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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.

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3 **Conclusion:** CARITAS has reached maturity in micro- and meso-levels of integration while
4
5 macro integration need further development. Integration can be enhanced by assessing service
6
7 gaps, increasing engagement with stakeholders and providing a shared communication system.
8
9

10 **(257 words)**
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12

13 **Key words:** dementia, care coordination, integrated systems, mixed method, programme
14
15 evaluation.
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17

18 **Article Summary**

20 **Strengths and Limitations of this Study**

- 21 • The strengths of this evaluation included the use of a mixed-methods - drawing on
22 both quantitative and qualitative methods to generate insights.
23
- 24 • Analyses by three coders minimized the bias of qualitative research.
25
- 26 • However, sampling of interview participants was conducted through the
27 recommendations of a managerial staff and could have skewed the selection.
28
- 29 • Additionally, 48% of the participants did not complete the RMIC questionnaire which
30 may limit the representativeness of the responses.
31
- 32 • Despite the limitations, the interviews largely validated the RMIC responses.
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43 **Funding Statement**

44 This research received support from GERI Intramural Funding, project reference GERI/1610.
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49 **Competing Interests**

50 Philip Yap is a key clinical leader of the CARITAS integrated dementia care network. The
51
52 other authors declare that they have no competing interests.
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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-,

1
2
3 meso- and micro- levels, which can be contextualized to any integrated care setting [18]. It has
4
5 been adopted as a conceptual framework to evaluate integrated care from managerial
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7 perspectives [17], [18].
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10 Beyond a conceptual framework, we also endeavour to understand *how* integrated care
11
12 programmes achieve intended outcomes. Existing studies have outlined strategies to integrate
13
14 person-centred services. Within a provider team, strategies include ensuring care coordination
15
16 and continuity through regular team meetings [19], shared information and communication
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18 technology (ICT) system and effective data management [4], [20], strong leadership [4], and
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20 an organisational culture that supports accountability and shared decision-making [4].
21
22 Externally, communication between providers is crucial to achieve integration [4], [20].
23
24 Funding incentives for providers could also foster greater commitment and sustain success [4],
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26 [21]. Lastly, eliciting the preferences of individuals and fostering mutual trust and
27
28 responsibility are crucial to achieving person-centered and integrated care [22].
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33 We evaluated the process and determinants of integration in a dementia care network.
34
35 Using the RMIC Measurement Tool (RMIC-MT), we evaluated the level and extent of
36
37 integration. We also analyzed the contextual factors and workings that underlie integration,
38
39 and identify strategies for improvement and scaling-up. The study adds to extant knowledge
40
41 on integrated care systems for patients with complex needs such as dementia, and provide
42
43 important insights for the design, development and implementation of integrated care
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45 programmes.
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53 **Methods**

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55 This study is the first phase of a mixed-methods evaluation of the CARITAS
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57 programme to examine the extent of integration in the network. The second phase which
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3 examines care recipients' experiences with the network and assess clinical outcomes will be
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5 separate. Domain Specific Review Board, National Healthcare Group (Singapore) gave study
6
7 ethics approval [Ref. 2017/00904]. We used the SQUIRE checklist when writing our report
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10 [23].
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14 **RMIC Framework**

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16
17 RMIC structures integrated care along macro-, meso- and micro- levels. At the macro
18
19 level, *system integration* refers to the linkages and visibility of the partnership formed between
20
21 the healthcare system and external environment. At the meso level, *organizational integration*
22
23 refers to network mechanisms between different organizations, and *professional integration*
24
25 refers to partnerships between different professionals in the healthcare system. At the micro
26
27 level, *clinical integration* refers to the coordination of patient care services across different
28
29 professionals in the healthcare system. *Functional* and *normative integration* link the macro,
30
31 meso and micro levels of integration. The former refers to key support functions and activities
32
33 by which financing, information, and management modalities are linked. The latter refers to
34
35 essential social and cultural factors (e.g., shared mission, vision and values) within the system.
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38 The RMIC also includes person-focused and population-based perspectives to guide better
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40 coordination of services across care continuum. *Person-focused care* reflects a bio-
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42 psychosocial health approach and considers personal preferences and needs, while *population-*
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44 *based care* requires healthcare be provided according to health profiles and needs of a defined
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population.

55 **Intervention/Programme**

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CARITAS was established as a dementia care network in 2012 within Singapore's
northern Regional Health System [18]. The acronym CARITAS signifies: comprehensive,

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3 accessible, responsive, individualized, trans-disciplinary, accountable and seamless care for
4 persons with dementia (PWD) [24]. CARITAS aims to: (i) enhance the quality, capacity and
5 efficacy of dementia care through vertically and horizontally integrated team-based care with
6 regular case conferencing, partnerships between the tertiary hospital and primary and
7 community care; (ii) increase the capability of primary and community care to care for PWD
8 through regular training, shared care and case conferencing; and (iii) empower caregivers to
9 care better for PWD through caregiver training programmes and a direct helpline. The model
10 was developed based on the concept of integrated practice units (IPU). IPU embodies concepts
11 of value-based care in organizing care around a condition and/or population, shared decision-
12 making, regular team meetings, and responsibility for the full cycle of care for the condition
13 [25]. Figure 1 depicts the CARITAS's logic model.

31 **Study Design**

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

44 **Quantitative Data**

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

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18 To better understand the activities of CARITAS, researchers (MN, LH and IC) observed
19 consultations and discussions (n=14) [26] in ambulatory clinics at the tertiary hospital, multi-
20 disciplinary meetings, primary care clinic and tele-consultations. Observers were
21
22 inconspicuous and did not influence the sessions. Field notes were recorded after each
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24 observation session using a guide (Appendix 1).
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30 Additionally, we conducted semi-structured interviews with key stakeholders of
31 CARITAS (n=17) to understand the programme workings and outcomes determinants. We
32 included participants who were involved in the conceptualization, design, development and
33 implementation of the programme. Those who had resigned were excluded. Participants were
34 selected using purposive sampling [27] to have a mix of healthcare professionals from different
35 settings and with different periods of involvement. Interview questions were developed based
36 on the RMIC dimensions including care coordination (clinical integration), how professionals
37 worked together (professional integration), financial and information management (functional
38 integration) (Appendix 2). Interviews averaged 67 (range 42 to 93) minutes, were audio
39 recorded and transcribed verbatim. Numbered identifiers were assigned to participants to
40 protect their identities, with prefixes "T" (from the tertiary hospital) and "P" (PCC providers).
41
42 After each interview, team members debriefed and created summary notes. Analysis was done
43 inductively through thematic coding and deductively through classifying data into initial
44 themes (NVivo v11). Team members (MN, LH and IC) developed a shared codebook to
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3 document the initial themes and definitions, which were iteratively refined into prominent
4 themes. These final themes were subsequently organized according to the eight RMIC
5 dimensions of integration.
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10 11 12 ***Data Triangulation*** 13

14 Through rigorous discussions, qualitative themes were classified accordingly to provide
15 insights on the quantitative results. The triangulated findings were subsequently presented to
16 CARITAS stakeholders at a meeting to assess their validity. Feedback was used to refine the
17 categorization of themes and interpretation of results.
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27 **Patient and Public Involvement** 28

29 Patients and their family caregivers were not involved in the design and conduct of this
30 phase of the study, which was focussed on evaluating the organization of CARITAS care
31 network and extent of integration from care providers' perspectives. As such, the findings will
32 primarily be disseminated to healthcare professionals and providers, not patients and their
33 families. Findings are intended to inform care integration and delivery and will not directly
34 result in any change to patient care.
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47 **Results** 48

49 **RMIC-MT** 50

51 Forty-nine healthcare participants came from the tertiary hospital (24.5%), volunteer
52 welfare organizations (VWO) (53.1%), a primary care provider (8.16%) and national agency
53 (14.3%). Twenty-seven (55.1%) attempted the questionnaire, 2 (7.41%) did not complete and
54 12 (44.4%) had >30% missing data. Majority (66.7%) opted to be anonymous. The final
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3 analysis comprised 13 respondents (48.1%) from 7 organizations - tertiary hospital (38.5%),
4 volunteer welfare organizations (30.8%), primary care provider (23.0%) and national agency
5 (7.7%). Majority were tertiary hospital doctors (38.5%) with >1 year of involvement in
6 CARITAS (84.6%) (Table 1).
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12 Most dimensions achieved scores averaging 70/100 (Figure 2). Population-based care
13 scored the highest (73.19), followed by professional (73.15), clinical (72.80) and organizational
14 integration (71.93). Functional integration scored the lowest (54.94).
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22 **Ethnographic Observation and In-depth interviews**

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25 Based on the observation notes, a typical patient's journey (Appendix 3) was charted
26 which provided initial understanding into the interventions available at CARITAS and how
27 members worked across settings within the system. Doctors (37.0%) from the tertiary hospital
28 (53.0%) with >4 years of involvement (58.0%) comprised the larger proportion of participants
29 in the semi-structured interviews (Table 2). A small proportion of themes derived from in-
30 depth interviews overlapped with those of observational notes, which described a patient's
31 journey at various settings in the network. Themes regarding the background of the interview
32 and reasons for their involvement in CARITAS were not classified into the eight RMIC
33 dimensions. Relevant interview quotes corresponding to the RMIC-MT dimensions are
34 summarized in Table 3.
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51 ***Population-based care***

52 This dimension scored highest as CARITAS was conceived specifically to address the
53 growing burden of dementia in Singapore [28] and focused on building the dementia
54 capabilities of primary and community care partners. PWD were admitted into the programme
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3 based on disease severity and extent of caregiver support. Stratification of patients, which
4 enabled care to be delivered appropriately in primary and community care settings, resulted in
5 better distribution of patients and care resources. Prior to CARITAS, primary care physicians
6
7 lacked experience and expertise caring for PWD. The CARITAS team provided regular
8 training, case conferences and teleconsultation via video conferencing to build competence of
9
10 this group of community stakeholders. They appreciated the avenue for direct access to hospital
11 dementia specialists for real-time advice. With increased capability and capacity of primary
12 care for PWD, this freed up the tertiary hospital's resources to attend to patients with more
13 complex and specialized needs.
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26 ***Professional integration***

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28 This dimension assessed the presence of dedicated clinical leaders and mutual
29 professional interdependencies. The leaders were described to be "*respectable, experienced,*
30 *knowledgeable, always present and instrumental*" [ALL]. Members felt supported and
31 understood when discussing patients which increased their confidence to care for PWD. It also
32 enabled them to possess greater responsibility for their patients, resulting in a higher level of
33 professional integration.
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42 Additionally, community partners participated regularly at inter-disciplinary meetings
43 where tertiary hospital referred patients to relevant community partners who would then update
44 the team regularly on the patients. The opportunity for face-to-face communication served as
45 a bridge between the tertiary hospital and community partners, and concurrently allowed
46 partners to learn from each other. Consequently, strong interdependencies developed between
47 community partners and hospital specialists, and the latter was able to tap on community
48 resources such as home- and centre day-care services to complement hospital care. Community
49 partners expressed that the team members were "*helpful to one another*", "*consistent*",
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3 “committed” and *intrinsically motivated*” [T001, P001, P002], hence fostering professional
4 trust. They also reported that members received “*good support from the network*” and “*regular*
5 *feedback among team members*” who “*had the same objectives*” and “*no competition mindset*”
6 [T009, P006, P007]. Having a shared goal to improve care for PWD promoted a sense of
7 accountability which enhanced professional integration.
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17 ***Clinical integration***

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19 Members rated their performance on coordination, referral and follow-up of patients,
20 involvement of patients in care planning and decisions, and if the network provided
21 comprehensive services.
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26 The structure of the CARITAS team was flat. Instead of the CARITAS lead directing
27 unilaterally, team members took ownership of their patients and developed individualised care
28 plans albeit through shared decision making. As a result, even when the lead was not present,
29 discussions proceeded smoothly with each team member taking turns to update and discuss
30 their cases. While diversity of opinions was encouraged, shared decision making was upheld
31 and clinical integration maintained.
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40 The strength of CARITAS laid in regular team meetings enabling two-way information
41 flow and provision of a comprehensive range of services to address the multi-faceted needs of
42 PWD and their caregivers. The relationships built through face-to-face meetings were
43 invaluable in facilitating inter-professional exchanges and empowered members to manage
44 more complex patients.
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51 Furthermore, the integration of staff members across care settings allowed patients to
52 expediently tap on a comprehensive suite of services from hospital-based interventions to
53 community centre-based care and home-care, coupled with a phone helpline to cater to patients’
54 ad hoc needs (Appendix 3). As a member expressed, “*It does help in terms of let’s say we refer*
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3 *to the day care, the day care does try (...) to expedite some of the cases*". [T004]. By working
4
5 in a coordinated manner, the integrated CARITAS service delivered comprehensive and
6
7 continued care of a higher standard.
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11 However, there were also factors impeding clinical integration. First, not all members,
12
13 especially those from the community, could be present at every meeting. Unsurprisingly,
14
15 members opined their objectives were not met when other partners caring for same patient did
16
17 not attend meetings. Second, some members indicated the need for operational guides and
18
19 protocols, particularly clearer criteria for referral to various services. While members with
20
21 more years in the team appeared to have an implicit understanding of the criteria, newer
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23 members felt less confident and were concerned about inappropriate referrals.
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28 ***Organizational integration***

29
30 This dimension examined how well organizations collaborated to provide care and
31
32 whether there was a shared understanding about care strategy. It also explored if there was
33
34 effective leadership to connect across organizations. Having an influential clinical leader and
35
36 the presence of a patient care workflow provided the foundation of organisation integration in
37
38 CARITAS.
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43 Since the inception of CARITAS, the clinical leader helped to form the network of
44
45 organisations by enunciating a shared mission and aligning care goals. Despite team members
46
47 coming from different care settings, the common vision to provide seamless care for PWD and
48
49 their families with consistent bi-directional information flow enabled collaborative and
50
51 integrated person centric care. There was tacit understanding of the workflow involving
52
53 different member organizations with clear delineation of roles. Therefore, each member
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55 understood his work scope and responsibilities, empowering smooth operations and team
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57 integrity.
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3 However, over time, staff turnover and change in the leadership of partnering
4 organisations with attendant shifts in priorities have negatively impacted organisational
5 integration. As a result, some members were less inclined to attend weekly meetings or only
6 attended when they needed to discuss their cases. There were also been instances of decreased
7 participation in learning opportunities such as case-based learning and continuing education
8 initiatives.
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21 ***Normative integration***

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23 We examined if members understood the vision and mission of CARITAS and if their
24 desire and ability to work together. Although senior members were generally clear on the
25 initiative's objectives, newer members were less able to do so. They shared that the objectives
26 were not consistently conveyed; a member remarked "*because when I join that time, nobody*
27 *tell[s]me what is the objective of Caritas network*" [P001] and another shared, "*we remind*
28 *what is the vision and yah I don't think we do enough especially when people move on*" [P005].
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38 Another issue lay in the primary care team not being able to participate regularly at
39 team meetings. Information concerning patients from primary care was often provided by
40 hospital team members who had learnt about the issues during the real-time video conferencing
41 support for the primary care team. The reduced face-to-face interaction implied diminished
42 opportunities for bonding and forging of a shared identity, and had impeded normative
43 integration.
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55 ***System integration***

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

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28 This dimension assessed the degree of patients' needs being explicit in care delivery,
29 and patients being educated and involved in planning and organising of care. The CARITAS
30 team adopted a biopsychosocial care approach and emphasized individualised relationship
31 centred care across the disease continuum. As a member remarked, "*there is the same team*
32 *who knows the patient, to be taking care of them as the primary team (...) We really get to*
33 *know them, how to care for them and what are the reasons why they have certain behaviours*
34 *before we can really give proper advice or treatment*" [T001]. The holistic and individualized
35 approach was shared by another member who elaborated, "*we will look at things like the type*
36 *of dementia, existing symptoms, the needs that they have in terms of both physical and*
37 *psychological...and the impact on their social circles. Then we will study their families or their*
38 *support network (...)* [T002]"
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54 However, while the patients received person centred care, they lacked awareness of
55 CARITAS as an integrated care team and how they benefited from the services afforded by the
56 network's partners. They knew little of which agencies were in the network and how the
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3 hospital partnered them to deliver care. Engagement with the family caregiver support group
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5 dwindled with time as only a small number of caregivers regularly attended these sessions out
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8 of a large repository of caregivers in the network.
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10 11 12 13 ***Functional integration*** 14

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16 Functional integration investigates the extent financial and other incentives are used to
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18 improve teamwork, coordination and continuity of care. Functional integration had the lowest
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20 score which could be attributed to staff turnover, the financing system favouring tertiary care,
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22 and the lack of a shared platform for documentation.
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26 Significant staff turnover, especially among community partners affected the stability
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28 of the team. Manpower shortage in community care compromised partners' attendance at
29
30 weekly team meetings which in turn impacted care. Moreover, new staff lacked experience and
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32 skills in managing more complex problems and needed time to become proficient with the
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34 workings of the CARITAS.
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38 Funding for CARITAS was channelled primarily to the tertiary hospital which shaped
39
40 the notion that leadership and management was concentrated within tertiary care instead of
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42 being distributed across care settings. The initiative was perceived to be driven by the hospital
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44 which embraced accountability and setting of key performance indicators. As such, other
45
46 partnering organisations tended to assume less accountability which compromised functional
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48 integration.
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52 The absence of a common IT platform for structured information sharing between
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54 hospital and community partners also impeded functional integration. As team members caring
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56 for the same patient could not access each other's records, much time was spent during
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58 meetings to update members about patients' progress instead of discussing how best to improve
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3 care. The lack of shared documentation of previous and ongoing services for patients also
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5 risked duplication of services.
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10 11 **Discussion**

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14 This study assessed the process and extent of integration of the CARITAS dementia
15 care network. We adopted a mixed-methods approach by triangulating the RMIC-MT with in-
16 depth interviews and ethnographic observation. All but one RMIC dimension achieved a mean
17 score of ~70/100 - highest for population-based (73.19) and lowest for functional integration
18 (54.94). Qualitative findings revealed contextual factors that strengthened or hindered the
19 integration of CARITAS. Notably, the presence of inspiring clinical leaders, having quick
20 access to and close guidance from the tertiary hospital increased community partners'
21 knowledge, skills and confidence in care delivery. The closely-knit inter-disciplinary and cross-
22 institutional partnership also facilitated the common goal of person-centred care for the patient-
23 caregiver dyad. However, less than optimal inter-organizational stakeholder engagement, lack
24 of structured process documentation, shared IT-platform and centralized case management
25 compromised the degree of integration.
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43 The determinants of care integration within CARITAS are consistent with published
44 literature. Salutary scores across professional, clinical and organizational integration could be
45 attributed to knowledgeable and inspiring clinical leaders, regular face-to-face meetings and a
46 comprehensive range of services for PWD and caregivers. These factors have been shown to
47 facilitate the development of integrated care and its components [29]–[31]. Competent
48 leadership in the sharing of clinical expertise, providing guidance on patient care and
49 establishing a culture that facilitates accountability and shared decision-making [4], [32]–[34]
50 contributed to the readiness and commitment of team members to implement changes towards
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3 integrated care [34]. Working across healthcare disciplines has been shown to enable shared
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5 decision making and formation of care plans for patients with complex needs [33]-[34],
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7 contributing to improved clinical outcomes and patient satisfaction [19]. Furthermore, having
8
9 a comprehensive range of services afforded for both customization and generalisation of care
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11 to meet varied needs.
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15 A few factors unique to CARITAS impeded its endeavour of seamless care. The
16
17 primary care team operated rather independently from the rest of the partners which
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19 compromised care continuity and information flow. Also, the absence of a common IT
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21 documentation and care planning platform [4], [20], hindered information exchange between
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23 care providers. Information sharing is important to integrated care programmes without which
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25 less expedient ways of communication are inevitable [34].
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30 Integrated care programmes evolve with time and some dimensions mature more
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32 quickly than others [35]. Integration often begins at micro (e.g. clinical integration) and meso
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34 levels (e.g. professional and organizational integration) before progressing to a macro level
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36 (e.g. system integration) [36]. Dimensions such as functional and normative integration which
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38 establish connectivity across the micro, meso and macro require significant time to stabilize
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40 [37]. Moreover, integration may start from the primary organization spearheading the initiative
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42 first before becoming established in other member agencies. It is thus conceivable that
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44 CARITAS performed better in dimensions such as clinical integration while the areas of
45
46 functional and normative integration are still a work in progress.
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50 There are ways to enhance the more mature dimensions of integration of CARITAS and
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52 augment the less developed ones. Addressing existing service gaps can refine the CARITAS
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54 model. First, extending telephone helpline beyond office hours can improve responsiveness to
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56 needs. Second, wider and deeper engagement to better understand caregiver needs will help
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58 develop targeted caregiver support services. Third, to improve functional integration, the
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3 network can adopt a centralized IT infrastructure for documentation, communication, and case
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5 coordination, all of which help standardize care delivery [37]. Fourth, the network could
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7 organize formal and informal processes and activities to facilitate cross-organizational
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9 understanding and collaboration. They can serve to reiterate the objectives of the team,
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11 communicate key performance indicators, discuss strategies and align goals. These efforts can
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13 have positive effects on system and normative integration which are often harder to achieve.
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15 Finally, initiatives to engage users, increase visibility and scale up the initiative should be
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17 prioritized. CARITAS can take advantage of its strong leadership to connect with more
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19 organizations and continuously engage community stakeholders to garner longer-term support.
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25 The strengths of this evaluation include the use of a mixed-methods - drawing on both
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27 quantitative and qualitative methods to generate insights. Analyses by three coders also
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29 minimized the bias of qualitative research. However, certain limitations should be considered.
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31 Sampling of interview participants was conducted through the recommendations of a
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33 managerial staff and could have skewed the selection. To mitigate bias, participants were
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35 reminded that their responses would be anonymized, and efforts were made to capture the
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37 opinions of participants from each component of CARITAS. Additionally, 48% of the
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39 participants did not complete the RMIC questionnaire which may limit the representativeness
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41 of the responses. This could be attributed to the length of the questionnaire (62 items), which
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43 took respondents 48 minutes on average to complete whereas respondents who did not
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45 complete averaged only 4 minutes on the questionnaire. It is likely that staff turnover had
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47 resulted in several new staff with <1 year of CARITAS experience who felt inadequate to
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49 provide valid responses. Still, despite the reduced sample, the interviews largely validated the
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51 RMIC responses.
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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	<p><i>The objectives of CARITAS were:</i></p> <ul style="list-style-type: none"> • “Provide <u>holistic dementia care</u>” [T006, P002, P004] • “<u>Manage PWD well in the community</u>” [T004] • “Provide <u>seamless delivery of care</u> for patients” [P003] • “To <u>bridge that medical and social care integration gap</u> [P007]
	Classification of patients was based on a biopsychosocial model and the need for caregiver support	<ul style="list-style-type: none"> • “(...) <i>The clinical part is important. The biological part, <u>the type of dementia, the stage of dementia,</u> you know (...) And another key component is <u>who the person with dementia really is</u> (...) and the other part that next comes in will be in terms of their <u>care giving capacity</u>, their desire to care, as well as their</i>

		<p>resources, what they can actually give to the patient.” [T001]</p>
	<p>Family physicians were not keen to look after PWDs as it is a complex condition that requires specialised expertise and resources</p>	<ul style="list-style-type: none"> • “Because dealing with dementia patient <u>took a lot of time</u> ...not just the patient, also the caregiver and family, and sometimes the maid. So, there are <u>many many issues to take care in the PWD</u>. 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 <u>majority of them are not very keen</u> to see dementia patients... That’s not what they are made up for (...)” [T004]
Professional integration	<p>Clinical leaders in the network were dedicated, inspiring, knowledgeable and respectable</p>	<ul style="list-style-type: none"> • “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]
	<p>Mutual interdependencies existed between professionals in the network</p>	<ul style="list-style-type: none"> • “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]

<p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25</p> <p>Clinical integration</p>	<p>Service providers worked closely with one another to provide a range of services to clients</p>	<ul style="list-style-type: none"> • “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. <u>Because of CARITAS nurse</u>, her commitment to step in to monitor the medical care for the client on a fortnightly basis - that actually <u>helped a lot for me</u> to flow back the information to other caregivers that are not staying with the client (...) [P006]”
	<p>Care was expedited</p>	<ul style="list-style-type: none"> • “So, through this Caritas programme, (...) I can say that okay, no need to wait for appointment. <u>I can straightaway get connection with this doctor</u> okay to <u>discuss this case straightaway in the next meeting</u>” [P002] • “They will just give us a call; say this client needed some attention. So instead of waiting, <u>we even do assessment way before</u> that, before even the <u>referral comes in</u>”. [P001]
	<p>Not all partners were always present at meetings</p>	<ul style="list-style-type: none"> • “(...) Because every Tuesday must go except public holiday... So <u>sometimes not all the stakeholders are there</u>. 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	<ul style="list-style-type: none"> • <i>“I: I’m just wondering when you discuss patients and cases at the MDM, what if the community partners are not present? R: <u>We (will) not discuss until they are around.</u> (...) [T007]</i>
	Protocols for care process and criteria for recommendations to services were not documented formally, while they seemed to be understood by the working team	<ul style="list-style-type: none"> • <i>“I: Is this workflow documented? R: If you talk about the clinical diagnosis, I will say yes (...) But with regards to the person (...). that <u>definitely there is no standard way of going and doing that</u> (...) <u>this is by and large not documented</u> (...)” [T005]</i>
Organizational integration	Before initiation of the network, an influential clinical leader was able to link up with various organizations and those in leadership positions	<ul style="list-style-type: none"> • <i>“So of course, then with Dr Y, because he is actually <u>very well known in the north</u> and then he with that background, <u>is able to garner gather a lot of people into the network.</u> Yeah, that’s why with the team on board, that’s why it’s very successful (...)” [P004]</i>
	There was a workflow for patient care linking various organizations	<ul style="list-style-type: none"> • <i>“(…) In terms of all clinical diagnosis there is always criteria to fulfil and things like that, <u>which stage of dementia</u> and all that. Okay,.. with regards to the person,.. second part, as in <u>who the person is</u></i>

	together, despite not being documented formally	<p>(...) the emotional needs, the psychological needs, look at the life story of this person and all. (...)”</p> <p>[T005]</p>
	Less involvement from senior management among partners’ organizations	<ul style="list-style-type: none"> • “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. <u>I’m talking about the management interest</u> (...)” [P005]
Normative integration	CARITAS’ objectives were not clearly and consistently conveyed to community partners, especially new staff over time	<ul style="list-style-type: none"> • “Because when I join that time, <u>nobody tell/s/me what is the objective of Caritas network</u>” [P001] • “We remind what is the vision and yah <u>I don’t think we do enough</u> especially when people move on” [P005]
	Some original intent waning over time	<ul style="list-style-type: none"> • But to be honest I think <u>some of the intent has been lost through the time</u>. 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	<ul style="list-style-type: none"> • “Actually I have discussed with Dr. Y <u>whether we can get our staff to join in their Tuesday meetings</u> – (...) but so far I’ve <u>not been able to really uh get it done lah</u>” [P005].

	<p>other community partners</p>	<ul style="list-style-type: none"> • <u>“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 (...)”</u> [P008]
<p>System integration</p>	<p>Increase in media advocacy on aged care issues</p>	<ul style="list-style-type: none"> • <u>“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.”</u> [T002] • <u>“I think over the past few years, there have been a lot more TV coverage on elderly people and the condition itself”</u> [T002]
	<p>Increase in government funding and support on aged care</p>	<ul style="list-style-type: none"> • <u>“(...) 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 (...)”</u> [T006] • <u>“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”</u> [T002]
<p>Person-focused care</p>	<p>Adopt a biopsychosocial team-based approach</p>	<ul style="list-style-type: none"> • <u>“(.) so we look at it from a biopsychosocial perspective. The biological and psychological changes and the impact on their social circles. Then</u>

		<p>we will study their families or their support network (...) [T002]”</p> <ul style="list-style-type: none"> “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]
	<p>Clients not aware of CARITAS network or how the hospital worked with community partners</p>	<ul style="list-style-type: none"> “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. I think majority will say “what’s Caritas?”. 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></u>” [T009]
	<p>Only a small group of caregivers regularly attend caregiver support sessions</p>	<ul style="list-style-type: none"> “(…) Caregivers, okay support group is always like that. <u>Twenty people sign up, fifty percent won’t come.</u>” [T008]

<p>Functional integration</p>	<p>High staff turnover among community partners</p>	<ul style="list-style-type: none"> • “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]
	<p>Channelling of finances to tertiary hospital reflect the notion that care is prioritised in hospital over community</p>	<ul style="list-style-type: none"> • “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 additional</u> 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]

<p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25</p>	<p>Lack of IT platform for information sharing</p>	<ul style="list-style-type: none"> • “If we miss the meeting...and want to catch up [on] what is going on about the patients... <u>Centralized electronic information is important.</u> 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 <u>it never took off.</u> Nobody even really bothered using the service...” [T004]
<p>26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48</p>	<p>Lack of sharing of performance indicators</p>	<ul style="list-style-type: none"> • “Because I think is very subjective just go by feeling to see whether it we have actually done better or not. (...) Yah, so <u>I’m not so sure whether we actually done better, stay the same or getting worse?.</u> So <u>currently there’s no progress update on all these that is going on</u>” [T006] • “I think these are the things that <u>KPI’s achievement</u> of how are we progressing and things like that <u>should be communicated across the team member</u> that only we know we are doing well...” [P005]
<p>49 50 51 52 53 54 55 56 57 58 59 60</p>	<p>Inadequate training for community partners</p>	<ul style="list-style-type: none"> • “R: <u>Sometimes the staff got training but sometimes</u> how they feel that the theory is theory <u>when you do really encounter experience with the clients right,</u> <u>they feel it’s difficult</u> not easy as you say because sometimes as (they also) human beings they also will

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

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

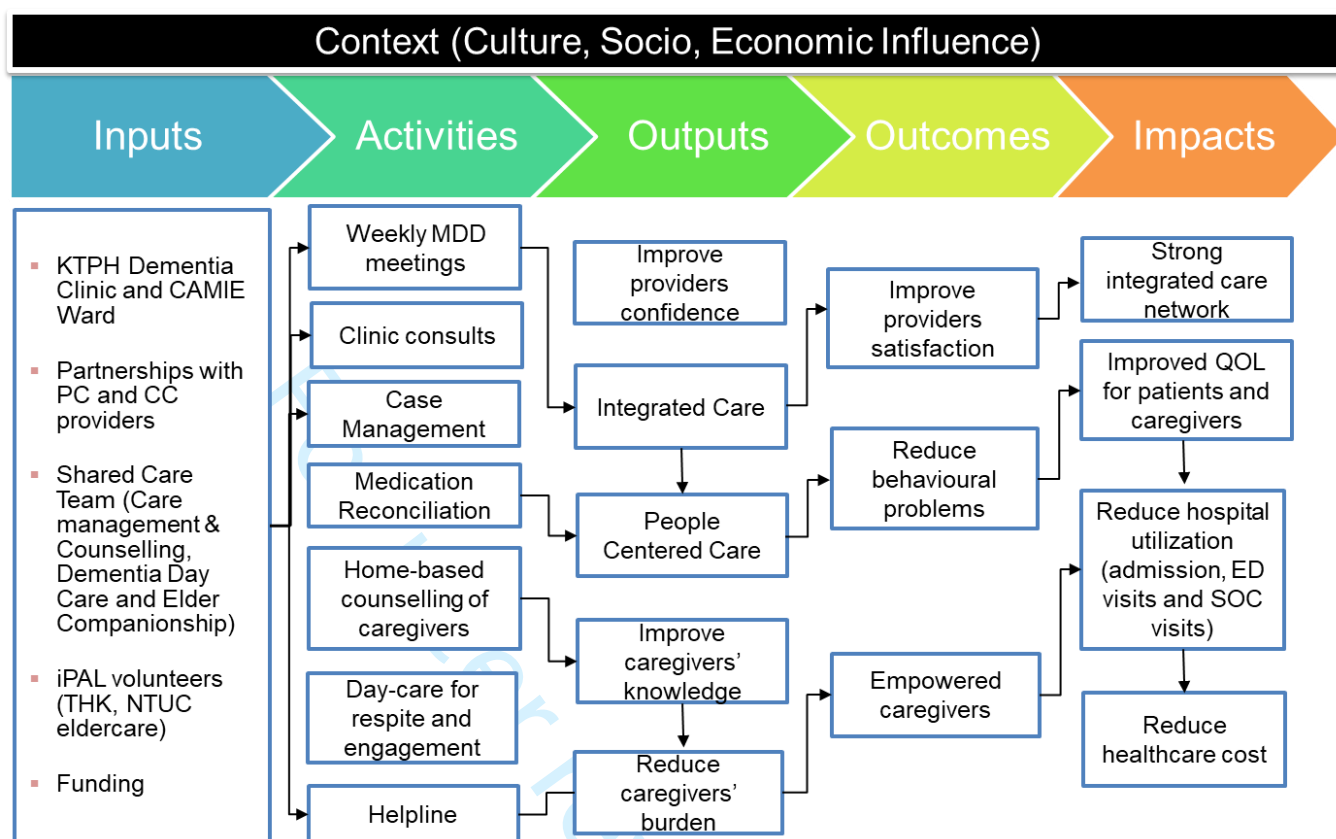
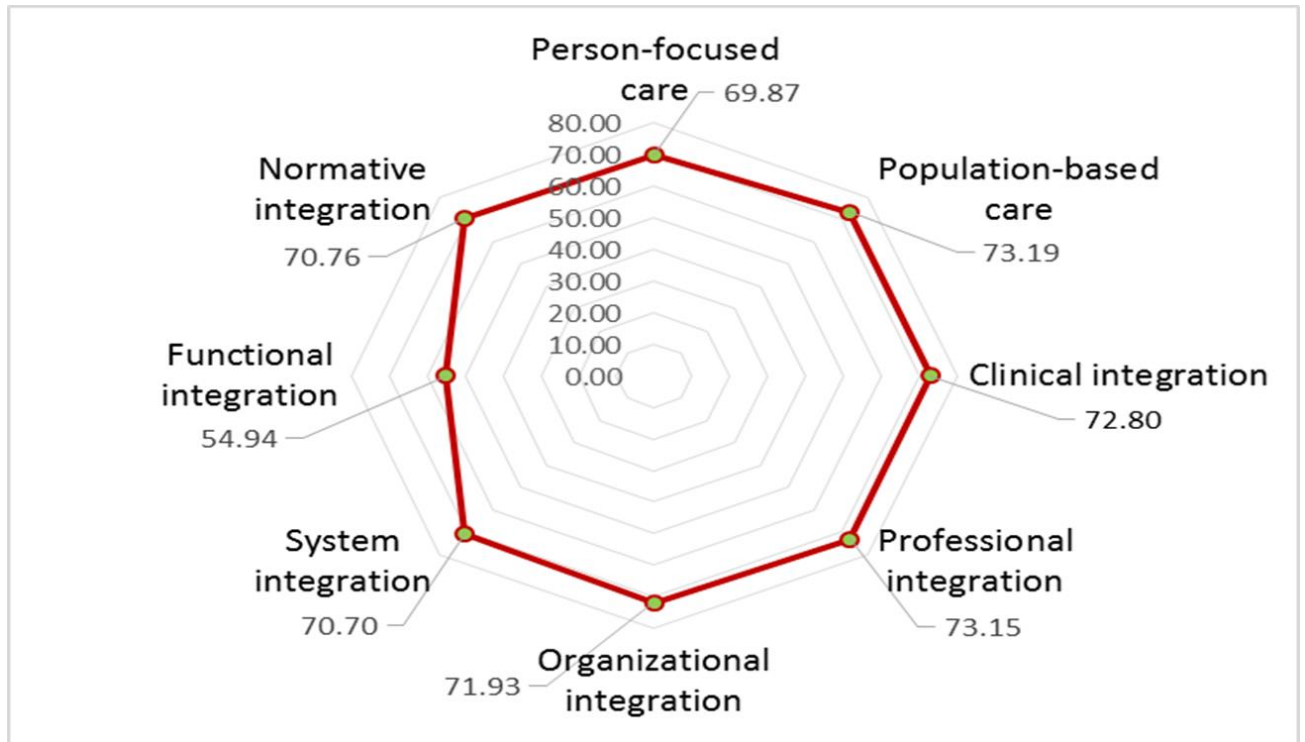
**Legends:****KTPH:** Khoo Teck Puat Hospital**CAMIE:** Care for the Acute Mentally Infirm Elders**PC:** Primary Care**CC:** Community Care**iPAL:** Integrated Pals for Active Living**THK:** Thye Hua Kuan**NTUC:** National Trades Union Congress**MDD:** Multi-disciplinary Discussion**QOL:** Quality of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

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



review only

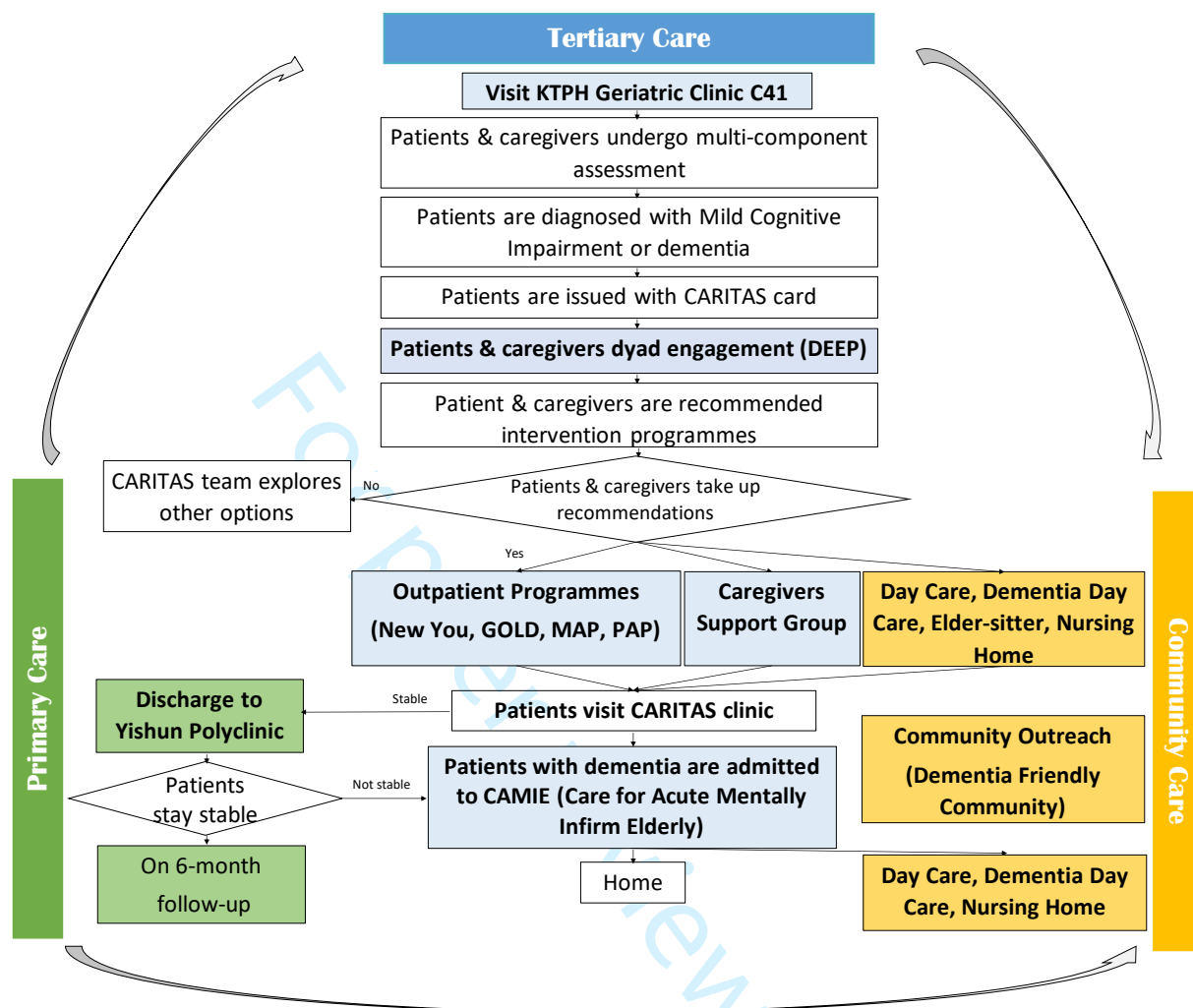
1
2
3 **Appendix 1. Ethnographic Observation Template**
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6

7 Participant ID:	8 Observer:	9 Visit type:
10 Program enrolled:	11 Date of observation:	12 Setting:
13 Team member:	14 Observation start time:	15 In attendance:
	16 Observation end time:	
17 Delivery of Information		
18 What are the activities carried out?		
19 Interactions between healthcare providers and clients (patients and (or) caregivers)		
20 Healthcare provider's effort to build rapport (observed relationships between providers and		
21 clients):		
22 Healthcare provider's effort to engage clients (involvement of clients in their health and		
23 social conditions):		
24 Healthcare provider's effort to empower clients (E.g. providing relevant information and		
25 skills to improve clients' self-efficacy and ability to make informed decisions):		
26 Clients' responsiveness (Clients' responses and extent of engagement to healthcare		
27 providers and intervention):		
28 Other Notes:		
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Appendix 2. Outline of an Interview Guide with Key Stakeholders in CARITAS

Topic	Questions
Introduction	<ol style="list-style-type: none"> 1. How are you involved in the CARITAS network? 2. How has your experience been working in the network?
Components of CARITAS	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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.

Based on the SQUIRE guidelines.

Instructions to authors

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

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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

1	Available	#4	Summary of what is currently known about the problem, including	4-5
2	knowledge		relevant previous studies	
3				
4				
5	Rationale	#5	Informal or formal frameworks, models, concepts, and / or theories used	5
6			to explain the problem, any reasons or assumptions that were used to	
7			develop the intervention(s), and reasons why the intervention(s) was	
8			expected to work	
9				
10				
11	Specific aims	#6	Purpose of the project and of this report	5
12				
13				
14	Methods			
15				
16	Context	#7	Contextual elements considered important at the outset of introducing	6
17			the intervention(s)	
18				
19				
20	Intervention(s)	#08a	Description of the intervention(s) in sufficient detail that others could	6-7
21			reproduce it	
22				
23				
24	Intervention(s)	#08b	Specifics of the team involved in the work	7-9
25				
26	Study of the	#09a	Approach chosen for assessing the impact of the intervention(s)	7-9
27	Intervention(s)			
28				
29				
30	Study of the	#09b	Approach used to establish whether the observed outcomes were due to	7-9
31	Intervention(s)		the intervention(s)	
32				
33				
34	Measures	#10a	Measures chosen for studying processes and outcomes of the	6
35			intervention(s), including rationale for choosing them, their operational	
36			definitions, and their validity and reliability	
37				
38				
39	Measures	#10b	Description of the approach to the ongoing assessment of contextual	7-9
40			elements that contributed to the success, failure, efficiency, and cost	
41				
42				
43	Measures	#10c	Methods employed for assessing completeness and accuracy of data	7-9
44				
45	Analysis	#11a	Qualitative and quantitative methods used to draw inferences from the	7-9
46			data	
47				
48				
49	Analysis	#11b	Methods for understanding variation within the data, including the	7-9
50			effects of time as a variable	
51				
52				
53	Ethical	#12	Ethical aspects of implementing and studying the intervention(s) and	5-6
54	considerations		how they were addressed, including, but not limited to, formal ethics	
55			review and potential conflict(s) of interest	
56				
57				
58	Results			
59				
60				

1		#13a	Initial steps of the intervention(s) and their evolution over time (e.g.,	9, 25, 26,
2			time-line diagram, flow chart, or table), including modifications made to	
3			the intervention during the project	
4				
5				
6		#13b	Details of the process measures and outcome	9-16, 27-
7				35
8				
9				
10		#13c	Contextual elements that interacted with the intervention(s)	9-16, 27-
11				35
12				
13				
14		#13d	Observed associations between outcomes, interventions, and relevant	9-16, 27-
15			contextual elements	35
16				
17				
18		#13e	Unintended consequences such as unexpected benefits, problems,	9-16, 27-
19			failures, or costs associated with the intervention(s).	35
20				
21				
22		#13f	Details about missing data	9
23				
24	Discussion			
25				
26	Summary	#14a	Key findings, including relevance to the rationale and specific aims	16-17
27				
28	Summary	#14b	Particular strengths of the project	19
29				
30				
31	Interpretation	#15a	Nature of the association between the intervention(s) and the outcomes	17-18
32				
33	Interpretation	#15b	Comparison of results with findings from other publications	17
34				
35	Interpretation	#15c	Impact of the project on people and systems	17-18
36				
37				
38	Interpretation	#15d	Reasons for any differences between observed and anticipated	17-18
39			outcomes, including the influence of context	
40				
41				
42	Interpretation	#15e	Costs and strategic trade-offs, including opportunity costs	n/a
43				
44	Limitations	#16a	Limits to the generalizability of the work	19
45				
46	Limitations	#16b	Factors that might have limited internal validity such as confounding,	19
47			bias, or imprecision in the design, methods, measurement, or analysis	
48				
49				
50	Limitations	#16c	Efforts made to minimize and adjust for limitations	19
51				
52	Conclusion	#17a	Usefulness of the work	18-20
53				
54	Conclusion	#17b	Sustainability	18-20
55				
56	Conclusion	#17c	Potential for spread to other contexts	18-20
57				
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60				

1	Conclusion	#17d	Implications for practice and for further study in the field	18-20
2				
3	Conclusion	#17e	Suggested next steps	18-20
4				
5	Other			
6	information			
7				
8				
9	Funding	#18	Sources of funding that supported this work. Role, if any, of the funding organization in the design, implementation, interpretation, and reporting	3
10				
11				
12				

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](#)

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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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3 1 **A mixed-method evaluation of CARITAS - a hospital-to-community model of integrated**
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6 2 **care for dementia**
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10 4 Ha NHL¹ - Chan Ivana¹ (*co-first authors*), Yap Philip^{1,2}, Nurjono M³, Vrijhoef HJM^{4,5},
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3 26 **Abstract**
4

5 27 **Objectives:** The capability and capacity of the primary and community care (PCC) sector for
6
7 28 dementia in Singapore may be enhanced through better integration. Through a partnership
8
9
10 29 involving a tertiary hospital and PCC providers, an integrated dementia care network
11
12 30 (CARITAS) was implemented. The study evaluated the process and extent of integration within
13
14 31 CARITAS.
15

16
17 32 **Design:** Triangulation mixed-methods design and analyses were employed to understand
18
19 33 factors underpinning network mechanisms.
20

21 34 **Setting:** The study was conducted at a tertiary hospital in the northern region of Singapore.
22

23
24 35 **Participants:** We recruited participants who were involved in the conceptualization, design,
25
26 36 development and implementation of the CARITAS programme from a tertiary hospital and
27
28 37 PCC providers.
29

30
31 38 **Intervention:** We used the Rainbow Model of Integrated Care-Measurement Tool (RMIC-MT)
32
33 39 to assess integration from managerial perspectives. RMIC-MT comprises eight dimensions that
34
35 40 play inter-connected roles on a *macro-*, *meso-* and *micro-*level. We administered RMIC-MT to
36
37 41 healthcare providers and conducted in-depth interviews with key CARITAS stakeholders.
38

39
40 42 **Primary and secondary outcome measures:** We assessed integration scores across eight
41
42 43 dimensions of the RMIC-MT and factors underpinning network mechanisms.
43

44 44 **Results:** Compared to other dimensions, functional integration (mechanisms by which
45
46 45 information and management modalities are linked) achieved the lowest mean score of 55.
47
48 46 Other dimensions (e.g. clinical, professional and organizational integration) scored about 70.
49
50 47 Presence of inspiring clinical leaders and tacit interdependencies among partners strengthened
51
52 48 the network. However, the lack of structured documentation and a shared information-
53
54 49 technology platform hindered functional integration.
55
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3 50 **Conclusion:** CARITAS has reached maturity in micro- and meso-levels of integration while
4
5 51 macro integration need further development. Integration can be enhanced by assessing service
6
7 52 gaps, increasing engagement with stakeholders and providing a shared communication system.
8
9

10 53 **(255 words)**
11
12

13 54 **Key words:** dementia, care coordination, integrated systems, mixed method, programme
14
15 55 evaluation.
16
17

18 56 **Article Summary**

20 57 **Strengths and Limitations of this Study**

- 23 58 • The strengths of this evaluation included the use of a mixed-methods - drawing on
24 59 both quantitative and qualitative methods to generate insights.
- 26 59 • Analyses by three coders minimized the bias of qualitative research.
- 28 60 • However, sampling of interview participants was conducted through the
30 61 recommendations of a managerial staff and could have skewed the selection.
32 62
- 34 63 • Additionally, 48% of the participants did not complete the RMIC questionnaire which
36 64 may limit the representativeness of the responses.
38 64

40 65 **Funding Statement**

41 66 This research received support from GERI Intramural Funding, project reference GERI/1610,
42 67 cost number REPFPM006.
43 67

44 68 **Competing Interests**

45 69 Philip Yap is a key clinical leader of the CARITAS integrated dementia care network. The
46 70 other authors declare that they have no competing interests.
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72 **Introduction**

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

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

92 The Rainbow Model of Integrated Care (RMIC) was conceived to provide a
93 comprehensive framework and taxonomy of integrated care based on principles derived from
94 primary care [15]–[16]. An initial framework was developed from literature reviews, further
95 refined and validated Delphi technique with international experts and practitioners of integrated
96 care from 11 countries [15], [17]. RMIC comprises eight dimensions structured along macro-,

1
2
3 97 meso- and micro- levels, which can be contextualized to any integrated care setting [18]. It has
4
5 98 been adopted as a conceptual framework to evaluate integrated care from managerial
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7
8 99 perspectives [17], [18].
9

10 Beyond a conceptual framework, we also endeavour to understand *how* integrated care
11
12 101 programmes achieve intended outcomes. Existing studies have outlined strategies to integrate
13
14 102 person-centred services. Within a provider team, strategies include ensuring care coordination
15
16
17 103 and continuity through regular team meetings [19], shared information and communication
18
19 104 technology (ICT) system and effective data management [4], [20], strong leadership [4], and
20
21
22 105 an organisational culture that supports accountability and shared decision-making [4].
23
24 106 Externally, communication between providers is crucial to achieve integration [4], [20].
25
26 107 Funding incentives for providers could also foster greater commitment and sustain success [4],
27
28 108 [21]. Lastly, eliciting the preferences of individuals and fostering mutual trust and
29
30 109 responsibility are crucial to achieving person-centered and integrated care [22].
31
32

33 110 We evaluated the process and determinants of integration in a dementia care network.
34
35 111 Using the RMIC Measurement Tool (RMIC-MT), we evaluated the level and extent of
36
37 112 integration. We also analyzed the contextual factors and workings that underlie integration,
38
39
40 113 and identify strategies for improvement and scaling-up. The study adds to extant knowledge
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42 114 on integrated care systems for patients with complex needs such as dementia, and provide
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44 115 important insights for the design, development and implementation of integrated care
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46 116 programmes.
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51 52 53 118 **Methods**

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56 119 This study is the first phase of a mixed-methods evaluation of the CARITAS
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58 120 programme to examine the extent of integration in the network. The second phase which
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2
3 121 examines care recipients' experiences with the network and assess clinical outcomes will be
4
5 122 separate. Domain Specific Review Board, National Healthcare Group (Singapore) gave study
6
7 123 ethics approval [Ref. 2017/00904]. We used the SQUIRE checklist when writing our report
8
9
10 124 [23].
11

12
13 125

14 126 **RMIC Framework**

16
17 127 RMIC structures integrated care along macro-, meso- and micro- levels. At the macro
18
19 128 level, *system integration* refers to the linkages and visibility of the partnership formed between
20
21 129 the healthcare system and external environment. At the meso level, *organizational integration*
22
23 130 refers to network mechanisms between different organizations, and *professional integration*
24
25 131 refers to partnerships between different professionals in the healthcare system. At the micro
26
27 132 level, *clinical integration* refers to the coordination of patient care services across different
28
29 133 professionals in the healthcare system. *Functional* and *normative integration* link the macro,
30
31 134 meso and micro levels of integration. The former refers to key support functions and activities
32
33 135 by which financing, information, and management modalities are linked. The latter refers to
34
35 136 essential social and cultural factors (e.g., shared mission, vision and values) within the system.
36
37 137 The RMIC also includes person-focused and population-based perspectives to guide better
38
39 138 coordination of services across care continuum. *Person-focused care* reflects a bio-
40
41 139 psychosocial health approach and considers personal preferences and needs, while *population-*
42
43 140 *based care* requires healthcare be provided according to health profiles and needs of a defined
44
45 141 population.
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53 143 **Intervention/Programme**

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55 144 CARITAS was established as a dementia care network in 2012 within Singapore's
56
57 145 northern Regional Health System [18]. The acronym CARITAS signifies: comprehensive,
58
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1
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3 146 accessible, responsive, individualized, trans-disciplinary, accountable and seamless care for
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5 147 persons with dementia (PWD) [24, 25]. CARITAS aims to: (i) enhance the quality, capacity
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7 148 and efficacy of dementia care through vertically and horizontally integrated team-based care
8
9 149 with regular case conferencing, partnerships between the tertiary hospital and primary and
10
11 150 community care; (ii) increase the capability of primary and community care to care for PWD
12
13 151 through regular training, shared care and case conferencing; and (iii) empower caregivers to
14
15 152 care better for PWD through caregiver training programmes and a direct helpline. The model
16
17 153 was developed based on the concept of integrated practice units (IPU). IPU embodies concepts
18
19 154 of value-based care in organizing care around a condition and/or population, shared decision-
20
21 155 making, regular team meetings, and responsibility for the full cycle of care for the condition
22
23 156 [26]. Figure 1 depicts the CARITAS's logic model.
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31 158 **Study Design**

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33 159 We applied a triangulation mixed-methods approach to combine the insights obtained
34
35 160 from administering RMIC-MT, conducting ethnographic observations and semi-structured
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37 161 interviews. Quantitative and qualitative data were collected concurrently and analysed
38
39 162 separately, but compared and contrasted using triangulation.
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44 164 ***Quantitative Data***

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46 165 Forty-nine healthcare professionals from CARITAS were invited via email to
47
48 166 participate. A reminder was sent after three months. The questionnaire, averaging 30 minutes
49
50 167 to complete, included a participant information sheet and consent, capturing demographics and
51
52 168 the RMIC-MT. RMIC-MT comprised 62 items grouped into eight dimensions with each item
53
54 169 rated on a 5-point Likert scale (from *never* to *all the time*). An additional option (*not sure/don't*
55
56 170 *know*) was provided if participants felt inadequate to provide a response. Values from 0 to 100
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3 171 were assigned to each point of the Likert scale and mean scores were computed across all
4
5 172 dimensions and respondents. We excluded entries with >30% missing data from analyses.
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8 173 Higher scores indicated higher levels care integration. Descriptive data and mean score were
9
10 174 computed using STATA v12.
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15 176 *Qualitative Data*

17 177 To better understand the activities of CARITAS, researchers (MN, LH and IC) observed
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19
20 178 consultations and discussions (n=14) [27] in ambulatory clinics at the tertiary hospital, multi-
21
22 179 disciplinary meetings, primary care clinic and tele-consultations. Observers were
23
24
25 180 inconspicuous and did not influence the sessions. Field notes were recorded after each
26
27 181 observation session using a guide (Appendix 1).
28

29 182 Additionally, we conducted semi-structured interviews with key stakeholders of
30
31 183 CARITAS (n=17) to understand the programme workings and outcomes determinants. We
32
33 184 included participants who were involved in the conceptualization, design, development and
34
35 185 implementation of the programme. Those who had resigned were excluded. Participants were
36
37 186 selected using purposive sampling [28] to have a mix of healthcare professionals from different
38
39
40 187 settings and with different periods of involvement. Interview questions were developed based
41
42
43 188 on the RMIC dimensions including care coordination (clinical integration), how professionals
44
45 189 worked together (professional integration), financial and information management (functional
46
47 190 integration) (Appendix 2). Interviews averaged 67 (range 42 to 93) minutes, were audio
48
49
50 191 recorded and transcribed verbatim. Numbered identifiers were assigned to participants to
51
52 192 protect their identities, with prefixes "T" (from the tertiary hospital) and "P" (PCC providers).
53
54 193 After each interview, team members debriefed and created summary notes. Analysis was done
55
56 194 inductively through thematic coding and deductively through classifying data into initial
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58
59 195 themes (NVivo v11). Team members (MN, LH and IC) developed a shared codebook to
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3 196 document the initial themes and definitions, which were iteratively refined into prominent
4
5 197 themes. These final themes were subsequently organized according to the eight RMIC
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7
8 198 dimensions of integration.
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12 200 ***Data Triangulation***

14 201 Through rigorous discussions, qualitative themes were classified accordingly to provide
16 202 insights on the quantitative results. The triangulated findings were subsequently presented to
18 203 CARITAS stakeholders at a meeting to assess their validity. Feedback was used to refine the
20 204 categorization of themes and interpretation of results.
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27 206 **Patient and Public Involvement**

29 207 Patients and their family caregivers were not involved in the design and conduct of this
31 208 phase of the study, which was focussed on evaluating the organization of CARITAS care
33 209 network and extent of integration from care providers' perspectives. As such, the findings will
35 210 primarily be disseminated to healthcare professionals and providers, not patients and their
37 211 families. Findings are intended to inform care integration and delivery and will not directly
39 212 result in any change to patient care.
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46 214 **Results**

49 215 **RMIC-MT**

51
52 216 Forty-nine healthcare participants came from the tertiary hospital (24.5%), volunteer
54 217 welfare organizations (VWO) (53.1%), a primary care provider (8.16%) and national agency
56 218 (14.3%). Twenty-seven (55.1%) attempted the questionnaire, 2 (7.41%) did not complete and
58 219 12 (44.4%) had >30% missing data. Majority (66.7%) opted to be anonymous. The final
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3 220 analysis comprised 13 respondents (48.1%) from 7 organizations - tertiary hospital (38.5%),
4
5 221 volunteer welfare organizations (30.8%), primary care provider (23.0%) and national agency
6
7 222 (7.7%). Majority were tertiary hospital doctors (38.5%) with >1 year of involvement in
8
9 223 CARITAS (84.6%) (Table 1).

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12 224 Most dimensions achieved scores averaging 70/100 (Figure 2). Population-based care
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14 225 scored the highest (73.19), followed by professional (73.15), clinical (72.80) and organizational
15
16 226 integration (71.93). Functional integration scored the lowest (54.94).

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22 228 **Ethnographic Observation and In-depth interviews**

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24
25 229 Based on the observation notes, a typical patient's journey was charted which provided
26
27 230 initial understanding into the interventions available at CARITAS and how members worked
28
29 231 across settings within the system. Doctors (37.0%) from the tertiary hospital (53.0%) with >4
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31 232 years of involvement (58.0%) comprised the larger proportion of participants in the semi-
32
33 233 structured interviews (Table 2). A small proportion of themes derived from in-depth interviews
34
35 234 overlapped with those of observational notes, which described a patient's journey at various
36
37 235 settings in the network. Themes regarding the background of the interview and reasons for their
38
39 236 involvement in CARITAS were not classified into the eight RMIC dimensions. Relevant
40
41 237 interview quotes corresponding to the RMIC-MT dimensions are summarized in Table 3.

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45 239 ***Population-based care***

46
47 240 This dimension scored highest as CARITAS was conceived specifically to address the
48
49 241 growing burden of dementia in Singapore [29] and focused on building the dementia
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51 242 capabilities of primary and community care partners. PWD were admitted into the programme
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53 243 based on disease severity and extent of caregiver support. Stratification of patients, which
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3 244 enabled care to be delivered appropriately in primary and community care settings, resulted in
4
5 245 better distribution of patients and care resources. Prior to CARITAS, primary care physicians
6
7 246 lacked experience and expertise caring for PWD. The CARITAS team provided regular
8
9 247 training, case conferences and teleconsultation via video conferencing to build competence of
10
11 248 this group of community stakeholders. They appreciated the avenue for direct access to hospital
12
13 249 dementia specialists for real-time advice. With increased capability and capacity of primary
14
15 250 care for PWD, this freed up the tertiary hospital's resources to attend to patients with more
16
17 251 complex and specialized needs.
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253 ***Professional integration***

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

260 Additionally, community partners participated regularly at inter-disciplinary meetings
261 where tertiary hospital referred patients to relevant community partners who would then update
262 the team regularly on the patients. The opportunity for face-to-face communication served as
263 a bridge between the tertiary hospital and community partners, and concurrently allowed
264 partners to learn from each other. Consequently, strong interdependencies developed between
265 community partners and hospital specialists, and the latter was able to tap on community
266 resources such as home- and centre day-care services to complement hospital care. Community
267 partners expressed that the team members were "*helpful to one another*", "*consistent*",
268 "*committed*" and "*intrinsically motivated*" [T001, P001, P002], hence fostering professional

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3 269 trust. They also reported that members received “*good support from the network*” and “*regular*
4
5 270 *feedback among team members*” who “*had the same objectives*” and “*no competition mindset*”
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8 271 [T009, P006, P007]. Having a shared goal to improve care for PWD promoted a sense of
9
10 272 accountability which enhanced professional integration.

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14 274 ***Clinical integration***

16
17 275 Members rated their performance on coordination, referral and follow-up of patients,
18
19 276 involvement of patients in care planning and decisions, and if the network provided
20
21 277 comprehensive services.

23
24 278 The structure of the CARITAS team was flat. Instead of the CARITAS lead directing
25
26 279 unilaterally, team members took ownership of their patients and developed individualised care
27
28 280 plans albeit through shared decision making. As a result, even when the lead was not present,
29
30 281 discussions proceeded smoothly with each team member taking turns to update and discuss
31
32 282 their cases. While diversity of opinions was encouraged, shared decision making was upheld
33
34 283 and clinical integration maintained.

35
36 284 The strength of CARITAS laid in regular team meetings enabling two-way information
37
38 285 flow and provision of a comprehensive range of services to address the multi-faceted needs of
39
40 286 PWD and their caregivers. The relationships built through face-to-face meetings were
41
42 287 invaluable in facilitating inter-professional exchanges and empowered members to manage
43
44 288 more complex patients.

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46 289 Furthermore, the integration of staff members across care settings allowed patients to
47
48 290 expediently tap on a comprehensive suite of services from hospital-based interventions to
49
50 291 community centre-based care and home-care, coupled with a phone helpline to cater to patients’
51
52 292 ad hoc needs. As a member expressed, “*It does help in terms of let’s say we refer to the day*
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54 293 *care, the day care does try (...) to expedite some of the cases*”. [T004]. By working in a
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3 294 coordinated manner, the integrated CARITAS service delivered comprehensive and continued
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5 295 care of a higher standard.
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8 296 However, there were also factors impeding clinical integration. First, not all members,
9
10 297 especially those from the community, could be present at every meeting due to commitments
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12 298 at their primary workplaces. Thus, case discussions would be delayed, or be held outside the
13
14 299 MDM through less personable communication channels such as exchange of emails and
15
16 300 messages. Unsurprisingly, members opined their objectives were not met when other partners
17
18 301 caring for same patient did not attend meetings. Second, some members indicated the need for
19
20 302 operational guides and protocols, particularly clearer criteria for referral to various services.
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22 303 While members with more years in the team appeared to have an implicit understanding of the
23
24 304 criteria, newer members felt less confident and were concerned about inappropriate referrals.
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306 ***Organizational integration***

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33 307 This dimension examined how well organizations collaborated to provide care and
34
35 308 whether there was a shared understanding about care strategy. It also explored if there was
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37 309 effective leadership to connect across organizations. Having an influential clinical leader and
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39 310 the presence of a patient care workflow provided the foundation of organisation integration in
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41 311 CARITAS.
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45 312 Since the inception of CARITAS, the clinical leader helped to form the network of
46
47 313 organisations by enunciating a shared mission and aligning care goals. Despite team members
48
49 314 coming from different care settings, the common vision to provide seamless care for PWD and
50
51 315 their families with consistent bi-directional information flow enabled collaborative and
52
53 316 integrated person centric care. There was tacit understanding of the workflow involving
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55 317 different member organizations with clear delineation of roles. Therefore, each member
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3 318 understood his work scope and responsibilities, empowering smooth operations and team
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5 319 integrity.

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8 320 However, over time, staff turnover and change in the leadership of partnering
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10 321 organisations with attendant shifts in priorities have negatively impacted organisational
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12 322 integration. Engagement with the leadership of partnering organisations to align goals and
13
14 323 discuss strategies was also observed to decrease over the years, which impeded understanding
15
16 324 and support towards the network's shared objectives. Members of partnering organizations
17
18 325 remarked that without consistent strong support from their employers, they felt less empowered
19
20 326 to extend their commitment to the CARITAS' activities beyond their defined roles, especially
21
22 327 when faced with heavy responsibilities in their own organizations. As a result, some members
23
24 328 were less inclined to attend weekly meetings or only attended when they needed to discuss
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26 329 their cases, and there were also instances of decreased participation in learning opportunities
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28 330 such as case-based learning and continuing education initiatives.

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35 36 37 332 ***Normative integration***

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40 333 We examined if members understood the vision and mission of CARITAS and if their
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42 334 desire and ability to work together. Although senior members were generally clear on the
43
44 335 initiative's objectives, newer members were less able to do so. They shared that the objectives
45
46 336 were not consistently conveyed; a member remarked "*because when I join that time, nobody*
47
48 337 *tell[s]me what is the objective of Caritas network*" [P001] and another shared, "*we remind*
49
50 338 *what is the vision and yah I don't think we do enough especially when people move on*" [P005].

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54 339 Another issue lay in the primary care team not being able to participate regularly at
55
56 340 team meetings. The primary care team worked mainly with the tertiary hospital team. As such,
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58 341 information concerning patients from primary care was often conveyed through hospital team

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3 342 members to community partners at the MDM. This inadvertently reduced the need for face-to-
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5 343 face interaction between the primary care team and community partners. There were hence
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7 344 diminished opportunities for forging a shared identity which is instrumental to normative
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9 345 integration.

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16 347 ***System integration***

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19 348 Systems integration assessed the presence of a favorable socio-economic and political
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21 349 milieu for advancing CARITAS as a viable model of integrated care. Given the thrust to
22
23 350 advance quality care for older persons in the country, CARITAS presents a working model of
24
25 351 integrated care for PWD and their families who often present with complex medical and social
26
27 352 needs. With increased community-based resources to enhance care for older adults, CARITAS'
28
29 353 ability to tap on these resources demonstrates its ability to synergise with the healthcare system
30
31 354 at large to secure continuity and scalability. However, as the main focus has been day-to-day
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33 355 patient care, CARITAS has yet to prioritise efforts to increase awareness of its work and to
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35 356 translate to other regions.

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42 358 ***Person-focused care***

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44 359 This dimension assessed the degree of patients' needs being explicit in care delivery,
45
46 360 and patients being educated and involved in planning and organising of care. The CARITAS
47
48 361 team adopted a biopsychosocial care approach and emphasized individualised relationship
49
50 362 centred care across the disease continuum. As a member remarked, "*there is the same team*
51
52 363 *who knows the patient, to be taking care of them as the primary team (...) We really get to*
53
54 364 *know them, how to care for them and what are the reasons why they have certain behaviours*
55
56 365 *before we can really give proper advice or treatment*" [T001]. The holistic and individualized

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3 366 approach was shared by another member who elaborated, “we will look at things like the type
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5 367 of dementia, existing symptoms, the needs that they have in terms of both physical and
6
7 368 psychological...and the impact on their social circles. Then we will study their families or their
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10 369 support network (...) [T002]”

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12 370 However, while the patients received person centred care, they lacked awareness of
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14 371 CARITAS as an integrated care team and how they benefited from the services afforded by the
15
16 372 network’s partners. They knew little of which agencies were in the network and how the
17
18 373 hospital partnered them to deliver care. Engagement with the family caregiver support group
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20 374 dwindled with time as only a small number of caregivers regularly attended these sessions out
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22 375 of a large repository of caregivers in the network.
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27 28 29 377 ***Functional integration***

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32 378 Functional integration investigates the extent financial and other incentives are used to
33
34 379 improve teamwork, coordination and continuity of care. Functional integration had the lowest
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36 380 score which could be attributed to staff turnover, the financing system favouring tertiary care,
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38 381 and the lack of a shared platform for documentation.
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42 382 Significant staff turnover, especially among community partners affected the stability
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44 383 of the team. Manpower shortage in community care compromised partners’ attendance at
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46 384 weekly team meetings which in turn impacted care. Moreover, new staff lacked experience and
47
48 385 skills in managing more complex problems and needed time to become proficient with the
49
50 386 workings of the CARITAS.
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54 387 Funding for CARITAS was channelled primarily to the tertiary hospital which shaped
55
56 388 the notion that leadership and management was concentrated within tertiary care instead of
57
58 389 being distributed across care settings. The initiative was perceived to be driven by the hospital
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3 390 which embraced accountability and setting of key performance indicators. As such, other
4
5 391 partnering organisations tended to assume less accountability which compromised functional
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8 392 integration.

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10 393 The absence of a common IT platform for structured information sharing between
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12 394 hospital and community partners also impeded functional integration. As team members caring
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14 395 for the same patient could not access each other's records, much time was spent during
15
16 396 meetings to update members about patients' progress instead of discussing how best to improve
17
18 397 care. The lack of shared documentation of previous and ongoing services for patients also
19
20 398 risked duplication of services. Even when a shared IT platform was piloted in the course of
21
22 399 CARITAS implementation, limitations in the system's usability and capability restricted its
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24 400 uptake among members of the team.
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33 402 **Discussion**

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35 403 This study assessed the process and extent of integration of the CARITAS dementia
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37 404 care network. We adopted a mixed-methods approach by triangulating the RMIC-MT with in-
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39 405 depth interviews and ethnographic observation. All but one RMIC dimension achieved a mean
40
41 406 score of ~70/100 - highest for population-based (73.19) and lowest for functional integration
42
43 407 (54.94). Qualitative findings revealed contextual factors that strengthened or hindered the
44
45 408 integration of CARITAS. Notably, the presence of inspiring clinical leaders, having quick
46
47 409 access to and close guidance from the tertiary hospital increased community partners'
48
49 410 knowledge, skills and confidence in care delivery. The closely-knit inter-disciplinary and cross-
50
51 411 institutional partnership also facilitated the common goal of person-centred care for the patient-
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53 412 caregiver dyad. However, less than optimal inter-organizational stakeholder engagement, lack
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3 413 of structured process documentation and shared IT-platform compromised the degree of
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5 414 integration.

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8 415 The determinants of care integration within CARITAS are consistent with published
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10 416 literature. Salutary scores across professional, clinical and organizational integration could be
11
12 417 attributed to knowledgeable and inspiring clinical leaders, regular face-to-face meetings and a
13
14 418 comprehensive range of services for PWD and caregivers. These factors have been shown to
15
16 419 facilitate the development of integrated care and its components [30]–[32]. Competent
17
18 420 leadership in the sharing of clinical expertise, providing guidance on patient care and
19
20 421 establishing a culture that facilitates accountability and shared decision-making [4], [33]–[35]
21
22 422 contributed to the readiness and commitment of team members to implement changes towards
23
24 423 integrated care [35]. Working across healthcare disciplines has been shown to enable shared
25
26 424 decision making and formation of care plans for patients with complex needs [34]–[35],
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28 425 contributing to improved clinical outcomes and patient satisfaction [19]. Furthermore, having
29
30 426 a comprehensive range of services afforded for both customization and generalisation of care
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32 427 to meet varied needs.

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39 428 A few factors unique to CARITAS impeded its endeavour of seamless care. The
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41 429 primary care team operated rather independently from the rest of the partners which
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43 430 compromised care continuity and information flow. Also, the absence of a common IT
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45 431 documentation and care planning platform [4], [20], hindered information exchange between
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47 432 care providers. Information sharing is important to integrated care programmes without which
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49 433 less expedient ways of communication are inevitable [35].

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53 434 Integrated care programmes evolve with time and some dimensions mature more
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55 435 quickly than others [36]. Integration often begins at micro (e.g. clinical integration) and meso
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57 436 levels (e.g. professional and organizational integration) before progressing to a macro level
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3 437 (e.g. system integration) [37]. Dimensions such as functional and normative integration which
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5 438 establish connectivity across the micro, meso and macro require significant time to stabilize
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7 439 [38]. Moreover, integration may start from the primary organization spearheading the initiative
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9 440 first before becoming established in other member agencies. It is thus conceivable that
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11 441 CARITAS performed better in dimensions such as clinical integration while the areas of
12
13 442 functional and normative integration are still a work in progress.
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17 443 There are ways to enhance the more mature dimensions of integration of CARITAS and
18
19 444 augment the less developed ones. Addressing existing service gaps can refine the CARITAS
20
21 445 model. First, extending telephone helpline beyond office hours can improve responsiveness to
22
23 446 needs. Second, wider and deeper engagement to better understand caregiver needs will help
24
25 447 develop targeted caregiver support services. Third, to improve functional integration, the
26
27 448 network can adopt a centralized IT infrastructure for documentation, communication, and case
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29 449 coordination, all of which help standardize care delivery [38]. Fourth, the network could
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31 450 organize formal and informal processes and activities to facilitate cross-organizational
32
33 451 understanding and collaboration. They can serve to reiterate the objectives of the team,
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35 452 communicate key performance indicators, discuss strategies and align goals. These efforts can
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37 453 have positive effects on system and normative integration which are often harder to achieve.
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39 454 Finally, initiatives to engage users, increase visibility and scale up the initiative should be
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41 455 prioritized. CARITAS can take advantage of its strong leadership to connect with more
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43 456 organizations and continuously engage community stakeholders to garner longer-term support.
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50 457 The strengths of this evaluation include the use of a mixed-methods - drawing on both
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52 458 quantitative and qualitative methods to generate insights. Analyses by three coders also
53
54 459 minimized the bias of qualitative research. However, certain limitations should be considered.
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56 460 Sampling of interview participants was conducted through the recommendations of a
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58 461 managerial staff and could have skewed the selection. To mitigate bias, participants were
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3 462 reminded that their responses would be anonymized, and efforts were made to capture the
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5 463 opinions of participants from each component of CARITAS. Additionally, 48% of the
6
7 464 participants did not complete the RMIC questionnaire which may limit the representativeness
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9 465 of the responses. This could be attributed to the length of the questionnaire (62 items), which
10
11 466 took respondents 48 minutes on average to complete whereas respondents who did not
12
13 467 complete averaged only 4 minutes on the questionnaire. It is likely that staff turnover had
14
15 468 resulted in several new staff with <1 year of CARITAS experience who felt inadequate to
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17 469 provide valid responses. Still, despite the reduced sample, the interviews largely validated the
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19 470 RMIC responses.
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28 472 **Conclusion**

29
30 473 The findings reveal that integration in CARITAS has attained maturity on micro
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32 474 (clinical integration) and meso levels (professional and organizational integration), with
33
34 475 potential for improvement on the macro level (functional, system and normative integration).
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38 476 Future studies could extend the RMIC to patient-caregiver dyads. This will help provide
39
40 477 more holistic assessments which can lend valuable insights to assist programme planners,
41
42 478 implementers, funders and policy makers in the conceptualization, implementation, monitoring
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44 479 and evaluation of integrated care initiatives for patients with complex needs. Lastly, evaluation
45
46 480 results of the clinical outcome and experience of CARITAS' service users will be reported in
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48 481 another publication.
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55 483 **Author Contribution**

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2
3 484 Ha NHL and Chan IWX collected, analysed, interpreted the data and wrote the manuscript.
4
5 485 Yap PLK initiated the study, provided suggestions on the study methodology, helped interpret
6
7 486 the findings and revised the manuscript. Nurjono M and Vrijhoef HJM conceptualized the
8
9 487 study, provided guidance for data collection, analysis and suggestions to enhance the
10
11 488 manuscript. Nicholas SO contributed to data interpretation and revised the manuscript. Wee
12
13 489 SL conceptualized the study, supervised data collection, analysis and interpretation of result,
14
15 490 and revised the manuscript. All authors approved the final manuscript.
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20 491 **Data Sharing Statement**

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22
23 492 Dataset of the study is not available to protect the identities of the study participants.
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26 493 **Word count**

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29 494 4334 words.
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32 495 **Supplementary Materials**

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35 496 Three appendices are provided as supplementary materials and they are:
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37

38 497 Figure 1: A Logic Model of CARITAS
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40 498 Figure 2: Scores of RMIC's Eight Dimensions of Integration
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43 499 Appendix 1: Ethnographic Observation Template
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46 500 Appendix 2: Outline of an Interview Guide with Key Stakeholders in CARITAS
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616 **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)

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624 **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)

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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	<p><i>The objectives of CARITAS were:</i></p> <ul style="list-style-type: none"> • “Provide <u>holistic dementia care</u>” [T006, P002, P004] • “<u>Manage PWD well in the community</u>” [T004] • “Provide <u>seamless delivery of care</u> for patients” [P003] • “To <u>bridge that medical and social care integration gap</u> [P007]
	Classification of patients was based on a biopsychosocial model and the need for caregiver support	<ul style="list-style-type: none"> • “(...) <i>The clinical part is important. The biological part, <u>the type of dementia, the stage of dementia,</u> you know (...) And another key component is <u>who the person with dementia really is</u> (...) and the other part that next comes in will be in terms of their <u>care giving capacity</u>, their desire to care, as well as their resources, what they can actually give to the patient.” [T001]</i>
	Family physicians were not keen to look after PWDs as it is a complex condition that requires	<ul style="list-style-type: none"> • “Because dealing with dementia patient <u>took a lot of time</u> ...not just the patient, also the caregiver and family, and sometimes the maid. So, there are <u>many many issues to take care in the PWD.</u> So, I won't say there are many family physicians who have a keen interest to look after them” [P004]

	specialised expertise and resources	<ul style="list-style-type: none"> “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	<ul style="list-style-type: none"> “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	<ul style="list-style-type: none"> “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	<ul style="list-style-type: none"> “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 <u>CARITAS nurse</u>, 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

		<i>flow back the information to other caregivers that are not staying with the client (...) [P006]”</i>
Care was expedited	<ul style="list-style-type: none"> • <i>“So, through this Caritas programme, (...) I can say that okay, no need to wait for appointment. <u>I can straightaway get connection with this doctor</u> okay to <u>discuss this case straightaway in the next meeting</u>” [P002]</i> • <i>“They will just give us a call; say this client needed some attention. So instead of waiting, <u>we even do assessment way before</u> that, before even the <u>referral comes in</u>”. [P001]</i> 	
Not all partners were always present at meetings	<ul style="list-style-type: none"> • <i>“(…) Because every Tuesday must go except public holiday... So <u>sometimes not all the stakeholders are there</u>. 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]</i> 	
Cases were not discussed when partners were not around	<ul style="list-style-type: none"> • <i>“I: I’m just wondering when you discuss patients and cases at the MDM, what if the community partners are not present? R: <u>We (will) not discuss until they are around.</u> (...) [T007]</i> 	
Protocols for care process and criteria for recommendations to services were not	<ul style="list-style-type: none"> • <i>“I: Is this workflow documented? R: If you talk about the clinical diagnosis, I will say yes (...) But with regards to the person (..). that <u>definitely there is no standard way of going and</u></i> 	

	documented formally, while they seemed to be understood by the working team	<u>doing that</u> (...) <u>this is by and large not documented</u> (...)” [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	<ul style="list-style-type: none"> • “So of course, then with Dr Y, because he is actually <u>very well known in the north</u> and then he with that background, <u>is able to garner gather a lot of people into the network</u>. 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	<ul style="list-style-type: none"> • “(...) In terms of all clinical diagnosis there is always criteria to fulfil and things like that, <u>which stage of dementia</u> and all that. Okay,.. with regards to the person,.. second part, as in <u>who the person is</u> (...) 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	<ul style="list-style-type: none"> • “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

		<i>talking about competent. <u>I'm talking about the management interest</u> (...) ” [P005]</i>
Normative integration	CARITAS' objectives were not clearly and consistently conveyed to community partners, especially new staff over time	<ul style="list-style-type: none"> • “Because when I join that time, <u>nobody tell[s]me what is the objective of Caritas network</u>” [P001] • “We remind what is the vision and yah <u>I don't think we do enough</u> especially when people move on” [P005]
	Some original intent waning over time	<ul style="list-style-type: none"> • <i>But to be honest I think <u>some of the intent has been lost through the time.</u> So right now, with the quarterly meeting, we are not as structured I feel, versus previously (...)” [P005]</i>
	Primary care's engagement was separate from that of other community partners	<ul style="list-style-type: none"> • “Actually I have discussed with Dr. Y <u>whether we can get our staff to join in their Tuesday meetings</u> – (...) but so far I've <u>not been able to really uh get it done lah</u>” [P005]. • “<u>Polyclinic has not fully been brought into the network yet.</u> 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	<ul style="list-style-type: none"> • “The government is giving a lot of money to the media to advertise on <u>projects that help to educate people on what dementia is like,</u> so that they can seek help earlier on, help make neighbours a little bit more friendly, to look out for each other.” [T002]

		<ul style="list-style-type: none"> • “I think over the past few years, there have been <u>a lot more TV coverage</u> on elderly people and the condition itself” [T002]
	<p>Increase in government funding and support on aged care</p>	<ul style="list-style-type: none"> • “(...) <u>The directions of the Ministry of Health is towards to have an aging in place.</u> 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 <u>a lot more schemes, subsidies and policies</u> that can help support certain care provision (...) the <u>government is pumping a lot more funds into the voluntary welfare organizations</u> that help to provide elderly sitting services” [T002]
<p>Person-focused care</p>	<p>Adopt a biopsychosocial team-based approach</p>	<ul style="list-style-type: none"> • “(..) so we look at it from <u>a biopsychosocial perspective.</u> 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]

	<p>Clients not aware of CARITAS network or how the hospital worked with community partners</p>	<ul style="list-style-type: none"> • “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. I think 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]
	<p>Only a small group of caregivers regularly attend caregiver support sessions</p>	<ul style="list-style-type: none"> • “(...) Caregivers, okay support group is always like that. <u>Twenty people sign up, fifty percent won’t come.</u>” [T008]
<p>Functional integration</p>	<p>High staff turnover among community partners</p>	<ul style="list-style-type: none"> • “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</u>

		<p><u>that additional hours</u> to go and organize anything <u>for the Caritas</u> lah. [P001]</p>
<p>Channelling of finances to tertiary hospital reflect the notion that care is prioritised in hospital over community</p>		<ul style="list-style-type: none"> • “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 additional</u> 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]
<p>Lack of IT platform for information sharing</p>		<ul style="list-style-type: none"> • “If we miss the meeting...and want to catch up [on] what is going on about the patients... <u>Centralized electronic information is important.</u> 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 <u>it never took off.</u> Nobody even really bothered using the service...” [T004]
<p>Lack of sharing of performance indicators</p>		<ul style="list-style-type: none"> • “Because I think is very subjective just go by feeling to see whether it we have actually done better or not. (...) Yah, so <u>I’m not so sure whether we actually done better, stay the same or getting worse?</u>. So

		<p><u>currently there's no progress update on all these that is going on</u>" [T006]</p> <ul style="list-style-type: none"> • "I think these are the things that <u>KPI's achievement</u> of how are we progressing and things like that <u>should be communicated across the team member</u> that only we know we are doing well..." [P005]
	<p>Inadequate training for community partners</p>	<ul style="list-style-type: none"> • "R: <u>Sometimes the staff got training but sometimes</u> how they feel that the theory is theory <u>when you do really encounter experience with the clients right, they feel it's difficult</u> not easy as you say because sometimes as (they also) human beings they also will be a bit frustrated. (...) Sometimes it's easier said than [than] done. So <u>theory part is theory but when practical part ah, it's not easy</u>" [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

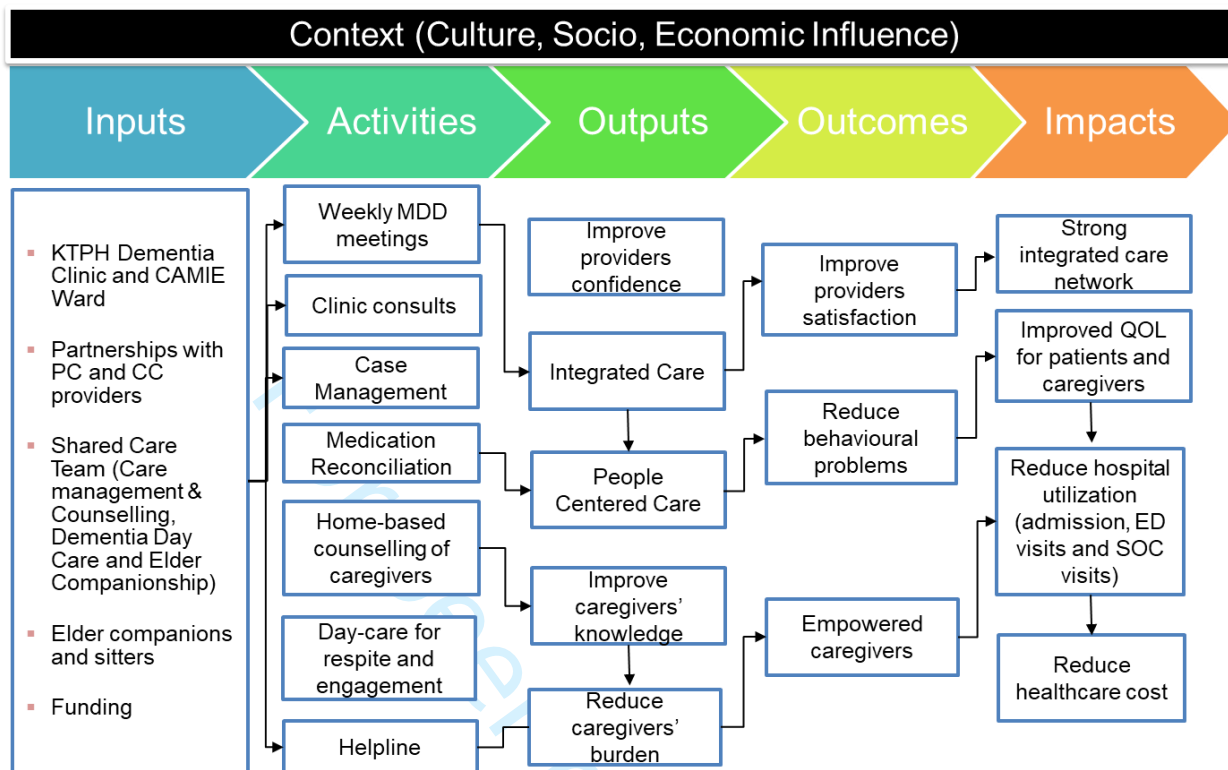
CCMS: Common Case Management System

KPI: Key Performance Indicators

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Figure 1. A Logic Model of CARITAS

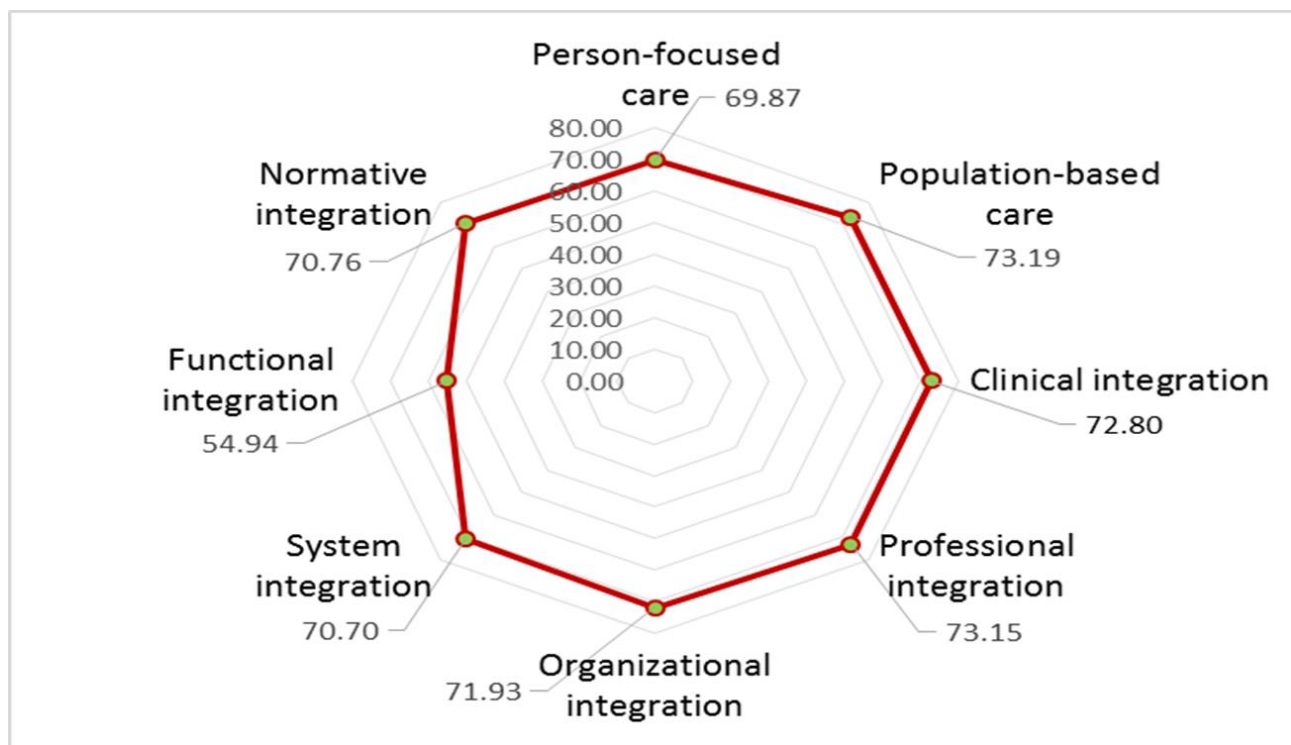


Legends:

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



review only

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3 **Appendix 1. Ethnographic Observation Template**
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Participant ID:	Observer:	Visit type:
Program enrolled:	Date of observation:	Setting:
Team member:	Observation start time:	In attendance:
	Observation end time:	
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:		

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

Topic	Questions
Introduction	<ol style="list-style-type: none"> 1. How are you involved in the CARITAS network? 2. How has your experience been working in the network?
Components of CARITAS	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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.

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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

1	Available	#4	Summary of what is currently known about the problem, including	4-5
2	knowledge		relevant previous studies	
3				
4				
5	Rationale	#5	Informal or formal frameworks, models, concepts, and / or theories used	5
6			to explain the problem, any reasons or assumptions that were used to	
7			develop the intervention(s), and reasons why the intervention(s) was	
8			expected to work	
9				
10				
11	Specific aims	#6	Purpose of the project and of this report	5
12				
13				
14	Methods			
15				
16	Context	#7	Contextual elements considered important at the outset of introducing	6
17			the intervention(s)	
18				
19				
20	Intervention(s)	#08a	Description of the intervention(s) in sufficient detail that others could	6-7
21			reproduce it	
22				
23				
24	Intervention(s)	#08b	Specifics of the team involved in the work	7-9
25				
26	Study of the	#09a	Approach chosen for assessing the impact of the intervention(s)	7-9
27	Intervention(s)			
28				
29				
30	Study of the	#09b	Approach used to establish whether the observed outcomes were due to	7-9
31	Intervention(s)		the intervention(s)	
32				
33				
34	Measures	#10a	Measures chosen for studying processes and outcomes of the	6
35			intervention(s), including rationale for choosing them, their operational	
36			definitions, and their validity and reliability	
37				
38				
39	Measures	#10b	Description of the approach to the ongoing assessment of contextual	7-9
40			elements that contributed to the success, failure, efficiency, and cost	
41				
42				
43	Measures	#10c	Methods employed for assessing completeness and accuracy of data	7-9
44				
45	Analysis	#11a	Qualitative and quantitative methods used to draw inferences from the	7-9
46			data	
47				
48				
49	Analysis	#11b	Methods for understanding variation within the data, including the	7-9
50			effects of time as a variable	
51				
52				
53	Ethical	#12	Ethical aspects of implementing and studying the intervention(s) and	5-6
54	considerations		how they were addressed, including, but not limited to, formal ethics	
55			review and potential conflict(s) of interest	
56				
57				
58	Results			
59				
60				

1		#13a	Initial steps of the intervention(s) and their evolution over time (e.g.,	9, 25, 26,
2			time-line diagram, flow chart, or table), including modifications made to	
3			the intervention during the project	
4				
5				
6		#13b	Details of the process measures and outcome	9-16, 27-
7				35
8				
9				
10		#13c	Contextual elements that interacted with the intervention(s)	9-16, 27-
11				35
12				
13				
14		#13d	Observed associations between outcomes, interventions, and relevant	9-16, 27-
15			contextual elements	35
16				
17				
18		#13e	Unintended consequences such as unexpected benefits, problems,	9-16, 27-
19			failures, or costs associated with the intervention(s).	35
20				
21				
22		#13f	Details about missing data	9
23				
24	Discussion			
25				
26	Summary	#14a	Key findings, including relevance to the rationale and specific aims	16-17
27				
28	Summary	#14b	Particular strengths of the project	19
29				
30				
31	Interpretation	#15a	Nature of the association between the intervention(s) and the outcomes	17-18
32				
33	Interpretation	#15b	Comparison of results with findings from other publications	17
34				
35	Interpretation	#15c	Impact of the project on people and systems	17-18
36				
37				
38	Interpretation	#15d	Reasons for any differences between observed and anticipated	17-18
39			outcomes, including the influence of context	
40				
41				
42	Interpretation	#15e	Costs and strategic trade-offs, including opportunity costs	n/a
43				
44	Limitations	#16a	Limits to the generalizability of the work	19
45				
46	Limitations	#16b	Factors that might have limited internal validity such as confounding,	19
47			bias, or imprecision in the design, methods, measurement, or analysis	
48				
49				
50	Limitations	#16c	Efforts made to minimize and adjust for limitations	19
51				
52	Conclusion	#17a	Usefulness of the work	18-20
53				
54	Conclusion	#17b	Sustainability	18-20
55				
56	Conclusion	#17c	Potential for spread to other contexts	18-20
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1	Conclusion	#17d	Implications for practice and for further study in the field	18-20
2				
3	Conclusion	#17e	Suggested next steps	18-20
4				
5	Other			
6	information			
7				
8				
9	Funding	#18	Sources of funding that supported this work. Role, if any, of the funding organization in the design, implementation, interpretation, and reporting	3
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13 Notes:

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- 16 • 13a: 9, 25, 26,
- 17
- 18 • 13b: 9-16, 27-35
- 19
- 20 • 13c: 9-16, 27-35
- 21
- 22 • 13d: 9-16, 27-35
- 23
- 24
- 25 • 13e: 9-16, 27-35 The SQUIRE 2.0 checklist is distributed under the terms of the Creative Commons
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