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Nurse Case Manager Lifestyle Medicine (NCMLM) in the Type Two Diabetes patient concerning post COVID-19 Pandemic management: Integrated-Scoping literature review

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Key words: Nurse Case Manager (NCM), Second Type Diabetes, Lifestyle Medicine (LM), Integrative-Scoping Review, Nurse Case Manager Lifestyle Medicine (NCMLM), COVID-19

Parole chiave: Infermiere Case Manager (ICM), Diabete di tipo due, Lifestyle Medicine (LM), Revisione integrativa d'ambito, Infermiere Case Manager Lifestyle Medicine (ICMLM), COVID-19

Abstract

Background. *The American Case Manager Association defines Case Management, in Lifestyle Medicine perspective, a collaborative practice between all the actors involved in the care process. The goal of this review was to evaluate the Nurse Case Manager role in Type 2 Diabetes patients, analyzing the quali/quantitative data related to Nurse Case Management programs in Lifestyle Medicine view.*

Study design and Methods. *Three independent operators were involved in two distinct phases, applying the Prisma method, specifics PICOS and research strategies from PubMed and Cinahl. The first part integrated a Cochrane systematic review on the Specialist Nurses in Diabetes Mellitus, while the second part evaluated the Nurse Case Manager interventions in Lifestyle Medicine view.*

Results. *The first part includes 13 studies and the second 6. The glycemic control was improved in the Nurse Case Manager groups in Lifestyle Medicine perspective. Good results were appreciated in secondary outcomes: lipid profile, Body Mass Index, quality of life and stress management. The results for the management of self-care and adherence to Lifestyle Medicine programs are encouraging.*

Conclusions. *It emerged unequivocally that, taking care and supporting the diabetic subject, leads to significant benefits in the general health and to reduction of possible complications. After the Covid-19 Pandemic, the Nurse Case Manager Lifestyle Medicine could represent a valid alternative of health management for the improvement of care in Type 2 Diabetic patients.*

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Introduction

Lifestyle Medicine (LM) is a recent multi-disciplinary approach to prevention, cure and research in the main chronic infirmities linked to environmental factors, such as: unhealthy diet (1, 2), physical inactivity, stress, smoking and alcohol consumption (3, 4). As opposed to the conventional medicine, whose approach tends to focus more on acute or chronical stages of the disease, the LM focuses on prevention and holistic wellness (5, 6). Most non-communicable diseases – in particular Type 2 Diabetes (T2D), cardiovascular disease and cancer - would be prevented or cured with a lifestyle approach, reducing the 80% of the incidence and related complications, improving life expectations (7-9). T2D hits 425 million people worldwide (between 20 and 79 years old), of whom 87-91% have T2D and 79% live in low-income countries. With this fast pace, in 2045, the number will increase up to 700 million of patients (20-79 years old), with a complex health institutions expenditure of 760 million of US dollars (10). In Italy, in the 2016 ISTAT report (11), 3 million and 200 thousand people declared to suffer from diabetes, around 5.3% of the entire population (the 16.5% between the over sixty-five). From the precise analysis of these data, it is possible to observe that 28.9% of the obese and sedentary are males, and 32.8% are female, between 45 and 64 years old (11). The lifestyle change, also considering the recent national and International Guidelines (IGL) could be an important starting point for the T2D management and prevention of complications, as well as of the treatment of acute and chronic stages of the condition. The whole multi-disciplinary team (Medical Doctors, Nurses, Dieticians, Psychologists, and all the figures acting in the complex care process) for the correct clinical and healthcare management, should first of all focus on the satisfaction of self-care needs, and on lifestyle in general (12, 13). The Case Management, that the American Case Management defines like "a collaboration between all the actors involved in the critical treatment that facilitates the sharing of clinical information between patients, caregivers, medical doctors, nurses, and all the health professionals" represents a true alternative in the treatment of the T2D patient (14). The Nurse Case Manager (NCM) could play a great role in taking charge of the diseased, supporting his cure and the personalized assistance process, improving the overall clinical conditions (15, 16). The recent Covid-19 Pandemic, which highlighted all difficulties associated with the territorial management of the emergency and with the increasing number of the elderly (almost 14 milion of >65y residents out of 59 million people) and of the pluri-morbid subjects, could suggest identifying the nurse as a fundamental point of reference for a healthcare proximity and support to chronic diseases, which affect 40.8% of the general population, reaching 66.6% of the subjects >65y (17-20). The main goal of this review was the evaluation of the quality/quantity of data concerning NCM' role in Diabetology, in the LM view. With this strategy, the produced review tried to answer to the following questions: which LM interventions suggested by the NCM in Diabetology could support the quali/quantitative situation of the T2D patient and treatment post COVID-19 Pandemic management? How, the NCM, could improve the management of T2D *patient* in the post COVID-19 Pandemic?

Material and Methods

The review, with the Prisma method [(21, 22), Figure 1-2], was conducted in

two different stages by two independent operators and a third one was available in case of conflict. The first part of the review integrated the Cochrane systematic review of Loveman *et al* (23) about the NCM Specialist in Diabetology. On the other hand, the second part tried, in a LM view, to evaluate, in the Clinical Trials, all the NCM interventions for the T2D patient. The papers were selected creating specific PICOS and research strategies (Attachment 1) in PubMed and Cinahl database. The review included also: complete dissertation papers, Italian or English language, with 31 July 2020 as time limit that agreed with specific Prisma Statement qualitative requirements [(21, 22)), Attachment 2]. In the first part of the review 13 studies were inserted, while 6 were inserted in the second one (Tab 1 and 2).

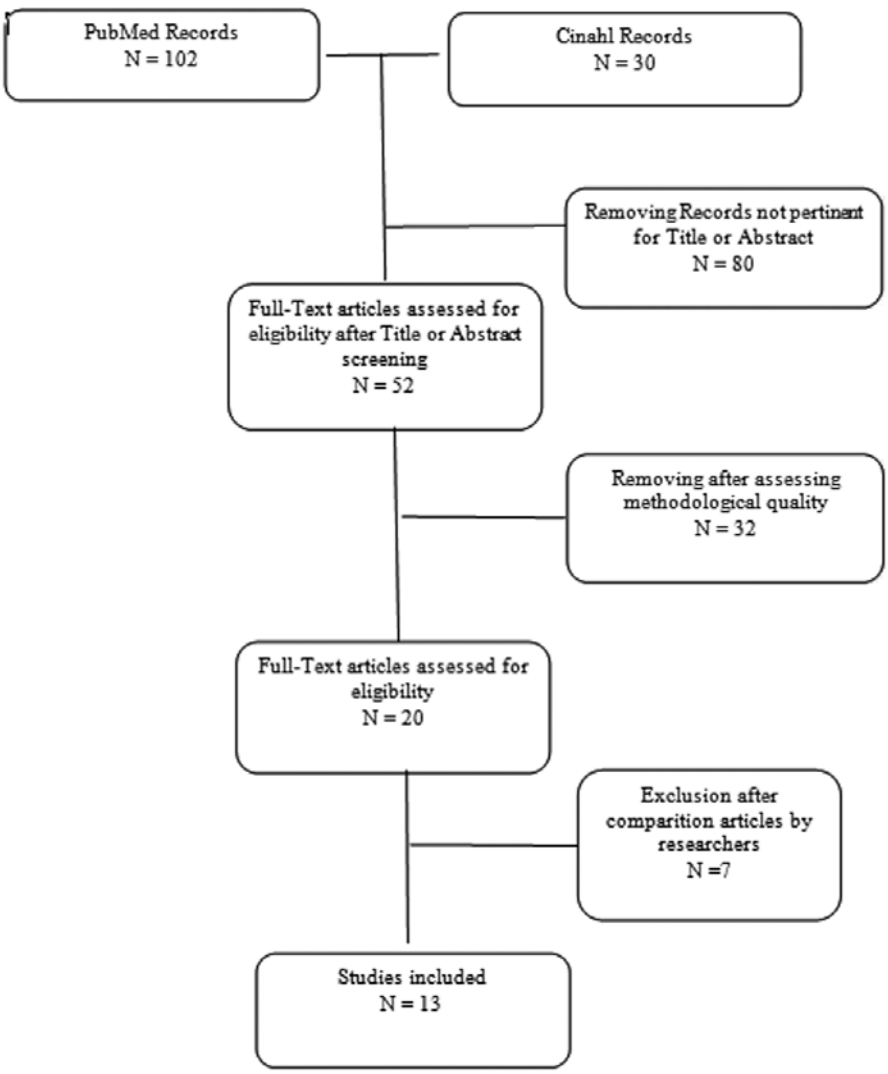

Figure 1 - Flowchart First Part selection process according to Prisma Method

Table 1 - Synthesis of the studies considered

First Author / Year of Publication	Type of Study	Population / Setting / Duration	Main NCM Interventions	Main Outcomes	Quality of the Study
Teston EF et al[24] / 2018	RCT	67 cases and controls/ Brasil / 5 months	- "nursing check-up" - phone calls between appointments - lifestyle improvement (healthy diet, no smoke and alcohol and physical activity) - self-care - goal sharing	Glycemia improvement ($P < 0.001$), nutritional aspect ($P < 0.001$) and physical activity ($P = 0.003$) in the case group compared the control	Medium
Azami G et al[25] / 2018	RCT	71 cases and controls/ Iran / 24 weeks	- intensive self-care support - lifestyle improvement (healthy diet, no smoke and alcohol and physical activity) - regular phone follow up of 10-15 minutes per week - distribution of informative material (paper and video) - education by specialist nurse in the first 4 weeks	Statistically significant improvements ($P < 0.001$) mainly for HbA1c and BP in the case group	Medium
Ji H et al[26]/ 2018	RCT	50 cases and controls/ China / 6 months	- intensive self-care support and lifestyle improvement - support by NCM at least once per month (cure management, skill nursing and multi-disciplinary support to pathology management) - care giver or family involvement (diet, therapeutic education, physical activity, self-care) in role-play video	Improvements concerning HbAlc, fasting and post-prandial plasmatic glycemia ($P < 0.05$), quality of life ($P = 0.001$), physical activity ($P = 0.043$), glycemia self-monitoring ($P < 0.001$) and reduction of pathology-related risks ($P < 0.001$) in the case group compared the control	Medium
Egede LE et al[27]/ 2017	RCT	54 cases and 59 controls/ USA / 6 months	- Tele-Nursing for rural population - clinic-therapeutic interventions in supervising the doctor specialist following Guide Lines	HbA1c reduction ($P = 0.024$) and faster reduction of time indicator ($P = 0.038$) was observed to the case group compared to control	Medium
Li D et al[28]/ 2017	RCT	72 cases and 68 controls/ Canada / 6 months	- multi-disciplinary approach hold by specialist nurses with great experience - 60 minutes of initial consult -regular phone calls and e-mails (weekly at first) about self-care, prevention of complications and pathology management	Hb1Ac reduction (-0.73%; $P = 0.027$) and perceived stress reduction (-0.40%; $P = 0.001$) in the case group compared usual care	Medium
Moreira RC et al[29] / 2015	RCT	40 cases and controls/ Brasil / 1 year	- self-care - lifestyle improvement (healthy diet, no smoke and alcohol and physical activity) - multi-disciplinary support - regular phone calls - monthly domiciliary visits	HbA1c reduced from 10.3% to 9.0% ($P < 0.01$) in the cases group and from 9.57% to 8.93% (P 0.05) in the controls group. No differences between the groups	Medium

Gabbay RA et al[33] / 2013	RCT	232 sperimental group and 313 control group/ USA / 2 years	- meetings with the NCM; initially every 2/3 week and then after 3, 6 and 12 months - motivational meetings about lifestyle improvement (healthy diet, no smoke and alcohol and physical activity)	Statistically significant improvement for the SBP (131 ± 15 vs. 135 ± 18 mmHg, P < 0.05) in the case group compared the control. Depressive symptoms showed better results for the sperimental group	High
Fischer HH et al[34] / 2012	RCT	381 cases and controls USA / 12 months	- regular phone calls - control, monitoring and treatment of lipidic profile according to Evidence Based - motivation for self-monitoring, BP and glycemia control - management support via medical consult	Percentage of patients with LDL values <100 mg / dl increased from 52.0% to 58.5% in the intervention group and reduced from 55.6% to 46.7% in the control group (P < 0.01). Cost reduction (P = 0.03) in the case group. Patients in the intervention group tended to have less hospitalizations (P = 0.06)	Medium
Ishani A et al[35] / 2011	RCT	278 cases and Usual Care/ USA / 1 year	- initial visit with NCM - interventions for lifestyle improvement (healthy diet, weight management and physical activity) - control and prevention of potential complications diabetes (BP, lipidic and glycemic asset, DASH diet) - phone calls and follow ups - final visit with NCM	HbA1c < 8% in the 73.7% of the sperimental patient vs the 65.8% for the controls (P = 0.04). Average BP 130/80 for the 45% of the cases and 25.4% for the controls (P < 0.01). LDL < 100 mg/dl (57.6% cases vs. 55.4% control, P = 0.61)	High
Heisler M et al[36] / 2010	RCT	119 cases and 126 controls/ USA / 6 months	- initial visit with NCM - intensive self-care support - regular follow up of 1h and half - support meetings with the NCM	Control group had a mean HbA1c of 8.02% at baseline, which improved to 7.73% at six months (– 0.29%) compared with an average increase in HbA1c among NCM gorup (7.93 to 8.22 [SD 0.29]). The difference between groups was 0.58% (P = 0.004)	Medium
Gary TL et al[37] / 2009	RCT	269 sperimental group and 273 control group/ USA/ 24 months	- intensive interventions that required a specific 6 weeks training, split in different steps: assistential method based on international guide lines, self-managment programme, specific educational home access, peer and skill education, regular follow up for 6 weeks	The urgent visits were less of 23% reduction in the NCM group	High
Shea S et al[38] / 2009	RCT	844 cases and 821 controls/ USA / 5 years	- telemedicine interventions by the NCM - web interviews and use of specific software for the pathology management - interventions according to international Guide Lines for blood chemistry parameters management (HbA1c, LDL) and BP - multi-disciplinary approach	Statistically significant reduction of HbA1c and LDL in the sperimental group compared to the controls (P = 0.001 the first and P < 0.001 the second). Reduction also for BP values in the cases compared to the controls (P = 0.024 SBP, P = 0.001 DBP)	High
Gabbay RA et al[39] / 2006	RCT	150 sperimental group and 182 control group/ USA / 1 year	- NCM personalized plans - self management support - complications preventions - multi-disciplinary approach - national and IGL - information sharing	Statistically significant improvement of BP values after 6 months and confirmed 1 year later (P < 0.001). HbA1c and LDL didn't show variations while screening and perceived stress were better handled in the sperimental group	Medium

Table 2 - Synthesis of the studies considered

First Author / Year of Publication	Type of Study	Population / Setting / Duration	Main NCM Interventions in LM view	Main Outcomes	Quality of the Study
Li et al[40] / 2020	RCT	117 cases and 108 controls/ China / 3 months	- weekly educative programs concerning: basic knowledge of the pathology, self-care, healthy diet and physical activity - educative sessions for overcoming personal limits toward changing and motivation - Engagement, Focus, Evoke process and personalized plan	PAID score better in the cases (12.7 ± 13.6, 5.8 ± 7.6) compared to the controls (22.7 ± 22.8, 11.7 ± 14.6). PEI score improvement in the intervention group (7.27 ± 2.45 vs 5.81 ± 2.97). No differences for the modifications concerning physical activity, diet and adherence to the cure	Medium
Aung MN et al[41] / 2019	RCT	160 cases and 159 controls/ Thailandia / 1 year	- motivational intervention by the same nurse - minthly piCO test + Smokerlyzer for 3 months - family member support and writing a specific diary - optional therapy with chewing-gum	The participants to the intervention improved their smoking addiction compared to the controls (25.62% vs 11.32%, OR 2.95, CI 95% 1.55-5.61)	Medium
Ismail K et al[43] / 2018	RCT	164 cases and 170 controls/ UK / 1 year	- 12 motivational sessions of 30 minutes - 6 phycological skills D6 pathology focused on: active listening, resistance management, changing strategies, self-care, lifestyle and behavior improvement.	No statistically significative difference for HbA1c (average difference – 0.79 mmol / mol, CI 95%, from – 5.75 to 4.18) and for secondary results. Competence level of D6 nurses was comparable to the one of the inexperienced nurses involved in the standard cures	Medium
Young H et al[44] / 2014	RCT	51 cases and 50 controls/ USA / 9 months	- 5 coaching sessions hold in Tele-Nursing or physically - interventions focused on: improving diet habits, weight management, physical activity, stress reduction, self-care and stop smoking	Statistically significant improvement for the score of pathology management (4.03 per cases vs 3.64; $P < 0.05$)	Medium
Debussche X et al[45] / 2012	RCT	206 cases and 192 controls/ France (Reunion Island) / 12 months	- quarterly sessions about healthier diet and lifestyle hold by nurse and dietician - changing and limit overcoming strategies - engagement via messages and phone calls	Statistically significant improvement for HbA1c values after 12 in both the groups (– 1.74 ± 2.64%, $P < 0.0001$ for the cases; – 2.02 ± 2.57%, $P < 0.0001$) and HDL ($P < 0.0001$) and BP values ($p < 0.0001$). No difference was observed for the others outcomes (BMI, weight, glycemia, triglycerides, cholesterol and waist circumference)	Low
Song MS et al[46]/ 2009	RCT	25 cases and 24 controls/ South Korea / 12 weeks	- multi-disciplinary approach - initial meeting with medical doctor and reference nurse - involvement in 10-participants educational groups concerning: self-care, complication management, diabetic foot, changing and nutritional support, stress and weight management - regular phone assistance by reference nurse and regular follow up (max. 1 - 2 months)	Patients in the intervention group reduced the HbA1c of 2.3% compared to the 0.4% of the control group. There was a significant increase of the adherence to the diet for the cases group compared to the control	Low

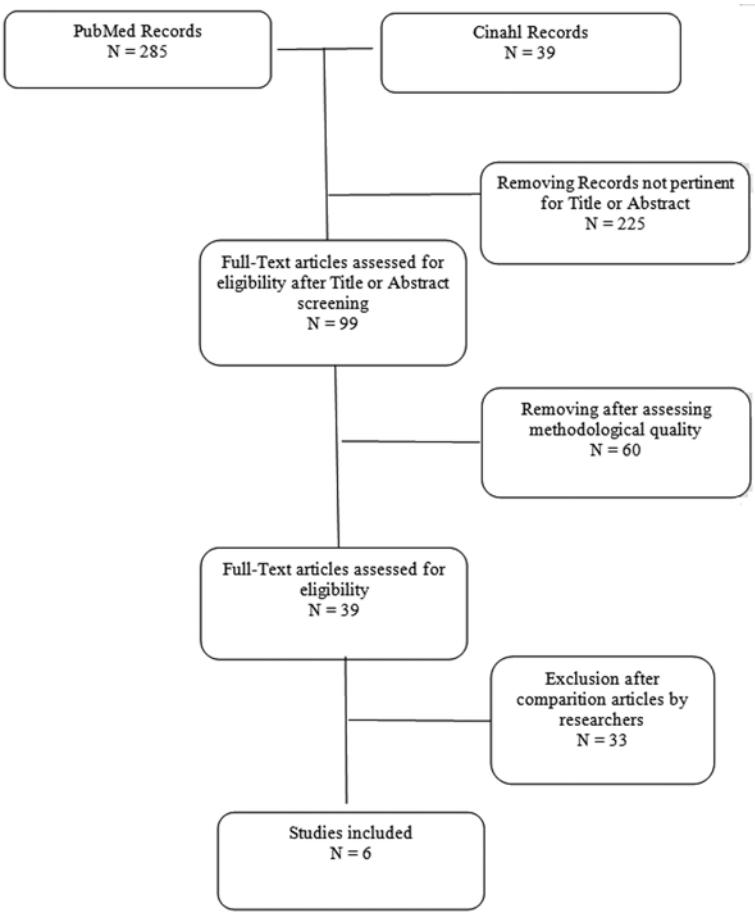

Figure 2 - Flowchart Second Part selection process according to Prisma Method

Results

The review aimed to analyze and theorize the clinical-care skills of Nurse Case Manager Lifestyle Medicine (NCMLM) in the management of the care of T2 diabetic subjects and chronic patients in general, in order to give a possible answer for the new organization of Community Health after Covid-19 Pandemic.

Nurse Case Manager Interventions

In the Teston *et al* study (24), that lasted 5 months, the main proposed intervention was 3 "nursing check-up" spaced out by 2 phone calls between the appointments. The main focus of the nurses involved, shared with the patients, were directed to the lifestyle improvement (healthy diet, no smoke or alcohol consumption and physical activity) and the auto-management of the condition. Azami *et al* (25) assisted the experimental group for 24 weeks with an intensive self-care support, healthy education programs with regular 15 minutes phone calls follow up each week and the distribution of informative material (paper and video). In Ji *et al* study (26) the NCM focused the attentions on the management of the treatment, on specific nursing skills and multi-disciplinary support to the condition handling. The caregiver or the family was

actively involved in an educative 30-minutes role-play video. In the first 4 week there were also educational sessions made by specialist nurses. The NCM Tele-Care, with the main goal of reducing distancing and improving cure outcomes for rural patients, was the main intervention proposed by the Egede *et al* study (27). On the other hand, in the Li *et al* study (28) the NCM practiced: multi-disciplinary approach held by professionals and education specialists, 60 minutes of starting consult, regular phone calls or emails (weekly at first) on the topic of self-care, complications prevention and overall pathology management. In the Moreira *et al* study (1 year) (29) the patients, included in the NCM experimental group, received a self-care approach customized on their socio-economic conditions - it is important to consider how the economic crisis influences alcohol consumption, smoking, prevention and use of medications - as well as food choices (30-32) - and regular phone calls and monthly home visits in order to reduce difficulties of pathology management. Gabbay *et al* (33) experimented (2 years) one hour-long motivational meetings about self-care and lifestyle improvement (starting every 2 week and following up every 3, 6 and 12 months). The NCM was shared in both groups but, in the control one, contacts were possible only by phone or emails. Fischer *et al* (34) created an NCM program primarily (Family Health Center) set on a regular phone support, focused on the lipid profile improvement in poor patients. In Ishani *et al* study (35), that lasted 1 year, the NCM pointed the attention on the prevention of complications and improvement of lifestyle in general (Dash diet suggested) through phone calls. In the Heisler *et al* study (36), six months long, the meetings with the NCM were implemented with regular follow ups between peers, supported by the professional figure. In the Gary *et al* study (37), a more intense approach integrated the socio-economic status of the subjects involved in the experimentation and reduced the cultural and social barriers that could influence the management of recovery. In the Shea *et al* study (38) the NCM used the Telemedicine approach, following IGL concerning ematochemistry parameters: Glycosylated Haemoglobin (HbA1c), Low-Density Lipoproteins (LDL) and Blood Pressure (BP), as a favorite method. The multi-disciplinary approach to the treatment contributed to the management of diabetic patients followed by specific software and web interviews, for five years. In Gabbay *et al* study (39) the NCM primarily developed personalized plans targeting self-management, prevention of complications, multi-disciplinary approach, national and IGL and sharing of information.

Nurse Case Manager Outcome

In Teston et al study (24), before and after the intervention it was observed an increased attention by the experimental group to the glycemic parameter management ($P < 0.001$), to the nutritional intake ($P < 0.001$) and to physical activity ($P = 0.003$). The proposed interventions didn't statistically influence for the smoking stop and alcohol consumption over the suggested quantitative. The participants of the Azami et *al* (25) experimental group, in the 12 weeks, had HbA1c significantly lower (47.9%) compared to the control group. At the 24 weeks, the difference increased to 62% ($P < 0.001$). More than one fifth (21.2%) of the patients of the intervention group reached HbAlc values < 7% compared to the no one of the control group ($P < 0.001$). For both groups, improvements were observed at the 12 and 24 weeks on the values of BP ($P < 0.001$). No improvement was observed concerning lipid profile, both in the cases and in the controls. Concerning Ji et al (26), the average value of HbAlc, fasting or after meal, plasmatic glycemia mainly improved in the experimental group respect to the control one ($P < 0.05$). Improvements

were encountered in the quality of life in the experimental group concerning healthy diet (P = 0.001), physical activity (P = 0.043), glycemic self-monitoring (P < 0.001) and reduction of risks (P < 0.001). In Egede et al study (27), the Balk at six months was more reduced in the intervention group compared to the control group (P = 0.024); it was also observed a rapid reduction time dependent of the same indicator in support of the cases (P = 0.038). According to Li *et al* (28), in the 134 subjects who completed the study that lasted six months, a reduction of HbAlc values was observed in the experimental group compared to the control one (- 0.73%; P = 0.027) (28). The NCM group showed also a statistically significant reduction of perceived stress level (- 0.40%; P = 0.001). On the other hand, according to Moreira *et al* (29), the HbAlc was reduced from 10.33% to 9.0% (P < 0.01) in the experimental group and from 9.57% to 8.93% (P = 0.05) in the control group; between the groups no statistically significant differences were observed. According to Gabbay et al (33), a statistically significant improvement was observed for the experimental group compared to the control concerning Systolic Blood Pressure (SBP): 131 ± 15 vs. 135 ± 18 mmHg, P < 0.05. The HbAlc % decreased from 9.1% to 8.0% in the experimental group and from 8.8% to 7.8% for the control. The LDL from 127 to 100 mg/dl in the case group and from 128 to 102 in the control group. The Diastolic Blood Pressure (DBP) from 78 to 74 mm/hg in the case group and from 80 to 74 mm/hg in the control group. The depressive symptom showed lower levels in the experimental group. According to Fisher *et al* (34), the percentage of patients with LDL values <100 mg/dl raised from 52.0% to 58.5% in the intervention group and decreased from 55.6% to 46.7% in the control group (P < 0.01).

The average price for patients enrolled in the experimental group ($ 6,600) was lower than the price recorded for patients in the control group ($ 9,033, P = 0.03). Furthermore, although the data did not reach statistical significance (P = 0.06), the number of hospital admissions was growing in the control group (162 in the pre-intervention period and 184 in the study period) whereas it was reduced in the experimental group (133 in the pre-intervention period and 112 in the study period).

In the Ishani *et al* study (35) the HbAlc < 8% was maintained by the 73.7% of the patients for the experimental group vs the 65.8% for the control one (P = 0.04). The average BP controlled 130/80 was reached by the 45% of the case and by the 25.4% of the controls (P < 0.01). LDL < 100 mg/dL didn't reach statistically significance (57.6% case vs 55.4% controls, P = 0.61). According to Heisler *et al* t (36), the HbAlc passed from 8.02% to 7.73% in the case group (-0.29%), compared to the average increment from 7.93 to 8.22 in the control group (SD 0.29; P = 0.004). A reduction of 23% of the emergencies for the subjects with intense NCM activity (RR 0.7; CI 95% from 0.59 to 1.00) and of 34% of all the treatments for the experimental group (RR 0.66; CI 95% from 0.43 to 1.00) was recorded by Gary et al (37). Shea *et al* (38) found a significant reduction of HbAlc and LDL values in the experimental group compared to the control (P = 0.001; P < 0.001). Also reductions concerning BP values were observed (P = 0.024 for SBP, p = 0.001 for DBP). In the Gabbay *et al* study (39) a significant improvement of BP values was observed after six months and confirmed after one year in the experimental group compared to the control (P < 0.001); average SBP was reduced of 9 mmHg (from 137 mmHg to 128 mmHg after 6 months and to 129 after 12 months), and average DBP was reduced of 5 mmHg (from 77 to 72 mmHg after 6 six and constant at 72 mmHg after one year). HbAlc and LDL didn't show significant variations while screening and stress perceived were better managed in the experimental group.

Nurse Case Manager on Lifestyle Medicine Support

In the Li *et al* study (40), the intervention group received specific weekly educative programs (motivational meetings) in small groups (no more than 10 participants) one hour and half / two hours long, concerning: basic knowledge about the pathology, self-care, healthy diet and physical activity. The sessions, held by specifically trained nurses with the availing of an expert in the field, focused on overcoming personal limits about changing and motivations. Engagement, Focus and Evoke programs were developed and so was a personalized cure plan. The analyzed outcomes were the diabetic patient stress management (PAID), that showed better scores after three months in the cases group (12.7 ± 13.6 vs 5.8 ± 7.6) compared to the controls (22.7 ± 22.8 vs 11.7 ± 14.6) and the adaptation score of the diabetic patient (PEI), improved in the intervention group (7.27 ± 2.45 vs 5.81 ± 2.97). No statistically significant difference was observed between the groups for the modifications concerning physical activity, diet ed adherence to the cure. In the Aung *et al* study (41) and in (42) the part of the experimental cases group was developed: motivational interventions to stop smoking addiction by the same nurse for three months, regular monthly PICO + Smokerlyzer test to show the carbon-monoxide level inhaled by the patient and the pulmonary health improvement of the same, assistance to reach the goal by one family member supported by the reference nurse, filling a questionnaire with the collaboration of the reference relative, optional therapy with nicotine-replacement chewing-gum, preferred alternative to a possible supplementation. The participants in the intervention group obtained a better result concerning stop smoking compared to the control group (25.62% cases vs 11.32% control, OR 2.95, CI 95% from 1.55 to 5.61). In the study of Ismali *et al* (43), in the experimental group the main interventions were: twelve 30 - minutes long motivational sessions that used 6 psychological skills (Diabetes-6 [D6]) about pathology approach (focused on active listening, resistance management, changing strategies, self-care, lifestyle and behaviors improvements). No statistically significant difference was observed between the intervention group and the one with standard assistance for HbAlc (average difference - 0.79 mmol/mol, CI 95% from 5.75 to 4.18) or for no one with secondary results. The level of knowledge between the D6 nurses was comparable to the one of the inexperienced colleagues and/or the one involved in standard cures. In the Young *et al* study (44), 5 sections of coaching were held in Tele-Nursing or in presence, with the aim of: improving diet habits, weight management, physical activity, stress reduction, self-care and stop smoking. After 9 months, statistically significant improvements were observed in the experimental group for the score concerning pathology management (DES), used for evaluating the study (4.03 in the experimental group vs 3.64; $P < 0.05$). In Debussche *et al* study (45), quarterly sections held by Specialist Nurse and Dietician were experimented, in order to promote healthier diet and lifestyle, focusing on strategies concerning changing, obstacles removal and engagement throughout messages and phone calls. A HbAlc values improvement was observed after 12 months for both the groups (- 1.74 ± 2.64%, $P < 0.0001$ for the cases; - 2.02 ± 2.57%, $P < 0.0001$); also High-Density Lipoprotein (HDL) values improved ($P < 0.0001$), together with BP ($P < 0.0001$). No statistically significant result was observed for the other clinical outcomes taken in consideration (BMI, weight, glycemia, triglycerides, cholesterol and waist circumference). According to Song *et al* (46), the study - through multi-disciplinary approach - initial meeting with medical doctor and reference nurse, involvement in

educational groups with max 10 participants (self-care, complications management, diabetic foot, changing support, nutritional support, weight and stress management) and regular phone consultation by reference nurse and ambulatory follow ups (max 1 - 2 months) - was observed, in intervention patients, a reduction of average HbAlc levels of 23% compared to the 0.4% of the control group. A significant increase of the diet adherence for the case group, compared to the controls, was also evidenced.

Discussion

The results of this review highlight that, bringing the attention of the patients with access to a Diabetology center on a healthier lifestyle (as corrections on the diet or suggestion of thealth-promoting lifestyles), offer new prospects for more active aging and higher levels of health (47, 48). Analyzing the specified field of the results, concerning the NCM Outcome, some evidence can be highlighted such as an improvement of secondary outcomes concerning quality of life in a period of treatment between 3 and 6 months (28, 40); the reduction of stress with positive repercussions on the decrease of HbAlc (P values included in the range between $P = 0.027$ and $P < 0.0001$) (25-29, 35, 38, 45, 46), and then again an improvement of lipid profile and HDL, reaching the statistical significance of $P < 0.0001$ (34, 38, 45). Furthermore, some studies demonstrate that the NCM management could reduce the average price of the cures in the experimental group compared to the control group (34). The interventions of Skill Nursing Lifestyle and Tele-Nursing (26, 44) in the Nurse Case manager on Lifestyle Medicine support, and the stress management applying a multidisciplinary approach and engagement (28, 40), lead to record a better score of patient stress management, an improvement of the adaptation score of the diabetic patient, a relevant increase of the diet adherence and, finally, a statistically significant reduction of Blood Pressure values (P 0.001) (25, 33, 35, 38, 39, 45). Applying the NCM management also benefits were observed, concerning the economic aspect, induced by the reduction of the Hospital admissions number by the reduction of hospitalizations (34) and 23% was the percentage of emergency visits reduction recorded in the intervention group in comparison with the group of control (37). Another study examined the benefits of a NCM program in an LM view for the reduction of smoking addiction (41). The NCM' interventions were exploited by consults by phone, in presence or mixed. Considering the recent COVID-19 Pandemic (49), the studies offered in Tele-Consult/Tele-Nursing were interesting (38, 44), because they highlight that the sections of coaching on diet, weight management, physical activity, stress reduction, self-care and stop smoking, were the instruments used to lead a better score concerning pathology management (DES) in the experimental group (44).

However, this review presents some limits. The major limit of this review is the extreme heterogeneity of the included studies, mainly in terms of proposed interventions, duration (minimum of three months to the maximum of 5 years) and of the quali/quantitative outcomes taken into consideration. It has been anyway evidenced that taking care and supporting the diabetic subject during the assistance process brings important benefits in terms of general health and reduction of possible complications.

Conclusion

The recent COVID-19 Pandemic - declared by the World Health Organization in March 2020 (49) - enhanced the correct

management of the cure for all the chronic conditions by all those involved in the complex healthcare process. The core of the healthcare process could be the patient, his family and his community (50), as in the case of the T2D patients. Italy, with 239,627 cases and 33,498 deaths (data of 22 June 2020) represents one of the countries greatly hit worldwide (51). The review of the organizational process post COVID-19 - especially for chronic conditions that were clearly the most hit and with the worst clinical outcome (50, 52) - will certainly represent one of the greatest challenges that the Country would face in the short-medium term to satisfy the cures for a growing multi-morbidity of an aging population, like the one in Italy. Professional investments like NCMLM - that put the patient, the family and the community in the middle of the assistance process - could be determinant for the improvement of health conditions of the entire Italian and European population. Specific studies concerning NCMLM could evaluate the potential of this professional figure and determine a specific organizing profile within the assistance process of the patient affected by T2D and/or other chronic infirmities. The managers of health services, especially local, could take into consideration the NCMLM healthcare professional as the main professional figure of the services offered to the patient affected by T2D and other conditions, primarily with an eye on prevention of complications. Also considering the recent National Prevention Plan 2020-2025 (52) - that puts in the middle of its interests an effective Healthcare system, capable of promoting multi-disciplinary, intersectional and coordinated interventions - the NCMLM could certainly represent the fundamental actor of a proximity assistance, where the patient could be the focus of every socio-sanitary intervention proposed with the intention of reducing the complications of risk factors and mortality.

Riassunto

Nurse Case Manager Lifestyle Medicine (NCMLM) in pazienti affetti da diabete di tipo 2 riguardanti la gestione della pandemia post COVID-19: revisione della letteratura di ambito integrato

Premessa. L'American Case Manager Association definisce il Case Management, basato sull'approccio Lifestyle Medicine, una pratica collaborativa tra tutti gli attori coinvolti nel processo di cura. L'obiettivo di questa revisione è valutare il ruolo dell'Infermiere Case Manager nei pazienti affetti da Diabete di Tipo 2, analizzando i dati quali / quantitativi relativi ai programmi dell'Infermiere Case Manager nell'ottica della Lifestyle Medicine.

Disegno dello studio e Metodi. Tre operatori indipendenti sono stati coinvolti in due fasi distinte, applicando il metodo Prisma, le specifiche PICOS e le strategie di ricerca di PubMed e Cinahl. La prima parte ha intergrato una revisione sistematica Cochrane avente come oggetto gli infermieri specializzati nella gestione del diabete mellito mentre la seconda parte ha valutato gli interventi dell'Infermiere Case Manger basati sull'approccio Lifestyle Medicine.

Risultati. La prima parte del lavoro ha riguardato 13 studi e la seconda 6. Il controllo glicemico ha fatto registrare un miglioramento nei gruppi Infermiere Case Manager gestiti con l'approccio Lifestyle Medicine. Buoni risultati sono stati apprezzati negli esiti secondari: profilo lipidico, indice di massa corporea, qualità della vita e gestione dello stress. I risultati per la gestione della cura di sé e l'adesione ai programmi Lifestyle Medicine sono incoraggianti.

Conclusioni. È emerso, in modo inequivocabile, che prendersi cura e sostenere il soggetto diabetico porti a significativi benefici per la salute generale riducendo possibili complicanze. Dopo la pandemia Covid-19, la Nurse Case Manager Lifestyle Medicine potrebbe rappresentare una valida alternativa di gestione sanitaria per il miglioramento dell'assistenza nei pazienti con Diabete di Tipo 2.

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Attachment 1: "Nurse Case Manager Lifestyle Medicine (NCMLM) in the Type Two Diabetes patient concerning post COVID-19 Pandemic management: an Integrated-Scoping literature review"

Research Strategy first part:

- PICOS

P: two type diabetes patients
I: Nurse Case Management Interventions
C: Nurse Case Management Interventions vs. no Interventions or no Nurse Case Management Interventions
O: qualitative or quantitative outcomes
S: primary studies

PUBMED

Mesh Terms Type 2 Diabetes:
"Diabetes Mellitus, Type 2"
"Diabetes Mellitus"
"Diabetes Complications"
Free terms Diabetes:
"Diabetes"
"DM"
"DM2"
"DT2"
Mesh Terms Case Manager:
"Case Management"
"Case Managers"
Mesh Terms Nursing:
"Nursing"
"Advanced Practice Nursing"
"Evidence-Based Nursing"
"Specialties, Nursing"
"Public Health Nursing"
"Nursing Assistants"
"Nursing Care"
"Nursing Assessment"
"Nursing Process"
"Nurses"
"Education, Nursing"
Free Terms Nursing:
"Nurs*"

PubMed Strategy:

((((((("Diabetes Mellitus, Type 2"[Mesh]) OR ("Diabetes Mellitus"[Mesh] OR "Diabetes Complications"[Mesh]))) OR ((((("Diabetes"[Title/Abstract]) OR "DM"[Title/Abstract]) OR "DM2"[Title/Abstract]) OR "DT2"[Title/Abstract]))) AND (((((((("Nursing"[Mesh] OR "Advanced Practice Nursing"[Mesh] OR "Evidence-Based Nursing"[Mesh]) OR "Specialties, Nursing"[Mesh]) OR "Public Health Nursing"[Mesh]) OR ("Nursing Assistants"[Mesh] OR "Nursing Care"[Mesh] OR "Nursing Assessment"[Mesh] OR "Nursing Process"[Mesh])) OR ("Nurses"[Mesh] OR "Education, Nursing"[Mesh]))) OR "Nurs*"[Title/Abstract])) AND (("Case Managers"[Mesh]) OR "Case Management"[Mesh]) **102** Records

CINAHL

Cinahl Strategy:

1. TI Nursing OR TI Nurses OR TI Nursing Process OR TI Nursing Assessment OR TI Nursing Care OR TI Nursing Assistants OR TI Public Health Nursing OR TI Specialties Nursing OR TI Evidence-Based Nursing OR TI Advanced Practice Nursing
2. TX Case managers OR TX Case management
3. TI Diabetes Mellitus OR TI Diabetes Complications OR TI Diabetes OR TI DM OR TI DM2 OR TI DT2 OR TI Diabetes Mellitus Type 2

1 AND 2 AND 3 **30** Records
Total Records First Part **132 Records**

Research Strategy Second Part:

- PICOS

P: two type diabetes patients
I: Nurse Lifestyle Medicine Intervention
C: Nurse Lifestyle Medicine intervetion vs. no interventions or no Nurse Lifestyle Medicine intervention
O: Qualitative or Quantitative outcomes

S: Clinical Trials

PUBMED

Mesh Terms Type 2 Diabetes:
"Diabetes Mellitus, Type 2"
"Diabetes Mellitus"
"Diabetes Complications"
Free terms Diabetes:
"Diabetes"
"DM"
"DM2"
"DT2"
Mesh Terms Nursing:
"Nursing"
"Advanced Practice Nursing"
"Evidence-Based Nursing"
"Nurses"
Free Terms Nursing:
"Nurs*"
Mesh Terms Lifestyle Medicine:
"Healthy Lifestyle"
"Health Behavior"
"Life Style"
"Sedentary Behavior"
"Risk Reduction Behavior"
"Health Risk Behaviors"
"Health Promotion"
"Healthy People Programs"
Free terms Lifestyle Medicine:
"Lifestyle Medicine"
"Life Style"
"LSM"

PubMed Strategy:

((((((((("Health Behavior"[Mesh] OR "Healthy Lifestyle"[Mesh]) OR "Life Style"[Mesh]) OR "Sedentary Behavior"[Mesh]) OR ("Risk Reduction Behavior"[Mesh] OR "Health Risk Behaviors"[Mesh])) OR ("Health Promotion"[Mesh] OR "Healthy People Programs"[Mesh]))) OR (("LSM"[Title/Abstract]) OR "Life Style"[Title/Abstract]) OR "Lifestyle Medicine"[Title/Abstract]))) AND ((((("Nursing"[Mesh] OR "Evidence-Based Nursing"[Mesh] OR "Advanced Practice Nursing"[Mesh]) OR "Nurses"[Mesh])) OR "Nurs*"[Title/Abstract])) AND ((((((("Diabetes"[Title/Abstract]) OR "DM"[Title/Abstract]) OR "DM2"[Title/Abstract]) OR "DT2"[Title/Abstract])) OR ("Diabetes Mellitus"[Mesh] OR "Diabetes Complications"[Mesh] OR "Diabetes Mellitus, Type 2"[Mesh])) Filters: Clinical Trial **285 Records**

CINAHL

Cinahl strategy:

1. TI Nursing OR TI Nurses OR TI Nursing Process OR TI Nursing Assessment OR TI Nursing Care OR TI Nursing Assistants OR TI Public Health Nursing OR TI Specialties Nursing OR TI Evidence-Based Nursing OR TI Advanced Practice Nursing
3. TI Diabetes Mellitus OR TI Diabetes Complications OR TI Diabetes OR TI DM OR TI DM2 OR TI DT2 OR TI Diabetes Mellitus Type 2
3. TX Healthy Lifestyle OR TX Health Behavior OR TX Life Style OR TX Health Promotion OR TX Healthy People Programs OR TX Lifestyle Medicine OR TX LSM OR TX Sedentary Behavior OR TX Risk Reduction Behavior OR TX Health Risk Behaviors
4. #1 AND #2 AND #3 **39** Records

Total Records Second Part **324 Records**

Attachment 2: Scoping Reviews (PRISMA-ScR) Checklist

1.	Identify the report as a scoping review	**check**
2.	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, source of evidence, charting methods, results, and conclusions that relate to the review questions and objectives	**check**
3.	Describe the rationale for the review in the context of what is already known. Explain why the review questions/ objectives lend themselves to a scoping review approach	**check**
4.	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives	**check**
5.	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number	**protocol check but not registered**
6.	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language and publication status), and provide a rationale	**check**
7.	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed	**check**
8.	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated	**check**
9.	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review	**check**
10.	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators	**check**
11.	List and define all variables for which data were sought and any assumptions and simplifications made	**check**
12.	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate)	**check**
13.	Describe the methods of handling and summarizing the data that were charted	**check**
14.	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram	**check**
15.	For each source of evidence, present characteristics for which data were charted and provide the citations	**check**
16.	If done, present data on critical appraisal of included sources of evidence	**check**
17.	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives	**check**
18.	Summarize and/or present the charting results as they relate to the review questions and objectives	**check**
19.	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups	**check**
20.	Discuss the limitations of the scoping review process	**check**
21.	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps	**check**
22.	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review	**check**