

Examining the Extent to which Elements of the Chronic Care Model Address Barriers to effective Self-Management of Patients with Multiple Chronic Conditions

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Abstract.

Multiple chronic conditions among patients is still a big public health burden across the globe, yet when properly managed, it can improve patient health outcomes. Despite the studies that have been conducted, little is known about the effectiveness of the chronic care model elements in addressing barriers to self-management of patients with multiple chronic conditions. Therefore, this study set out to study the effectiveness of the Chronic Care Model (CCM) in addressing self-management (SM) barriers of patients with multiple chronic conditions (MCC). A comprehensive literature search was conducted in PubMed, google, google scholar, ScienceDirect, Embase, Cochrane library for English studies published in between 2007 – 2021. Articles were included if they were peer reviewed and focused on barriers to self-management of patients with multiple chronic condition and chronic care model implementation. Data was synthesized, carefully mapped, categorised to eliminate ambiguity and thematized to increase clarity. From an initial population of 105 articles, 18 articles passed on grounds of relevance. Literature was classified into patient centred barriers, health provider barriers, and environmental barriers. This study revealed that the CCM does not address multimorbidity SM barriers of; limited resources, distance to health facilities, conflicting information, treatment burden and environmental barriers. Therefore there is need for a model applicable in low resource settings that addresses the identified gaps in the CCM for effective SM of patients with MCC. There is a need for policies that enable coordination and communication amongst public and private multiple chronic care providers. Chronic Care providers need to adopt a holistic approach in managing patients with MCC.

Keywords: Self-management (SM), Multiple Chronic Conditions (MCC), Multimorbidity, Chronic Care Model

1. Introduction

Globally, approximately one in three of all adults suffer from multiple chronic conditions (MCCs) (Boehmer, 2018), and according to the World Health Organisation, every year

chronic diseases kill 41 million people, equivalent to 71% of the global deaths (World Health Organisation[WHO], 2021). It is estimated that more than 15 million people who die from chronic disease are between the ages of 30 and 69; 85% of the death (WHO, 2021). In developing countries, 16–57% of adults suffer from more than one chronic condition (Cother, 2018). This is currently termed multimorbidity, or having multiple chronic conditions (MCC) (Contant et al, 2019; Cother, 2018; Moffat, 2015; Porter et al, 2015; Wallace et al, 2015). Multiple chronic conditions are increasing worldwide, due to an increase in the ageing population, rise in life expectancy and demographic changes (Contant et al, 2019). Also, the Improvements in health care systems have resulted in greater numbers of people living with multiple chronic conditions for longer periods of time (Grady et al, 2014). The vulnerability, complexity and frailty that are associated with aging, make old adults mostly affected (Contant et al, 2019). In a study conducted in the US, more than half of adults had at least 1 to 10 selected diagnosed chronic conditions (arthritis, cancer, chronic obstructive pulmonary disease, coronary heart disease, current asthma, diabetes, hepatitis, hypertension, stroke, and weak or failing kidneys), and 27.2% of US adults had multiple chronic conditions (Boersma , 2018). Patients with multiple chronic conditions have the most complex health care need. This is because most healthcare providers use the traditional single disease oriented paradigm, which makes multimorbidity patients to get duplicated and fragmented healthcare services from multiple health providers. In most cases, this results into increased treatment burden, increased treatment cost and frequent admission to hospital (Cother, 2018; Gobeil-Lavoie, 2019; Liddy et al, 2014; Moffat, 2015; Onder, 2015; Yuanyuan ,2021). It also makes patients receive multiple drugs (polypharmacy) with consequent difficulties to adherence hence resulting into patient poor quality of life (Liddy et al, 2014; Moffat, 2015; Onder, 2015; Wallace et al, 2015; Yuanyuan, 2021). Therefore, when compared to patients with a single chronic disease, patients with multiple chronic conditions are much more likely to die prematurely (Porter et al, 2015). Management of patients with chronic conditions present unique challenges, needs and requirements (Wallace et al, 2015). Therefore, several health care models have been developed particularly for management of chronic conditions in developed countries (Ramli, 2014; Ryan et al, 2009). The most popular and internationally adopted model for management of chronic illnesses in primary care settings is the Chronic Care Model (CMM) (Davy et al, 2015; Lall et al, 2018; Ramli, 2014; Ryan et al, 2009; Yuanyuan,2021; Struckmann et al, 2017), others models include, the Extended Chronic Care Model, the Guided Care Model (GCM), the Collaborative Care Model, the Model of Multidisciplinary Integrated Care and WHO's Innovative Care for Chronic Condition (ICCC) framework(Lall et al, 2018; Lisa et al, 2018; Yuanyuan ,2021; Struckmann et al, 2017).

1.1 Theoretical background

Currently, many chronic disease management strategies and interventions within primary healthcare settings are based on the Chronic Care Model (Davy et al, 2015; Lall et al, 2018; Ramli, 2014; Ryan et al, 2009; Yuanyuan ,2021; Struckmann et al, 2017). The model was developed by Wagner and colleagues as an evidence-based approach with multi-dimensional structured process designed to facilitate management of chronic illnesses²⁷. The model has six elements: [1] **Self-management support** that helps patients, family and friends to effectively manage the chronic conditions, [2] **Decision support** that structure of the service provider and the organization of patient encounters, [3] **Information systems** for provision of timely useful data about patients, [4] **Delivery system design** ensures delivery of effective and efficient patient care, [5] **The health care system** that provides the organisational context

were care is provided,[6] *Community resources and policies* that describe strategies such as having partnerships with community organizations that health care givers use to improve health care delivery (Wagner et al,1996). These six elements of the CCM interact in order to provide good care for the chronically ill. However, most studies and implementations of the CCM in managing chronic illnesses are from high-income countries (Lall et al, 2018). The CCM may not be applicable in resource constrained settings where medicines, medically qualified staff and laboratory equipment are limited (Lall et al, 2018). Figure 1, shows the different elements of the CCM.

Figure 1: The Chronic Care Model



The Chronic Care Model (Adopted from: Wagner et al, 1996)

Recently, the applications of the Chronic Care Model (CCM) for managing chronic illnesses has moved towards a patient-centred care approach (self-management) (Contant et al, 2019; Cother, 2018; Gobeil, 2019; Porter et al, 2015). Hence the element of self-management support on the CCM is the most commonly implemented (Davy et al, 2015; Lall et al, 2018). Self-management (SM) is; the individual's ability to manage the symptoms, treatment, physical and psychosocial consequences and lifestyle changes inherent in living with a chronic condition (Cother, 2018; Davy et al, 2015; Porter et al, 2015; Ryan et al, 2009). SM can result in health outcomes for patients with MCC, such as; improved blood glucose levels, lowered blood pressure, reduced pain, and maintained levels of physical function, reduced treatment costs, reduced frequent visits to healthcare providers and increased quality of life (Cother, 2018; Davy et al, 2015; Gobeil, 2019; Malarvizhi, 2015). Self-management of patients with MCC is affected by physical barriers, psychological barriers, social and cultural barriers, low levels of health literacy, economic barriers, contradictory information from multiple health providers, distance to health facilities, resource availability, treatment burden and environmental barriers (Boehmer, 2018; Cother, 2018; Gobeil, 2019; Grady et al, 2014; Lall et al, 2018; Liddy et al, 2014; Moffat, 2015; Porter et al, 2015; Watt, 2017; Yuanyuan, 2021). Therefore, the objective of this paper was to examine the extent to which the original

2 Methods

2.1 Design

CCM addresses the barriers to self-management among patients with multiple chronic conditions.

among patients with multiple chronic conditions. The search was done in PubMed, which included the following terms: (“barriers” [All fields] OR “challenges” [All fields]) AND “multiple chronic condition” [All Fields] OR (“multiple” [MeSH] AND “chronic” [All Fields] OR “chronic” [MeSH]) OR “condition” AND (“multimorbids” [All Fields] OR “self-care” [MeSH] OR “self-care” [All Fields] OR “self-management” [MeSH] OR self-management [All Fields]). (“health” [All Fields] OR “care” [All Fields] OR “models” [All Fields] OR “chronic care models” [All Fields]). Similar searches were conducted in google and google scholar using the following search terms; barriers to self-management of multimorbids, health care models, multiple chronic conditions, chronic disease, multimorbidity, multimorbids, complex health care needs, Chronic Care Model, multiple chronic conditions. Other searches were made in ScienceDirect, Embase, Cochrane library. Reference lists of all included studies were also synthesized for additional literature.

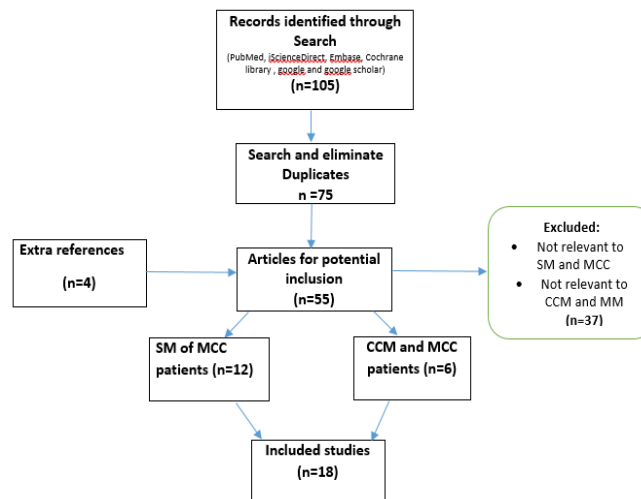
2.2 Inclusion and Exclusion Criteria

The search criteria included; i) papers published between 2007 and 2021, ii) qualitative, quantitative and mixed studies, iii) published in English, iv) studies focusing on how chronic care model addresses the barriers of self-management among patients with multiple chronic conditions. The exclusion criteria included studies, i) that addressed self-management of a single chronic disease, ii) that did not have any notion of multimorbidity, multiple chronic conditions, complexity, iii) that focused on application of the CCM on a single chronic disease.

2.3 Study selection

Out of the 105 articles that were originally obtained from the online database search, only 18 articles were eligible for the study. The rest of the studies were not included because they were either duplicates, unrelated to the study, not in English or did not have full text. . The researchers independently scrutinized the titles and the abstracts of all selected studies. Articles from the reference list were assessed against the inclusion criteria for eligibility. Authors unanimously agreed on which articles to include and where contention arose, all reviewers discussed and mutually resolved any issues therein. Descriptive themes from previous related studies of Gobeil et al, 2019, Yuanyuan et al, 2021 and Liddy et al, 2014 have been maintained and new themes constructed then followed by the development of analytic theme.

Figure 2 show a number of references found.



3 Results

Out the 18 examined articles, 12 focused on barriers to SM patients with MCC and only 6 articles focused on the CCM and patients with MCC. Table 1 presents results from the 12 reviewed articles on SM of patients with MCC.

Table 1: SM barriers and approaches that can be used to overcome the barriers to SM

Author and Year	Method	Barriers to SM	Approaches to address SM barriers
Bayliss et al ² , 2007	Qualitative interviews	<ul style="list-style-type: none"> -Low level of health literacy -Low level of physical functioning -Presence of depression -Low level of social well-being -Financial constraints 	<ul style="list-style-type: none"> -Patient-centred and collaborative self-management support -Providing individualized patient education - Physical therapy to enhance physical functioning -Collaborative care choices that take into account patients' financial resources.
Liddy et al, 2014	Qualitative thematic synthesis	<ul style="list-style-type: none"> -Lack of social support -Lack of financial resources -Contradictory knowledge. -Poor access 	<ul style="list-style-type: none"> -Patient-centred approach -Sharing power and responsibility

		Challenges with medication	
Grady and Gough,2014	Qualitative	-Environmental barriers	-Community-based self-management intervention programs Improving SM skills
Moffat and Mercer,2015	Qualitative thematic synthesis	-Fragmented and duplicative services -Treatment burden -Depression -Financial costs -Polypharmacy	-Using a holistic approach by generalists
Wallace et al, 2015	Qualitative thematic synthesis	-Fragmentation and poor coordination of care -Polypharmacy -Treatment burden -Anxiety and depression	-Assigning named doctor to the patient -Plan regular reviews -Shared decision making
Kenning et al, 2015	Prospective study design	-Patient physical condition -Managing complex treatment regimens -Face decisions about priorities among self-management tasks	- Better navigate healthcare services or redesigning services for patients -Tailored preparation helping patients manage priorities and the emotional consequences
Onder et al, 2015	Qualitative thematic synthesis	-Disability and poor physical function -Mental health problems/depression	- A comprehensive approach targeting not only diseases, but also social, cognitive, and functional problems
Garnett et al, 2017	Concept analysis	-Financial constraints -Disease-related knowledge and behaviour -Social support -Psychological and emotional barriers	-Using strong social support networks -Educational initiatives -Seeking emotional support
Watt, 2017	Debate and Analysis	-Treatment burden -Balancing the specialist paradigm	-Generalist care programs. -Building patients' knowledge and confidence
Gobeil-Lavoie et al, 2019	Mixed thematic analysis, deductive and inductive	-Lack of motivation -Depression -Conflicting information -Economic hardship	- Rely on knowledge and previous experience gained in other situations to improve their SM skills.

		-Underprivileged Neighbourhoods	
Contant et al ,2018	Secondary data analysis	-low socioeconomic Status	-Self-management education -Social integration and support
Jin et al, 2018	Qualitative thematic synthesis	-Decreased strength visual sensations, cognitive impairment, -environmental factors -low levels of health literacy, -Financial constraints, -Family/caregiver support	-Patient-centred approach

Table 2 presents the results from the six reviewed articles on the Chronic Care model and management of multiple chronic conditions. No article was identified focusing on how the six CCM elements overcome SM barriers of patients with MCC.

Table 2: The Chronic Care model implementation and management of multiple chronic conditions.

Author and Year	Method	CCM element implemented	SM Barriers addressed by the CCM elements	Identified Challenges/barriers	Solutions
Davy et al,2015	Systematic literature review	-SM support -Delivery system design	Clinical knowledge and skills		Reflective healthcare practice
Aryani et al, 2016	Quantitative		Anxiety/depression -Psychological support -Compliance to diet and life style		-Multi-disciplinary team to provide collaborative care to the patients with chronic conditions.
Saude et al,2016	Quantitative	-Self-management support -Delivery system design	-Community support -Patients' or family members' Knowledge	-Accurate medication reconciliation	-Communication within the healthcare teams -Medication reconciliation -Self-care management education -Access to follow-up appointments
Boehmer et al, 2017	Systematic review and qualitative thematic synthesis		Patient capacity	-Financial complexity of patients with MCC -High work associated with accessing and coordinating care	-Provide health education, holistic care -Provision of resources -Coordination and communication amongst clinicians -Collaboration with their social networks
Lall et al,2018	Qualitative		-Poor communication between providers and patients	-Distance to health facilities -Limited social	-Ensure quality Communication between health workers and

			-Doctors and healthcare professionals have limited time to attend to patients	and economic information -low levels of health literacy -limited Interactions with the healthcare team. -Long distance and cost of accessing care -limited resource -Lack of coordination	patients -Make essential medicines and trained personnel available. -Establish coordination between the many healthcare providers (public, private and alternative providers of healthcare)
Garland-Baird and Fraser, 2018	Mixed approach		Social support	Provision of social support to patients	-Developing Partnerships

Table 3: Thematic findings

Theme	Sub themes
Patient-centred	Physical barriers, Psychological barriers, social-cultural barriers, Low levels of health literacy and economic barriers.
Health provider	Conflicting information, Distance to health facilities, Resource availability and treatment burden
Environmental	Limited and poor access to fitness facilities

4 Discussion

4.1 Barriers to self-management of patients living with multiple chronic conditions

The main themes identified were; Patient centred barriers with the following sub themes; Physical barriers, psychological barriers, social and cultural barriers, economic barriers, low levels of health literacy, Health provider barriers with the following sub themes; conflicting information, Distance to health facilities, Limited resources, treatment burden and Environmental barriers

4.1.1 Patient centred barriers

These are barriers related to the patient, family and community of the patient. Five sub themes emerged; physical barriers, psychological barriers, social-cultural barriers, Low levels of health literacy and economic barriers.

i. Physical barriers

This review revealed that patients with MCC are associated with multiple symptoms. In 6 studies included, physical barriers resulting from multiple symptoms which may appear simultaneously from the multiple chronic conditions emerged as a barrier (Bayliss & Ellis, 2007; Cassandra et al, 2015; Gobeil, 2019; Liddy et al, 2014; Onder, 2015; Yuanyuan ,2021).

Multiple symptoms make the patient loose strength and visual sensation which affects the patient's ability to effectively self-manage. The CCM element of self-management support takes care of the fundamental role that health care providers have in managing chronic conditions for the informed patient (Aryani et al, 2016). Whereas the CCM model elements of self-management support and community resources and polices articulately addresses physical barriers (Davy et al, 2015; Lall et al, 2018; Saude et al, 2020), the extended chronic model was found to be much better in handling cases of MCC (Yuanyuan ,2021).

ii. Psychological barriers

This study revealed that psychological barriers make patients loose energy and motivation to effectively self-manage. In many studies included , patients with MCC revealed having treatment related side effects such; pain, fatigue, anger sadness, and anxiety which puts them at a risk of depression (Aryani et al, 2016; Bayliss et al, 2007; Davy et al, 2015; Gobeil, 2019; Liddy et al, 2014; Moffat, 2015; Wallace et al, 2015; Yuanyuan ,2021). This emotional state usually results from frequent multiple medical appointments, treatment related side effects and treatment cost. The CCM elements articulately addresses patient psychological barriers. The CCM implementation in primary care improves patients'quality of life manifested by; reduced pain, discomfort and anxiety/depression (Aryani et al, 2016).

iii. Social and Cultural barriers

From the study, it was realised that lack social support from family members or friends affect effective self-management. According to a study by Lall et al, 2018, patients from communities in low resource settings usually lack resources and support programs that can enable them effectively self-manage. This is also be cited in other similar studies of Kimberly et al,2011,Liddy et al,2014,Porter et al,2015,Cother et al,2018. Lack of Social support from family can affect effective self- management activities in the following ways; preparing meals that don't follow dietary guidelines, discouraging physical activity, giving unwanted advice and engaging in depressing talk. Whereas the CCM element of community resources and polices articulately addresses this Social and Cultural barriers (Saude et al, 2020;Lisa et al, 2018; Ryan et al, 2009) the expanded Chronic Care Model and the Innovative Care for Chronic Conditions Framework was found to be much better in handling social cultural barriers of patients with MCC.

iv. Economic barriers

The study revealed that managing patients with multimorbidity is associated with use of a lot of financial resources. From many studies included, it was realised that patients with MCC have to meet frequent fragmented multiple medical appointments and treatment costs (Contant et al, 2019;Cother, 2018;Davy et al, 2015; Garnett et al, 2017; Gobeil, 2019;Liddy et al, 2014; Moffat, 2015; Yuanyuan ,2021). The frequent fragmented medical appointments require use of financial resources which makes patients with financial hardships fail to meet medical appointment and treatment bills. Whereas the CCM model doesn't address the economic issues of patients with MCC (Boehmer, 2018; Lall et al, 2018), the Innovative Care for Chronic Conditions (ICCC) framework was found to address this aptly (Ramli, 2014).

v. Low levels of health literacy

Low levels of health literacy affect effective self-management of patients with MCC. From the studies included, it has been noted that low levels of health literacy make patients to be unsure of what exactly is required of them, unable to follow and adhere to guidance from care

teams (Bayliss et al, 2007;Contant et al, 2019;Davy et al, 2015; Lall et al, 2018;Saude et al, 2020;Yuanyuan ,2021). Low levels of health literacy results from limited time to conduct health education by health providers in a busy outpatient setting. In low resource settings, it can also result from low levels of academic education. The low levels of health literacy is associated SM challenges which results into poor health outcomes (Saude et al, 2020). Whereas the CCM addresses this issue appropriately through SM support programs including SM education to increase health knowledge for effective SM(Contant et al, 2019;Davy et al, 2015; Lall et al, 2018), other models that build on the CCM as such as the expanded CCM and the ICCC framework address the same issue appropriately (Struckmann et al, 2017).

4.1.2 Health provider centred barriers

These are self-management barriers that relate to the health care providers and health system. Four sub themes emerged related to the health provider; conflicting information, distance to health facilities, Limited resources and treatment burden.

i. Conflicting information

Patients with MCC are associated with conflicting information/ instructions from multiple providers. From the many studies included, it was realised that multimorbidity patients often receive specialist care from multiple fragmented providers who are still largely based on a traditional single chronic disease oriented approach (Boehmer, 2018; Gobeil, 2019; Lall et al, 2018; Liddy et al, 2014; Moffat, 2015; Saude et al, 2020;Wallace et al, 2015;Watt, 2017). In most cases, there is no coordination and communication amongst these fragmented care providers. This puts patients at a risk of receiving confusing and conflicting information. The conflicting information makes patients feel unsure of what exactly is required of them to effectively self-manage. Whereas the CCM element of delivery system design in most health facilities does not enable interaction, communication and coordination amongst multiple healthcare providers (Boehmer, 2018; Lall et al, 2018; Moffat, 2015; Saude et al, 2020;Wallace et al, 2015), the Collaborative Care Model was found to address this aptly (Struckmann et al, 2017).

ii. Treatment burden

Multimorbid patients have treatment demands resulting from multiple fragmented chronic care providers. From the study, it was realised that for every long term condition, a patient gets a prescription and medication regimes from a different specialist (Boehmer, 2018; Liddy et al, 2014; Moffat, 2015;Wallace et al, 2015; Watt, 2017). Consequently, this leads to an increase in patients' treatment workload and polypharmacy with its side effects among patients with MCC. According to a study by Boehmer et al, 2018, there are no CCM studies and implementations that acknowledge patient workload. The CCM element of SM support partially addresses the issue of treatment burden by enabling patients develop skills necessary to use equipment and tools to self-manage and regularly contact health care team (Ryan et al, 2009).

i. Distance to health facilities

The study realised that patients especially from low resource settings, move long distances to access chronic care treatment providers. Patients with MCC cannot conveniently access multiple providers, they incur transport costs to access fragmented health facilities (Lall et al, 2018; Liddy et al, 2014; Moffat, 2015). The long distances and transport costs, impacts on the patient's ability to self-manage. The CCM does not address this challenge and it may not be

applicable in resource constrained settings were health care providers with drugs, medically qualified staff and laboratory equipment are limited and fragmented (Lall et al, 2018).

ii. Limited resources

Low resource availability affects self-management activities. In low income countries, there are limited chronic care providers with resource such as medicines, medical equipment, laboratory supplies, patient education materials and qualified medical personnel (Lall et al, 2018; Liddy et al, 2014). In most cases, patients lack the necessary resources to move to the limited fragmented health facilities. The limited resources affects patients' treatment schedules and self-management activities. From the review, it was realised that the CCM elements does not address the issue of limited resources in low resource settings (Contant et al, 2019; Lall et al, 2018; Liddy et al, 2014), the Innovative Care for Chronic Conditions (ICCC) framework was found to be better in addressing financial issues articulately (Ramli, 2014).

4.1.3 Environmental barriers

Environmental factors directly affect the patient's ability to self-manage chronic conditions. Some places have limited and poor access to fitness facilities, have polluted air, water and insecure neighbourhoods (Grady et al, 2014; Yuanyuan ,2021). These environmental barriers limit patient's physical activities hence effecting effective self-management. Whereas the CCM elements doesn't address the issue of environmental barriers (Boehmer, 2018; Davy et al, 2015; Lisa et al, 2018; Lall et al, 2018; Saude et al, 2020), the expanded CCM was found to address this aptly.

5 Limitations

Our search strategy included only publications from scientific journal papers in English language. We might have missed relevant papers. Most of the articles accessed relating to self-management and the CMM focused on a single chronic disease. Only 6 related MCC and the chronic care model were identified. From these six articles, it was not clear which elements of the CCM were implemented.

6 Conclusion

The objective of this review was to study the effectiveness of the Chronic Care Model in addressing Self-Management barriers of Patients with multiple chronic condition. Self-management (SM) of MCC patients is affected by physical barriers, psychological barriers, social and cultural barriers, low levels of health literacy, economic barriers, conflicting information, distance to health facilities, limited resources, treatment burden and environmental barriers. However, this study revealed that the CCM does not address multimorbidity SM barriers of; limited resources, distance to health facilities, conflicting information, treatment burden and environmental barriers.

Therefore, there is need for a model applicable in low resource settings that addresses the identified gaps in the CCM for effective SM of patients with MCC. With appropriate health care models implemented, patients with MM can effectively SM hence improved health outcomes.

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Implications of the study: There is a need for policies that enable coordination and communication amongst public and private multiple chronic care providers. Chronic Care providers need to adopt a holistic approach in managing patients with MCC.

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