertiary hospital and PCC providers, an integrated dementia care network (CARITAS) was implemented. The study evaluated the process and extent of integration within CARITAS.

Design: Triangulation mixed-methods design and analyses were employed to understand factors underpinning network mechanisms.

Setting: The study was conducted at a tertiary hospital in the northern region of Singapore.

Participants: We recruited participants who were involved in the conceptualization, design, development and implementation of the CARITAS programme from a tertiary hospital and PCC providers.

Intervention: We used the Rainbow Model of Integrated Care-Measurement Tool (RMIC-MT) to assess integration from managerial perspectives. RMIC-MT comprises eight dimensions that play inter-connected roles on a *macro-*, *meso-* and *micro-*level. We administered RMIC-MT to healthcare providers and conducted in-depth interviews with key CARITAS stakeholders.

Primary and secondary outcome measures: We assessed integration scores across eight dimensions of the RMIC-MT and factors underpinning network mechanisms.

Results: Compared to other dimensions, functional integration (mechanisms by which information and management modalities are linked) achieved the lowest mean score of 55. Other dimensions (e.g. clinical, professional and organizational integration) scored about 70. Presence of inspiring clinical leaders and tacit interdependencies among partners strengthened the network. However, the lack of structured documentation and a shared information-technology platform hindered functional integration.

Conclusion: CARITAS has reached maturity in micro- and meso-levels of integration while macro integration need further development. Integration can be enhanced by assessing service gaps, increasing engagement with stakeholders and providing a shared communication system.

(255 words)

Key words: dementia, care coordination, integrated systems, mixed method, programme evaluation.

Article Summary

Strengths and Limitations of this Study

- The strengths of this evaluation included the use of a mixed-methods - drawing on both quantitative and qualitative methods to generate insights.
- Analyses by three coders minimized the bias of qualitative research.
- However, sampling of interview participants was conducted through the recommendations of a managerial staff and could have skewed the selection.
- Additionally, 48% of the participants did not complete the RMIC questionnaire which may limit the representativeness of the responses.

Funding Statement

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Competing Interests

Philip Yap is a key clinical leader of the CARITAS integrated dementia care network. The other authors declare that they have no competing interests.

Introduction

With ageing populations and more multi-morbidity, managing chronic and complex patients is a critical task for health systems. Care integration has been advocated as an approach to improving access to, quality and continuity of health services [1]–[4]. Integrated care involves coordination of care services across different levels and sites so that recipients of care experience continuity according to their needs and preferences. Recent studies on the effects of integrated care have been mixed. While some studies reported reduced hospital admissions, better quality of life and patient satisfaction [5]–[7], others showed little effect on hospital utilization or mortality [8]-[9] or increased nursing home admissions [10].

There are several explanations for such contrasting findings. First, there are inherent difficulties in evaluating integrated care with a reductionist randomized controlled methodology [11]. Compared to single interventions, care integration involves multiple components, layers and outcomes [11]. Thus, evaluation of such a complex approach needs to consider the context of the composite intervention and the interaction between different contextual factors beyond merely assessing one or few quantitative outcomes [11]. Secondly, the time needed to experience and assess outcomes in integrated care exceed the usual duration of most studies. Multiple or mixed methods enable more comprehensive data collection to evaluate the maturity and impact of integrated care. Thirdly, integrated care as a concept is ambiguous as it encompasses a range of meanings [2]-[3], [12]–[14]. The lack of a conceptual framework results in paucity of measures to assess the extent and quality of integrated care.

The Rainbow Model of Integrated Care (RMIC) was conceived to provide a comprehensive framework and taxonomy of integrated care based on principles derived from primary care [15]-[16]. An initial framework was developed from literature reviews, further refined and validated Delphi technique with international experts and practitioners of integrated care from 11 countries [15], [17]. RMIC comprises eight dimensions structured along macro-, meso- and micro- levels, which can be contextualized to any integrated care setting [18]. It has been adopted as a conceptual framework to evaluate integrated care from managerial perspectives [17], [18].

Beyond a conceptual framework, we also endeavour to understand *how* integrated care programmes achieve intended outcomes. Existing studies have outlined strategies to integrate person-centred services. Within a provider team, strategies include ensuring care coordination and continuity through regular team meetings [19], shared information and communication technology (ICT) system and effective data management [4], [20], strong leadership [4], and an organisational culture that supports accountability and shared decision-making [4]. Externally, communication between providers is crucial to achieve integration [4], [20]. Funding incentives for providers could also foster greater commitment and sustain success [4], [21]. Lastly, eliciting the preferences of individuals and fostering mutual trust and responsibility are crucial to achieving person-centered and integrated care [22].

We evaluated the process and determinants of integration in a dementia care network. Using the RMIC Measurement Tool (RMIC-MT), we evaluated the level and extent of integration. We also analyzed the contextual factors and workings that underlie integration, and identify strategies for improvement and scaling-up. The study adds to extant knowledge on integrated care systems for patients with complex needs such as dementia, and provide important insights for the design, development and implementation of integrated care programmes.

Methods

This study is the first phase of a mixed-methods evaluation of the CARITAS programme to examine the extent of integration in the network. The second phase which examines care recipients' experiences with the network and assess clinical outcomes will be separate. Domain Specific Review Board, National Healthcare Group (Singapore) gave study ethics approval [Ref. 2017/00904]. We used the SQUIRE checklist when writing our report [23].

RMIC Framework

RMIC structures integrated care along macro-, meso- and micro- levels. At the macro level, *system integration* refers to the linkages and visibility of the partnership formed between the healthcare system and external environment. At the meso level, *organizational integration* refers to network mechanisms between different organizations, and *professional integration* refers to partnerships between different professionals in the healthcare system. At the micro level, *clinical integration* refers to the coordination of patient care services across different professionals in the healthcare system. *Functional* and *normative integration* link the macro, meso and micro levels of integration. The former refers to key support functions and activities by which financing, information, and management modalities are linked. The latter refers to essential social and cultural factors (e.g., shared mission, vision and values) within the system. The RMIC also includes person-focused and population-based perspectives to guide better coordination of services across care continuum. *Person-focused care* reflects a bio-psychosocial health approach and considers personal preferences and needs, while *population-based care* requires healthcare be provided according to health profiles and needs of a defined population.

Intervention/Programme

CARITAS was established as a dementia care network in 2012 within Singapore's northern Regional Health System [18]. The acronym CARITAS signifies: comprehensive, accessible, responsive, individualized, trans-disciplinary, accountable and seamless care for persons with dementia (PWD) [24, 25]. CARITAS aims to: (i) enhance the quality, capacity and efficacy of dementia care through vertically and horizontally integrated team-based care with regular case conferencing, partnerships between the tertiary hospital and primary and community care; (ii) increase the capability of primary and community care to care for PWD through regular training, shared care and case conferencing; and (iii) empower caregivers to care better for PWD through caregiver training programmes and a direct helpline. The model was developed based on the concept of integrated practice units (IPU). IPU embodies concepts of value-based care in organizing care around a condition and/or population, shared decision-making, regular team meetings, and responsibility for the full cycle of care for the condition [26]. Figure 1 depicts the CARITAS's logic model.

Study Design

We applied a triangulation mixed-methods approach to combine the insights obtained from administering RMIC-MT, conducting ethnographic observations and semi-structured interviews. Quantitative and qualitative data were collected concurrently and analysed separately, but compared and contrasted using triangulation.

Quantitative Data

Forty-nine healthcare professionals from CARITAS were invited via email to participate. A reminder was sent after three months. The questionnaire, averaging 30 minutes to complete, included a participant information sheet and consent, capturing demographics and the RMIC-MT. RMIC-MT comprised 62 items grouped into eight dimensions with each item rated on a 5-point Likert scale (from *never* to *all the time*). An additional option *(not sure/don't know)* was provided if participants felt inadequate to provide a response. Values from 0 to 100 were assigned to each point of the Likert scale and mean scores were computed across all dimensions and respondents. We excluded entries with >30% missing data from analyses. Higher scores indicated higher levels care integration. Descriptive data and mean score were computed using STATA v12.

Qualitative Data

To better understand the activities of CARITAS, researchers (MN, LH and IC) observed consultations and discussions (n=14) [27] in ambulatory clinics at the tertiary hospital, multi-disciplinary meetings, primary care clinic and tele-consultations. Observers were inconspicuous and did not influence the sessions. Field notes were recorded after each observation session using a guide (Appendix 1).

Additionally, we conducted semi-structured interviews with key stakeholders of CARITAS (n=17) to understand the programme workings and outcomes determinants. We included participants who were involved in the conceptualization, design, development and implementation of the programme. Those who had resigned were excluded. Participants were selected using purposive sampling [28] to have a mix of healthcare professionals from different settings and with different periods of involvement. Interview questions were developed based on the RMIC dimensions including care coordination (clinical integration), how professionals worked together (professional integration), financial and information management (functional integration) (Appendix 2). Interviews averaged 67 (range 42 to 93) minutes, were audio recorded and transcribed verbatim. Numbered identifiers were assigned to participants to protect their identities, with prefixes “T” (from the tertiary hospital) and “P” (PCC providers). After each interview, team members debriefed and created summary notes. Analysis was done inductively through thematic coding and deductively through classifying data into initial themes (NVivo v11). Team members (MN, LH and IC) developed a shared codebook to document the initial themes and definitions, which were iteratively refined into prominent themes. These final themes were subsequently organized according to the eight RMIC dimensions of integration.

Data Triangulation

Through rigorous discussions, qualitative themes were classified accordingly to provide insights on the quantitative results. The triangulated findings were subsequently presented to CARITAS stakeholders at a meeting to assess their validity. Feedback was used to refine the categorization of themes and interpretation of results.

Patient and Public Involvement

Patients and their family caregivers were not involved in the design and conduct of this phase of the study, which was focussed on evaluating the organization of CARITAS care network and extent of integration from care providers' perspectives. As such, the findings will primarily be disseminated to healthcare professionals and providers, not patients and their families. Findings are intended to inform care integration and delivery and will not directly result in any change to patient care.

Results

RMIC-MT

Forty-nine healthcare participants came from the tertiary hospital (24.5%), volunteer welfare organizations (VWO) (53.1%), a primary care provider (8.16%) and national agency (14.3%). Twenty-seven (55.1%) attempted the questionnaire, 2 (7.41%) did not complete and 12 (44.4%) had >30% missing data. Majority (66.7%) opted to be anonymous. The final analysis comprised 13 respondents (48.1%) from 7 organizations - tertiary hospital (38.5%), volunteer welfare organizations (30.8%), primary care provider (23.0%) and national agency (7.7%). Majority were tertiary hospital doctors (38.5%) with >1 year of involvement in CARITAS (84.6%) (Table 1).

Most dimensions achieved scores averaging 70/100 (Figure 2). Population-based care scored the highest (73.19), followed by professional (73.15), clinical (72.80) and organizational integration (71.93). Functional integration scored the lowest (54.94).

Ethnographic Observation and In-depth interviews

Based on the observation notes, a typical patient's journey was charted which provided initial understanding into the interventions available at CARITAS and how members worked across settings within the system. Doctors (37.0%) from the tertiary hospital (53.0%) with >4 years of involvement (58.0%) comprised the larger proportion of participants in the semi-structured interviews (Table 2). A small proportion of themes derived from in-depth interviews overlapped with those of observational notes, which described a patient's journey at various settings in the network. Themes regarding the background of the interview and reasons for their involvement in CARITAS were not classified into the eight RMIC dimensions. Relevant interview quotes corresponding to the RMIC-MT dimensions are summarized in Table 3.

Population-based care

This dimension scored highest as CARITAS was conceived specifically to address the growing burden of dementia in Singapore [29] and focused on building the dementia capabilities of primary and community care partners. PWD were admitted into the programme based on disease severity and extent of caregiver support. Stratification of patients, which enabled care to be delivered appropriately in primary and community care settings, resulted in better distribution of patients and care resources. Prior to CARITAS, primary care physicians lacked experience and expertise caring for PWD. The CARITAS team provided regular training, case conferences and teleconsultation via video conferencing to build competence of this group of community stakeholders. They appreciated the avenue for direct access to hospital dementia specialists for real-time advice. With increased capability and capacity of primary care for PWD, this freed up the tertiary hospital's resources to attend to patients with more complex and specialized needs.

Professional integration

This dimension assessed the presence of dedicated clinical leaders and mutual professional interdependencies. The leaders were described to be *"respectable, experienced, knowledgeable, always present and instrumental"* [ALL]. Members felt supported and understood when discussing patients which increased their confidence to care for PWD. It also enabled them to possess greater responsibility for their patients, resulting in a higher level of professional integration.

Additionally, community partners participated regularly at inter-disciplinary meetings where tertiary hospital referred patients to relevant community partners who would then update the team regularly on the patients. The opportunity for face-to-face communication served as a bridge between the tertiary hospital and community partners, and concurrently allowed partners to learn from each other. Consequently, strong interdependencies developed between community partners and hospital specialists, and the latter was able to tap on community resources such as home- and centre day-care services to complement hospital care. Community partners expressed that the team members were *"helpful to one another", "consistent", "committed"* and *intrinsically motivated"* [T001, P001, P002], hence fostering professional trust. They also reported that members received *"good support from the network"* and *"regular feedback among team members"* who *"had the same objectives"* and *"no competition mindset"* [T009, P006, P007]. Having a shared goal to improve care for PWD promoted a sense of accountability which enhanced professional integration.

Clinical integration

Members rated their performance on coordination, referral and follow-up of patients, involvement of patients in care planning and decisions, and if the network provided comprehensive services.

The structure of the CARITAS team was flat. Instead of the CARITAS lead directing unilaterally, team members took ownership of their patients and developed individualised care plans albeit through shared decision making. As a result, even when the lead was not present, discussions proceeded smoothly with each team member taking turns to update and discuss their cases. While diversity of opinions was encouraged, shared decision making was upheld and clinical integration maintained.

The strength of CARITAS laid in regular team meetings enabling two-way information flow and provision of a comprehensive range of services to address the multi-faceted needs of PWD and their caregivers. The relationships built through face-to-face meetings were invaluable in facilitating inter-professional exchanges and empowered members to manage more complex patients.

Furthermore, the integration of staff members across care settings allowed patients to expediently tap on a comprehensive suite of services from hospital-based interventions to community centre-based care and home-care, coupled with a phone helpline to cater to patients' ad hoc needs. As a member expressed, *"It does help in terms of let's say we refer to the day care, the day care does try (...) to expedite some of the cases".* [T004]. By working in a coordinated manner, the integrated CARITAS service delivered comprehensive and continued care of a higher standard.

However, there were also factors impeding clinical integration. First, not all members, especially those from the community, could be present at every meeting due to commitments at their primary workplaces. Thus, case discussions would be delayed, or be held outside the MDM through less personable communication channels such as exchange of emails and messages. Unsurprisingly, members opined their objectives were not met when other partners caring for same patient did not attend meetings. Second, some members indicated the need for operational guides and protocols, particularly clearer criteria for referral to various services. While members with more years in the team appeared to have an implicit understanding of the criteria, newer members felt less confident and were concerned about inappropriate referrals.

Organizational integration

This dimension examined how well organizations collaborated to provide care and whether there was a shared understanding about care strategy. It also explored if there was effective leadership to connect across organizations. Having an influential clinical leader and the presence of a patient care workflow provided the foundation of organisation integration in CARITAS.

Since the inception of CARITAS, the clinical leader helped to form the network of organisations by enunciating a shared mission and aligning care goals. Despite team members coming from different care settings, the common vision to provide seamless care for PWD and their families with consistent bi-directional information flow enabled collaborative and integrated person centric care. There was tacit understanding of the workflow involving different member organizations with clear delineation of roles. Therefore, each member understood his work scope and responsibilities, empowering smooth operations and team integrity.

However, over time, staff turnover and change in the leadership of partnering organisations with attendant shifts in priorities have negatively impacted organisational integration. Engagement with the leadership of partnering organisations to align goals and discuss strategies was also observed to decrease over the years, which impeded understanding and support towards the network's shared objectives. Members of partnering organizations remarked that without consistent strong support from their employers, they felt less empowered to extend their commitment to the CARITAS' activities beyond their defined roles, especially when faced with heavy responsibilities in their own organizations. As a result, some members were less inclined to attend weekly meetings or only attended when they needed to discuss their cases, and there were also instances of decreased participation in learning opportunities such as case-based learning and continuing education initiatives.

Normative integration

We examined if members understood the vision and mission of CARITAS and if their desire and ability to work together. Although senior members were generally clear on the initiative's objectives, newer members were less able to do so. They shared that the objectives were not consistently conveyed; a member remarked *"because when I join that time, nobody tell[s]me what is the objective of Caritas network"* [P001] and another shared, *"we remind what is the vision and yah I don't think we do enough especially when people move on"* [P005].

Another issue lay in the primary care team not being able to participate regularly at team meetings. The primary care team worked mainly with the tertiary hospital team. As such, information concerning patients from primary care was often conveyed through hospital team members to community partners at the MDM. This inadvertently reduced the need for face-to-face interaction between the primary care team and community partners. There were hence diminished opportunities for forging a shared identity which is instrumental to normative integration.

System integration

Systems integration assessed the presence of a favorable socio-economic and political milieu for advancing CARITAS as a viable model of integrated care. Given the thrust to advance quality care for older persons in the country, CARITAS presents a working model of integrated care for PWD and their families who often present with complex medical and social needs. With increased community-based resources to enhance care for older adults, CARITAS' ability to tap on these resources demonstrates its ability to synergise with the healthcare system at large to secure continuity and scalability. However, as the main focus has been day-to-day patient care, CARITAS has yet to prioritise efforts to increase awareness of its work and to translate to other regions.

Person-focused care

This dimension assessed the degree of patients' needs being explicit in care delivery, and patients being educated and involved in planning and organising of care. The CARITAS team adopted a biopsychosocial care approach and emphasized individualised relationship centred care across the disease continuum. As a member remarked, *"there is the same team who knows the patient, to be taking care of them as the primary team (...) We really get to know them, how to care for them and what are the reasons why they have certain behaviours before we can really give proper advice or treatment"* [T001]. The holistic and individualized approach was shared by another member who elaborated, *"we will look at things like the type of dementia, existing symptoms, the needs that they have in terms of both physical and psychological…and the impact on their social circles. Then we will study their families or their support network (…)* [T002]*"*

However, while the patients received person centred care, they lacked awareness of CARITAS as an integrated care team and how they benefited from the services afforded by the network's partners. They knew little of which agencies were in the network and how the hospital partnered them to deliver care. Engagement with the family caregiver support group dwindled with time as only a small number of caregivers regularly attended these sessions out of a large repository of caregivers in the network.

Functional integration

Functional integration investigates the extent financial and other incentives are used to improve teamwork, coordination and continuity of care. Functional integration had the lowest score which could be attributed to staff turnover, the financing system favouring tertiary care, and the lack of a shared platform for documentation.

Significant staff turnover, especially among community partners affected the stability of the team. Manpower shortage in community care compromised partners' attendance at weekly team meetings which in turn impacted care. Moreover, new staff lacked experience and skills in managing more complex problems and needed time to become proficient with the workings of the CARITAS.

Funding for CARITAS was channelled primarily to the tertiary hospital which shaped the notion that leadership and management was concentrated within tertiary care instead of being distributed across care settings. The initiative was perceived to be driven by the hospital which embraced accountability and setting of key performance indicators. As such, other partnering organisations tended to assume less accountability which compromised functional integration.

The absence of a common IT platform for structured information sharing between hospital and community partners also impeded functional integration. As team members caring for the same patient could not access each other's records, much time was spent during meetings to update members about patients' progress instead of discussing how best to improve care. The lack of shared documentation of previous and ongoing services for patients also risked duplication of services. Even when a shared IT platform was piloted in the course of CARITAS implementation, limitations in the system's usability and capability restricted its uptake among members of the team.

Discussion

This study assessed the process and extent of integration of the CARITAS dementia care network. We adopted a mixed-methods approach by triangulating the RMIC-MT with in-depth interviews and ethnographic observation. All but one RMIC dimension achieved a mean score of ~70/100 - highest for population-based (73.19) and lowest for functional integration (54.94). Qualitative findings revealed contextual factors that strengthened or hindered the integration of CARITAS. Notably, the presence of inspiring clinical leaders, having quick access to and close guidance from the tertiary hospital increased community partners' knowledge, skills and confidence in care delivery. The closely-knit inter-disciplinary and cross-institutional partnership also facilitated the common goal of person-centred care for the patient-caregiver dyad. However, less than optimal inter-organizational stakeholder engagement, lack of structured process documentation and shared IT-platform compromised the degree of integration.

The determinants of care integration within CARITAS are consistent with published literature. Salutary scores across professional, clinical and organizational integration could be attributed to knowledgeable and inspiring clinical leaders, regular face-to-face meetings and a comprehensive range of services for PWD and caregivers. These factors have been shown to facilitate the development of integrated care and its components [30]–[32]. Competent leadership in the sharing of clinical expertise, providing guidance on patient care and establishing a culture that facilitates accountability and shared decision-making [4], [33]-[35] contributed to the readiness and commitment of team members to implement changes towards integrated care [35]. Working across healthcare disciplines has been shown to enable shared decision making and formation of care plans for patients with complex needs [34]-[35], contributing to improved clinical outcomes and patient satisfaction [19]. Furthermore, having a comprehensive range of services afforded for both customization and generalisation of care to meet varied needs.

A few factors unique to CARITAS impeded its endeavour of seamless care. The primary care team operated rather independently from the rest of the partners which compromised care continuity and information flow. Also, the absence of a common IT documentation and care planning platform [4], [20], hindered information exchange between care providers. Information sharing is important to integrated care programmes without which less expedient ways of communication are inevitable [35].

Integrated care programmes evolve with time and some dimensions mature more quickly than others [36]. Integration often begins at micro (e.g. clinical integration) and meso levels (e.g. professional and organizational integration) before progressing to a macro level (e.g. system integration) [37]. Dimensions such as functional and normative integration which establish connectivity across the micro, meso and macro require significant time to stabilize [38]. Moreover, integration may start from the primary organization spearheading the initiative first before becoming established in other member agencies. It is thus conceivable that CARITAS performed better in dimensions such as clinical integration while the areas of functional and normative integration are still a work in progress.

There are ways to enhance the more mature dimensions of integration of CARITAS and augment the less developed ones. Addressing existing service gaps can refine the CARITAS model. First, extending telephone helpline beyond office hours can improve responsiveness to needs. Second, wider and deeper engagement to better understand caregiver needs will help develop targeted caregiver support services. Third, to improve functional integration, the network can adopt a centralized IT infrastructure for documentation, communication, and case coordination, all of which help standardize care delivery [38]. Fourth, the network could organize formal and informal processes and activities to facilitate cross-organizational understanding and collaboration. They can serve to reiterate the objectives of the team, communicate key performance indicators, discuss strategies and align goals. These efforts can have positive effects on system and normative integration which are often harder to achieve. Finally, initiatives to engage users, increase visibility and scale up the initiative should be prioritized. CARITAS can take advantage of its strong leadership to connect with more organizations and continuously engage community stakeholders to garner longer-term support.

The strengths of this evaluation include the use of a mixed-methods - drawing on both quantitative and qualitative methods to generate insights. Analyses by three coders also minimized the bias of qualitative research. However, certain limitations should be considered. Sampling of interview participants was conducted through the recommendations of a managerial staff and could have skewed the selection. To mitigate bias, participants were reminded that their responses would be anonymized, and efforts were made to capture the opinions of participants from each component of CARITAS. Additionally, 48% of the participants did not complete the RMIC questionnaire which may limit the representativeness of the responses. This could be attributed to the length of the questionnaire (62 items), which took respondents 48 minutes on average to complete whereas respondents who did not complete averaged only 4 minutes on the questionnaire. It is likely that staff turnover had resulted in several new staff with <1 year of CARITAS experience who felt inadequate to provide valid responses. Still, despite the reduced sample, the interviews largely validated the RMIC responses.

Conclusion

The findings reveal that integration in CARITAS has attained maturity on micro (clinical integration) and meso levels (professional and organizational integration), with potential for improvement on the macro level (functional, system and normative integration).

Future studies could extend the RMIC to patient-caregiver dyads. This will help provide more holistic assessments which can lend valuable insights to assist programme planners, implementers, funders and policy makers in the conceptualization, implementation, monitoring and evaluation of integrated care initiatives for patients with complex needs. Lastly, evaluation results of the clinical outcome and experience of CARITAS' service users will be reported in another publication.

Author Contribution

Ha NHL and Chan IWX collected, analysed, interpreted the data and wrote the manuscript. Yap PLK initiated the study, provided suggestions on the study methodology, helped interpret the findings and revised the manuscript. Nurjono M and Vrijhoef HJM conceptualized the study, provided guidance for data collection, analysis and suggestions to enhance the manuscript. Nicholas SO contributed to data interpretation and revised the manuscript. Wee SL conceptualized the study, supervised data collection, analysis and interpretation of result, and revised the manuscript. All authors approved the final manuscript.

Data Sharing Statement

Dataset of the study is not available to protect the identities of the study participants.

Word count

4334 words.

Supplementary Materials

Three appendices are provided as supplementary materials and they are:

Figure 1: A Logic Model of CARITAS

Figure 2: Scores of RMIC's Eight Dimensions of Integration

Appendix 1: Ethnographic Observation Template

Appendix 2: Outline of an Interview Guide with Key Stakeholders in CARITAS

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Table 1. Demographic characteristics of RMIC-MT respondents (n = 13)

Variables	N (%)
Profession	
Doctor	5 (38.5)
Nurse	3 (23.0)
Allied Health	3 (23.0)
Administrator	2 (15.5)
Work Setting	
Tertiary hospital	5 (38.5)
Primary care provider	3 (23.0)
Voluntary Welfare Organization	4 (30.8)
National agency	1 (7.70)
Years of Involvement	
<6 months	0 (0.00)
6 months – 1 year	2 (15.4)
>1 year	11 (84.6)

Table 2. Demographic characteristics of respondents for qualitative interviews (n = 17)

Variables	**N (%)**
Profession	
Doctor	6 (37.0)
Nurse	3 (19.0)
Allied Health	4 (25.0)
Administrator	3 (19.0)
Work Setting	
Tertiary hospital	9 (53.0)
Primary care provider	2 (12.0)
Voluntary Welfare Organization	5 (29.0)
National agency	1 (6.00)
Years of Involvement	
<1 year	3 (18.0)
1-2 years	1 (6.00)
2-3 years	3 (18.0)
3-4 years	0 (0.00)
4-5 years	6 (29.0)
>5 years	4 (29.0)

630 **Table 3: Summary of Key Themes across Eight Dimensions of the RMIC-MT**

Dimension	**Key Themes**	**Quotes**
Population-based care	CARITAS was developed to better care for increasing needs of PWD and caregivers in Singapore	*The objectives of CARITAS were:* • *"Provide **holistic dementia care**"* [T006, P002, P004] • *"**Manage PWD well in the community**"* [T004] • *"Provide **seamless delivery of care** for patients"* [P003] • *"To **bridge that medical and social care integration gap*** [P007]
	Classification of patients was based on a biopsychosocial model and the need for caregiver support	• *"(…) The clinical part is important. The biological part, **the type of dementia, the stage of dementia**, you know (…) And another key component is **who the person with dementia really is** (…) and the other part that next comes in will be in terms of their **care giving capacity**, their desire to care, as well as their resources, what they can actually give to the patient."* [T001]
	Family physicians were not keen to look after PWDs as it is a complex condition that requires	• *"Because dealing with dementia patient **took a lot of time** …not just the patient, also the caregiver and family, and sometimes the maid. So, there are **many many issues to take care in the PWD**. So, I won't say there are many family physicians who have a keen interest to look after them"* [P004]

	specialised expertise and resources	- *"The problem with polyclinic is that the doctors there are* ***majority of them are not very keen*** *to see dementia patients... That's not what they are made up for (...)"* [T004]
Professional integration	Clinical leaders in the network were dedicated, inspiring, knowledgeable and respectable	- *"Experienced and knowledgeable", "Committed and passionate", "Persistent", "Visionary", "Have clear direction and goal", "Influential in getting partners together", "Instrumental in setting up network", "Believes in collaboration", "Always present"* [ALL]
	Mutual interdependencies existed between professionals in the network	- *"Helpful to one another", "Share the same objectives", "Willing to participate", "Committed", "Have no competition mindset", "Intrinsically motivated","Regular feedback among members of the team"* [T001, T004, T003, P001, P002, P006, P009]
Clinical integration	Service providers worked closely with one another to provide a range of services to clients	- *"We co-manage a client then I usually only able to do a monthly visit for this client but because the client is already in severe dementia stage, she wouldn't able to verbalise a lot for herself. The caregiver may not be able to give so much information.* ***Because of CARITAS nurse****, her commitment to step in to monitor the medical care for the client on a fortnightly basis - that actually* ***helped a lot for me*** *to*

		flow back the information to other caregivers that are not staying with the client (…) [P006]*”*
	Care was expedited	• *“So, through this Caritas programme, (…) I can say that okay, no need to wait for appointment.* ***I can straightaway get connection with this doctor*** *okay to* ***discuss this case straightaway in the next meeting****”* [P002] • *“They will just give us a call; say this client needed some attention. So instead of waiting,* ***we even do assessment way before*** *that, before even the* ***referral comes in****”.* [P001]
	Not all partners were always present at meetings	• *“(…) Because every Tuesday must go except public holiday... So* ***sometimes not all the stakeholders are there****. Not all, not all because this is the thing maybe I feel. Maybe I say work related or other commitment they not able to attend”.* [P002]
	Cases were not discussed when partners were not around	• *“I: I’m just wondering when you discuss patients and cases at the MDM, what if the community partners are not present?* *R:* ***We (will) not discuss until they are around****. (…)* [T007]
	Protocols for care process and criteria for recommendations to services were not	• *“I: Is this workflow documented?* *R: If you talk about the clinical diagnosis, I will say yes (…) But with regards to the person (..). that* ***definitely there is no standard way of going and***

	documented formally, while they seemed to be understood by the working team	***doing that*** *(...)* ***this is by and large not documented*** *(...)"* [T005]
Organizational integration	Before initiation of the network, an influential clinical leader was able to link up with various organizations and those in leadership positions	• *"So of course, then with Dr Y, because he is actually* ***very well known in the north*** *and then he with that background,* ***is able to garner gather a lot of people into the network****. Yeah, that's why with the team on board, that's why it's very successful (...)"* [P004]
	There was a workflow for patient care linking various organizations together, despite not being documented formally	• *"(...) In terms of all clinical diagnosis there is always criteria to fulfil and things like that,* ***which stage of dementia*** *and all that. Okay,.. with regards to the person,.. second part, as in* ***who the person is*** *(...) the emotional needs, the psychological needs, look at the life story of this person and all. (...)"* [T005]
	Less involvement from senior management among partners' organizations	• *"I: Yah I think it's very important like to have a clear vision and also shared vision but it's not easy like to get people.* • *R: Actually if you ask, I have this network would you like to come? They say sorry I have no time then this is not their priority right. So, ah, I don't think we're*

		talking about competent. ***I'm talking about the management interest*** *(...) "* [P005]
Normative integration	CARITAS' objectives were not clearly and consistently conveyed to community partners, especially new staff over time	• *"Because when I join that time,* ***nobody tell[s]me what is the objective of Caritas network****"* [P001] • *"We remind what is the vision and yah* ***I don't think we do enough*** *especially when people move on"* [P005]
	Some original intent waning over time	• *But to be honest I think* ***some of the intent has been lost through the time****. So right now, with the quarterly meeting, we are not as structured I feel, versus previously (...)* " [P005]
	Primary care's engagement was separate from that of other community partners	• *"Actually I have discussed with Dr. Y* ***whether we can get our staff to join in their Tuesday meetings*** *– (...) but so far I've* ***not been able to really uh get it done*** *lah"* [P005]. • *"****Polyclinic has not fully been brought into the network yet****. They are still having their own dealing issues and their own things taking on so many dimensions (...)"* [P008]
System integration	Increase in media advocacy on aged care issues	• *"The government is giving a lot of money to the media to advertise on* ***projects that help to educate people on what dementia is like****, so that they can seek help earlier on, help make neighbours a little bit more friendly, to look out for each other." [T002]*

		- *"I think over the past few years, there have been* ***a lot more TV coverage*** *on elderly people and the condition itself"* [T002]
	Increase in government funding and support on aged care	- *"(…)* ***The directions of the Ministry of Health is towards to have an aging in place****. We have a(n) active aging action plan. Yah so all these things are actually helping (…)"* [T006] - *"In terms of care provision it becomes a lot easier…there are* ***a lot more schemes, subsidies and policies*** *that can help support certain care provision (…) the* ***government is pumping a lot more funds into the voluntary welfare organizations*** *that help to provide elderly sitting services"* [T002]
Person-focused care	Adopt a biopsychosocial team-based approach	- *"(..) so we look at it from* ***a biopsychosocial perspective****. The biological and psychological changes and the impact on their social circles. Then we will study their families or their support network (…)* [T002]*"* - *"There is* ***the same team*** *who knows the patient, to be taking care of them as the primary team (…) We* ***really get to know them****, how to care for them and what are the reasons why they have certain behaviours before we can really give proper advice or treatment"* [T001]

	Clients not aware of CARITAS network or how the hospital worked with community partners	• *“I: Do you think they (caregivers) are aware that YP is part of this bigger network?* *R: Emm… **I think some of them do but not all of them**”. [P004]* • *“I: Um, do patients and caregivers know that they are part of this Caritas network?* *R: **I don’t think so they know about this Caritas network**. I think **majority will say “what’s Caritas?”**. Not say which lah, but **even our own staff will ask you what’s Caritas like?** (…) So, so **I don’t think they know very much about this network itself lah**.”* [T009]
	Only a small group of caregivers regularly attend caregiver support sessions	• *“(…) Caregivers, okay support group is always like that. **Twenty people sign up, fifty percent won’t come**.”* [T008]
Functional integration	High staff turnover among community partners	• *“We **had reach[ed] our peak for our clientele**. So we have **a lot of cases to manage**. .. Most of the Case Manager, Case Worker, **we don’t have the time** to actually attend or we will just rotate to attend as in every month (…)”* [P006] • *“I think considering I’m quite pro-active but my priority is my work, is my organization, my client which **every day to day I already swamped with it**. So this on top of it ah **I don’t think I want to extend***

		that additional hours *to go and organize anything* ***for the Caritas*** *lah.* [P001]
	Channelling of finances to tertiary hospital reflect the notion that care is prioritised in hospital over community	• *"There is a shared care so they do provide us* ***the financial support the FTEs*** *we need to build this team…The finances for CARITAS is to the medical team so they provide us with FTEs for us* ***to employ*** *additional because you know in the wards and all to care for dementia you sometimes need* ***additional manpower****, like music therapist, drama therapist, other therapists to engage them right"* [T001]
	Lack of IT platform for information sharing	• *"If we miss the meeting…and want to catch up [on] what is going on about the patients...* ***Centralized electronic information is important****. And…if we document clearly the goals of care…of each patient in the system, then the whole team…can work towards that target."* [T006] • *"A while ago they tried to come up with a system… called CCMS… so that we can share information. …I think that* ***it never took off****. Nobody even really bothered using the service…"* [T004]
	Lack of sharing of performance indicators	• *"Because I think is very subjective just go by feeling to see whether it we have actually done better or not. (…) Yah, so* ***I'm not so sure whether we actually done better, stay the same or getting worse****?. So*

		currently there's no progress update on all these that is going on" [T006] • "*I think these are the things that* ***KPI's achievement*** *of how are we progressing and things like that* ***should be communicated across the team member*** *that only we know we are doing well...*" [P005]
	Inadequate training for community partners	• "*R:* ***Sometimes the staff got training but sometimes*** *how they feel that the theory is theory* ***when you do really encounter experience with the clients right, they feel it's difficult*** *not easy as you say because sometimes as (they also) human beings they also will be a bit frustrated. (...) Sometimes it's easier said then [than] done. So* ***theory part is theory but when practical part ah, it's not easy***" [P002]

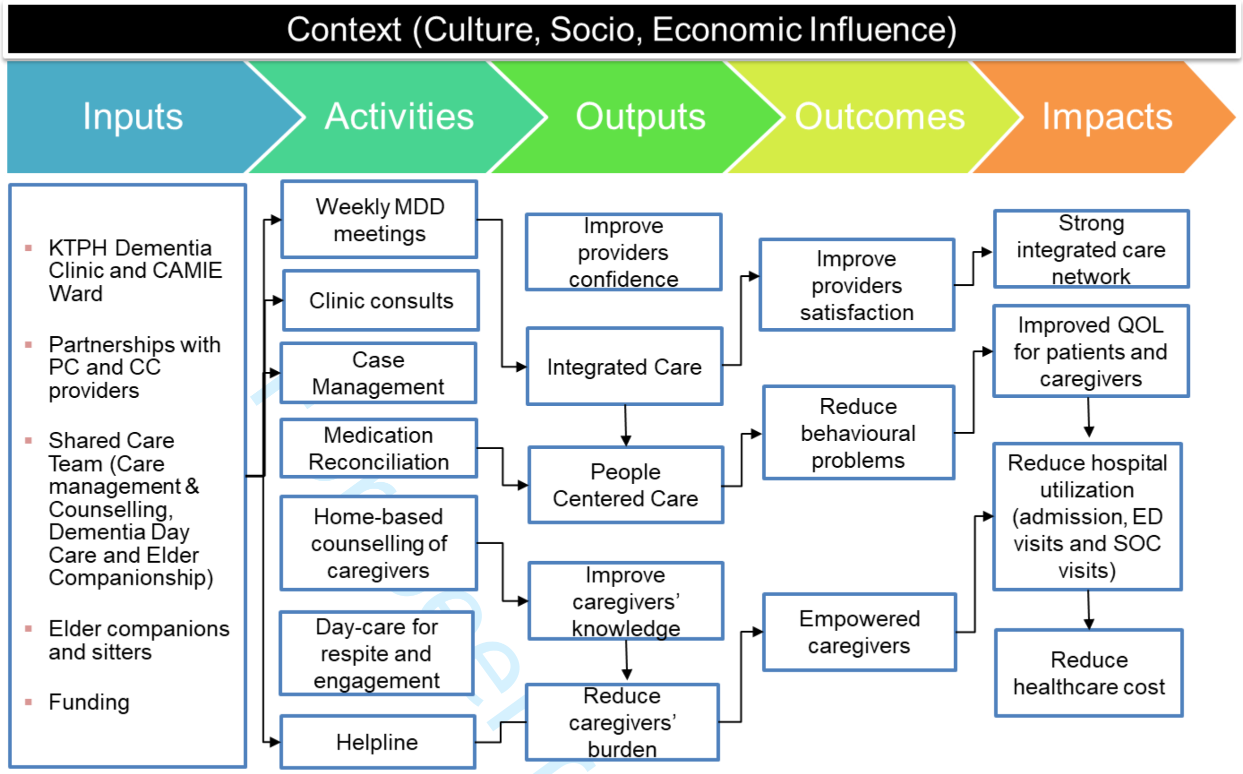
Legends:

Participants were given identifiers numbering 001 to 017, with "T" referring to participants from the tertiary hospital and "P" referring to those from primary and community care providers.

Abbreviations:

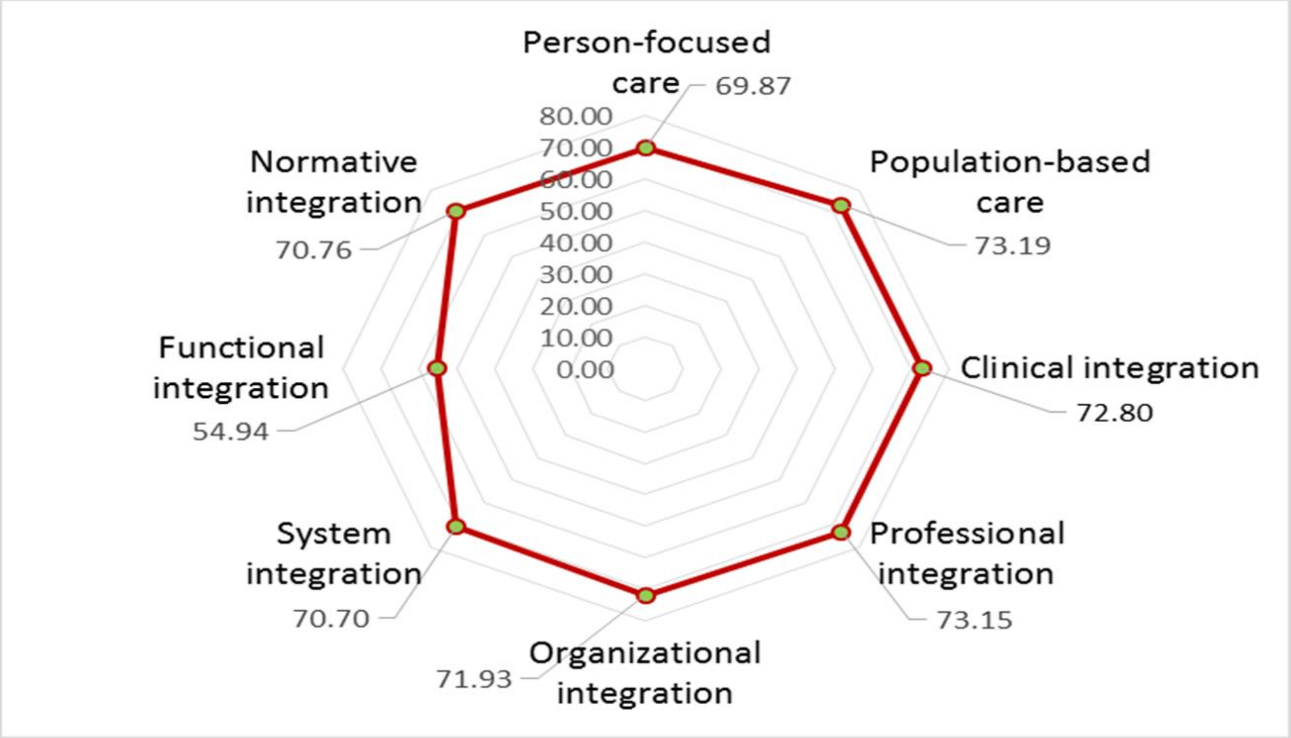
CARITAS: Acronym of the integrated care network (Comprehensive, Accessible, Responsive, Individualized, Transdisciplinary, Accountable, Seamless)
PWD: Persons with Dementia
MDM: Multi-disciplinary Meeting
FTE: Full-time Equivalent
IT: Information Technology
CCMS: Common Case Management System
KPI: Key Performance Indicators

Figure 1. A Logic Model of CARITAS



Legends:
KTPH: Khoo Teck Puat Hospital
CAMIE: Care for the Acute Mentally Infirm Elders
PC: Primary Care
CC: Community Care
iPAL: Integrated Pals for Active Living
MDD: Multi-disciplinary Discussion
QOL: Quality of Life
ED: Emergency Department
SOC: Specialist Outpatient Clinic

Figure 2. Scores of RMIC's Eight Dimensions of Integration



Appendix 1. Ethnographic Observation Template

Participant ID:	**Observer:**	**Visit type:**
Program enrolled:	**Date of observation:**	**Setting:**
Team member:	**Observation start time:** **Observation end time:**	**In attendance:**
Delivery of Information		
What are the activities carried out?		
Interactions between healthcare providers and clients (patients and (or) caregivers)		
Healthcare provider's effort to build rapport (observed relationships between providers and clients):		
Healthcare provider's effort to engage clients (involvement of clients in their health and social conditions):		
Healthcare provider's effort to empower clients (E.g. providing relevant information and skills to improve clients' self-efficacy and ability to make informed decisions):		
Clients' responsiveness (Clients' responses and extent of engagement to healthcare providers and intervention):		
Other Notes:		

Appendix 2. Outline of an Interview Guide with Key Stakeholders in CARITAS

Topic	Questions
Introduction	1. How are you involved in the CARITAS network?
	2. How has your experience been working in the network?
Components of CARITAS	1. Could you help me understand more about the various components of CARITAS? (e.g. weekly multi-disciplinary meeting, referral to community partners, outpatient follow-up, inpatient ward, polyclinics, etc)
	2. How do you follow up with patients? How do you design care plans?
	3. How is information exchanged? How is the network financed?
Experience of working together	1. What do you think is the objective of the network?
	2. How do you work together to provide different aspects of care in the network?
	3. How has the partnership across organizations been like?
Experience of being in the network	1. What do you think are the factors that contributed to the success of the programme? What are your challenges?
	2. What are some aspects you felt have changed over the years? How did you adapt?
	3. How do you think patients and family members have benefitted from the network?
Evaluation	1. How can CARITAS be improved?
	2. How does CARITAS compare with other integrated care programmes you have worked with or are familiar with?
	3. Do you think that CARITAS should be scaled up or expanded?

Reporting checklist for quality improvement study.

Based on the SQUIRE guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the SQUIREreporting guidelines, and cite them as:

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		Reporting Item	Page Number
Title			
	#1	Indicate that the manuscript concerns an initiative to improve healthcare (broadly defined to include the quality, safety, effectiveness, patientcenteredness, timeliness, cost, efficiency, and equity of healthcare)	1
Abstract			
	#02a	Provide adequate information to aid in searching and indexing	3
	#02b	Summarize all key information from various sections of the text using the abstract format of the intended publication or a structured summary such as: background, local problem, methods, interventions, results, conclusions	2-3
Introduction			
Problem description	#3	Nature and significance of the local problem	4

Available knowledge	#4	Summary of what is currently known about the problem, including relevant previous studies	4-5
Rationale	#5	Informal or formal frameworks, models, concepts, and / or theories used to explain the problem, any reasons or assumptions that were used to develop the intervention(s), and reasons why the intervention(s) was expected to work	5
Specific aims	#6	Purpose of the project and of this report	5
Methods			
Context	#7	Contextual elements considered important at the outset of introducing the intervention(s)	6
Intervention(s)	#08a	Description of the intervention(s) in sufficient detail that others could reproduce it	6-7
Intervention(s)	#08b	Specifics of the team involved in the work	7-9
Study of the Intervention(s)	#09a	Approach chosen for assessing the impact of the intervention(s)	7-9
Study of the Intervention(s)	#09b	Approach used to establish whether the observed outcomes were due to the intervention(s)	7-9
Measures	#10a	Measures chosen for studying processes and outcomes of the intervention(s), including rationale for choosing them, their operational definitions, and their validity and reliability	6
Measures	#10b	Description of the approach to the ongoing assessment of contextual elements that contributed to the success, failure, efficiency, and cost	7-9
Measures	#10c	Methods employed for assessing completeness and accuracy of data	7-9
Analysis	#11a	Qualitative and quantitative methods used to draw inferences from the data	7-9
Analysis	#11b	Methods for understanding variation within the data, including the effects of time as a variable	7-9
Ethical considerations	#12	Ethical aspects of implementing and studying the intervention(s) and how they were addressed, including, but not limited to, formal ethics review and potential conflict(s) of interest	5-6
Results			

	#13a	Initial steps of the intervention(s) and their evolution over time (e.g., time-line diagram, flow chart, or table), including modifications made to the intervention during the project	9, 25, 26,
	#13b	Details of the process measures and outcome	9-16, 27-35
	#13c	Contextual elements that interacted with the intervention(s)	9-16, 27-35
	#13d	Observed associations between outcomes, interventions, and relevant contextual elements	9-16, 27-35
	#13e	Unintended consequences such as unexpected benefits, problems, failures, or costs associated with the intervention(s).	9-16, 27-35
	#13f	Details about missing data	9
Discussion			
Summary	#14a	Key findings, including relevance to the rationale and specific aims	16-17
Summary	#14b	Particular strengths of the project	19
Interpretation	#15a	Nature of the association between the intervention(s) and the outcomes	17-18
Interpretation	#15b	Comparison of results with findings from other publications	17
Interpretation	#15c	Impact of the project on people and systems	17-18
Interpretation	#15d	Reasons for any differences between observed and anticipated outcomes, including the influence of context	17-18
Interpretation	#15e	Costs and strategic trade-offs, including opportunity costs	n/a
Limitations	#16a	Limits to the generalizability of the work	19
Limitations	#16b	Factors that might have limited internal validity such as confounding, bias, or imprecision in the design, methods, measurement, or analysis	19
Limitations	#16c	Efforts made to minimize and adjust for limitations	19
Conclusion	#17a	Usefulness of the work	18-20
Conclusion	#17b	Sustainability	18-20
Conclusion	#17c	Potential for spread to other contexts	18-20

Conclusion	#17d	Implications for practice and for further study in the field	18-20
Conclusion	#17e	Suggested next steps	18-20
Other information			
Funding	#18	Sources of funding that supported this work. Role, if any, of the funding organization in the design, implementation, interpretation, and reporting	3

Notes:

- 13a: 9, 25, 26,
- 13b: 9-16, 27-35
- 13c: 9-16, 27-35
- 13d: 9-16, 27-35
- 13e: 9-16, 27-35 The SQUIRE 2.0 checklist is distributed under the terms of the Creative Commons Attribution License CC BY-NC 4.0. This checklist was completed on 30. March 2020 using https://www.goodreports.org/, a tool made by the EQUATOR Network in collaboration with Penelope.ai