

Chronic Care Model (CCM) Effectiveness in Management of Type 2 Diabetes and Changes Needed for Primary Care Setting

Yasir Mohammed Zaroug Elradi*

Department of Family Medicine/Family Medicine Physician, Dhaman Company, Kuwait

***Corresponding Author:** Yasir Mohammed Zaroug Elradi, Department of Family Medicine/Family Medicine Physician, Dhaman Company, Kuwait.

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Introduction about chronic care model (CCM) and chronic diseases impact

The growing number of people suffering from chronic diseases such as Diabetes Mellitus especially type 2, Hypertension, Dyslipidemia and Cardiovascular Diseases that leading to high rate of mortality and morbidity worldwide need a new care approach, Currently, type 2 diabetes mellitus (DM) is a growing worldwide epidemic with more than 422 million are affected, with high incidence and prevalence in the Middle East and North Africa (MENA) with rate 10%, particularly in Kuwaiti adults 15.8% estimated by International Diabetes Federation (IDF Atlas 8th edition) [1], World Health organization (WHO) demonstrates that type 2 diabetes mellitus is the leading cause of cardiovascular diseases, blindness, renal failure and lower limb amputation [2]. Also, many governments' even rich countries cannot afford the cost of management of chronic diseases trend as noticed by study that was done by Center for Disease Control and Prevention (CDC 2013) [3]. Before of this evidence based analysis produced by CDC, great efforts was performed by Wagner and his colleagues to find out proper solutions for more than half people with chronic diseases still uncontrolled despite good traditional care system in the United State of America (USA), so he thought the reason behind this is the way of care delivery of chronic diseases is not sufficient and didn't effective as care of acute general conditions which responded properly by historical care system. Fortunately, the institute of medicine reported that: (the major problem is the design of the care system and more stress on the system cannot improve or achieve our goals unless changing current care system), so Wagner and his team concluded their survey to the necessity of introducing chronic care interventions that mainly focus on rising chronic patients skills and confidence through implementing chronic care model (CCM) [4].

The CCM components

The CCM is an evidence-based guideline, not like an explanatory literature or theory, moreover, it depends on best available evidence currently [5], so CCM is considered a systemic approach to constructing medical care that make partnership between health care systems and local communities, based on Institute of Health Improvement (IHI), there are six elements of CCM which include: (Self-management support, delivery system design, decision support, clinical information system, organization of health care, community support) [5].

Effectiveness of CCM in management of type 2 diabetes

Nowadays, various international studies was performed to confirm the effectivity of CCM in management of type 2 diabetes, most famous studies like (Wagner and his team 1996 and 2002 in the USA), (Zhejiang school of medicine study, 2019 in China), (Brenda Bongartes team, meta-analysis in CCM implementation in type 2 DM, 2017 in the Europe) and most informative and strongly evidence based study was done by CDC in USA in 2013 under the title (The CCM and Diabetes Management in US Primary Care Settings: A Systemic Review), hence, I will discuss it by details to show up relevant evidence of dramatic changes that made by CCM in DM care:

1. Self-management Support for diabetic patients that means providing well organized information beside active regular support from physicians, nurses, family members and friends, who might be Certified Diabetes Educators (CDEs) to make the patient is more active, responsible and confident, through diabetes self-management education (DSME) we found it provide improving in clinical and psychosocial results generally, both individual based approach and group sessions are effective in rising awareness about goal setting, medication compliance, foot care and interpretation of lab results. Follow up is fundamental in management plan to monitor progress and pick up diabetes complication early, in our clinic in Kuwait most patient preferred face to face meeting regularly, wherever Schilling, *et al.* [6] found regular phone call weekly from nurses associated with improved physical activity, function and slight better in HbA1c, lipid profile, also some diabetic patient felt connected and satisfied with secure e-mail connecting blood sugar readings with device in nurses office was illustrated by Lyles, *et al* [7].
2. Delivery system design to improve diabetes patients care require up to dated clinicians and trained multi-disciplinary team to set goals for each patient and work properly together to achieve patient goals. For example, implementation of American Diabetes Association (ADA) guideline in primary or hospital care setting via DSME of patients led to optimizing metabolic control, prevent and manage complication and increase quality of life [8].
3. Decision support for diabetes care means treatment decision should be based on proven guidelines supported by many approved studies, so health care system integrate this guidelines and train care givers to use it efficiently. Many studies showed improvement of diabetes knowledge and control of HbA1c and Blood pressure when trained physicians and nurses practicing guidelines within CCM approach properly which confirmed by Institute of Clinical System Improvement (ICSI) [8].
4. Clinical information system to improve care of diabetic patients via a registry which is an information system that tracking patients individually, by using of registry and collaborative electronic medical record system in CCM enable care providers to review details of patient lab results and examination findings, also help in detecting laps of diabetic care such as missed visit and annual checkup appointments. Thus, registry help both patients and health care providers to set goals and individualized plan, moreover, reviewing progress in parameters of glycemic control as (HbA1c level).
5. Organization of health care in diabetes management means the leadership role in translating preventive and chronic care practice into health policies, procedures, financial and business plan. Studies found that partnership between CMM in health care settings with government boards resulted in HbA1c reduction by 1% during 12 months and improvement in foot care program [9], changes in organization system by redefining role of each member of multi-disciplinary team, also helped in eye examination program, weight reduction, blood pressure and sugar control.
6. Community support for patient with diabetes: t means community resources and polices that improve health care of diabetic patients and increase preventive strategies via several ways for example, health educational meetings and lectures in schools or clubs, beside collaboration between physicians and community enable to implement of CCM in local community.

Adaptations of the CCM in management of type 2 diabetes in primary care setting

Situation of diabetes care in primary care settings in Kuwait

Currently most primary care system for chronic diseases care and diabetes in the gulf region is a usual and traditional care system which depend on physicians mainly, who responsible from clinical consultation first, then ordering lab tests to confirm the disease and making plan of management for diabetic patient, also we are doing health education for our patients about diabetes definition, clinical manifestations, parameters of glycemic control, drugs and side effects of both oral hypoglycemic drugs and insulins, also we provide 2 sessions in office individually about diabetes complication especially hypoglycemic episodes in elderly or athletes. Fortunately we have educated nurses in diabetes management, they are preparing patient first and check how the blood sugar in the past month and share

advice with patient about changes needed, while nutritional therapy is the corner stone in diabetes management as recommended by American Diabetes Association (ADA 2019) [10], interestingly we have some tips and leaflets about glycemic index and calories calculation, we advise our patients to meet endocrinologist and ophthalmologist at first visit beside dental clinic consultation. Registry and electronic record system used widely in the gulf region with some limitations that will be discussed later, also administrators and ministry of health organize whole process of care and provide periodic training for health staffs. Finally, this traditional care of diabetes in our primary care setting is suboptimal and need implementation of whole CCM components with some modifications that are suitable to our financial situation, technology and demographic factors.

Adaptations of the CCM needed in management of type 2 diabetes in primary care setting

Tsai Ac and his colleagues conducted meta-analysis and found that application of one element of CCM had minor effects and outcomes, but on the other hand implementing all components of CCM were beneficial clearly [11], so IHI suggested many applicable adaptations in our local primary care system such as:

1. Organization system changes include activating both leaders and staff in doing activities to improve diabetes care like, encouraging senior leaders to visit the clinical team and speaking about improvement efforts needed and set aims and discuss it monthly in comprehensive meetings, also leaders can make updates for surrounding community and share governmental board about process of care and problems might be present to get quick fund and appropriate solutions.
2. Decision support among providers strengthened by training our physicians, nurses and health educators about guidelines as standard of diabetes care (ADA) guidelines through periodic interactive continuing learning sessions performed by expert physicians, whereas in private sector or far away centers we can make it via online learning process to keep all staff updated and confident. Also encouraging patients' participation through sharing guidelines with them.
3. Delivery system design changes include physicians plan visits and monitor carefully patients at need as elderly or patient with comorbidity like cardiovascular or renal diseases because of risk of hypoglycemia or worsening effects of diabetes or medications.
4. Self management support is the cornerstone of the CCM in primary care and huge efforts should be done to train clinicians and staff about how to do proper self-management support, promoting good doctor-patient relationship that help in identifying patient culture, needs and problem solving accordingly, DSME is very important tool in rising level of diabetes care among patient but really need well educated staff or social workers who interested in diabetes volunteering education program, so we can set individual self-management goals and follow up them through accessing in DSME.
5. Clinical information system can be used actively to set patient goals in one place and look at these goals in each visit then we can analyze progress and prevent micro and macrovascular complications easily, nowadays due to availability of smartphones, laptops and iPads many information and communication technologies might be used to make patient engaged in taking decision and part of self-management tools, but still some patient refused to deal with technologies.
6. Community role in diabetes management need changes as integrating more community leaders and organization to fund and support initiatives as DIABETES DAY and filling gaps of primary care as providing of glucometer for each patient, helping poor patients to buy medications and make it free for them if possible, also partnership with primary care we can make Diabetes Association group and meetings regularly [5].

CCM barriers in the management of diabetes in the primary care setting

A systemic review has done by Yeoh., *et al.* and found several limitations for CCM implementation in primary care setting, literature mention main limitations include: weakness of study design, data contamination beside problems in differing professional providers and patient presentations [12], some challenges in our practice include accessibility of far distant patients into service because primary care centers is distributed in crowded populated areas, while there are deficiency in far distant areas so we have to construct more small clinics for those far away or providing transportation means to get the service in time, financial situation is the main constrain for diabetic patients in our local society and most of poor patients cannot afford the cost of medications and lab tests so incorporating those poor people in insurance service is mandatory as well as governmental support to make it all free for those poor diabetics and helping them to get jobs or source of income. Technological issues is barriers especially in developing countries while multidisciplinary team is only available in big centers in main city with all facilities. Sunaert., *et al.* [13] found that many physicians feel worry about some patients not accepting primary care programs and suppose details of self-management goals is useless so physicians afraid of losing diabetic patients and income too. Many physicians who working in crowded clinic have no sufficient time for consultation, particularly newly discovered patient who need proper counseling to build up good care in the future. Finally, there is still gaps in knowledge between CCM implantation and existing barriers that need to solved.

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