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Care Coordination of Older Adults with Diabetes: A Scoping Review

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Key Messages

- Care coordination has been implemented in diverse ways, and most commonly focuses on communication and monitoring within and between healthcare teams.
- Outcome measures of care coordination emphasize biometric patient-level outcomes as opposed to overall quality of care, or integrated health and social care.
- Future research should explore patient and provider preferences and emphasize comprehensive needs assessment in traditional and virtual delivery systems.

Keywords

diabetes mellitus; older adults; care coordination; virtual care; integrated care; complex needs

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Table and Figure Counts

Table: 1, Figures: 2

Author disclosures

Conflicts of interest: none

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1   **Care Coordination of Older Adults with Diabetes: A Scoping Review**

2   **Abstract**

3   **Introduction:** Care coordination is a common intervention to support older adults with diabetes and their

4   caregivers, and provides individualized, integrated health and social care. However, the optimal approach

5   of care coordination is not well described. This scoping review synthesized evidence regarding the

6   implementation of traditional and virtual care coordination for older adults with diabetes to inform future

7   research and best practices.

8

9   **Methods:** The Joanna Briggs Institute scoping review methods were used. A systematic search was

10   conducted in CINAHL, Embase, EmCare, and Medline, as well as a targeted grey literature search, and a

11   hand-search of reference lists. Screening and data extraction were completed by three independent

12   reviewers.

13

14   **Results:** 42 articles were included in the synthesis. Included studies operationalized care coordination in

15   different ways. The most commonly implemented elements of care coordination were regular

16   communication and monitoring. In contrast, coordination between health-care teams and the community,

17   individualized planning, and caregiver involvement was less often reported. Outcomes to evaluate the

18   impact of care coordination were predominantly diabetes-centric, and less often person-centred.

19   Additionally, evidence indicates that older adults value a trusting and relationship with their care

20   coordinator.

21

22   **Conclusion:** Studies assessing care coordination for older adults with diabetes have shown positive

23   outcomes. Future intervention research for this population should focus on evaluating the impact of

24   comprehensive care planning, system navigation across the health and social care sectors, the care

25   coordinator and patient relationship, and caregiver support in order to inform best practices.

26 **Key Messages**

27 • Care coordination has been implemented in diverse ways, and most commonly focuses on

28 communication and monitoring within and between healthcare teams.

29 • Outcome measures of care coordination emphasize biometric patient-level outcomes as opposed

30 to overall quality of care, or integrated health and social care.

31 • Future research should explore patient and provider preferences and emphasize comprehensive

32 needs assessment in traditional and virtual delivery systems.

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46 **Introduction**

47   Diabetes is a highly prevalent chronic condition in older adults, affecting over 25 per cent of

48 persons over age 65 [1]. The majority of older adults with diabetes are living with other chronic

49 conditions [2]. Older adults with diabetes may also have geriatric syndromes, multifactorial conditions

50 such as urinary incontinence and cognitive impairment [3]. Furthermore, they may depend on the support

51 of family or friend caregivers who facilitate diabetes-related self-care activities [4]. Thus, older adults

52 living with diabetes require a different approach to their care than younger adults [5]. Care should be

53 individualized to the older adult's functional status, co-existing chronic conditions, and life expectancy

54 and patient-centred care planning needs to follow a comprehensive geriatric assessment [6].

55   Care coordination has been used as an intervention to support older adults with complex chronic

56 conditions as they receive care from both the health-care system (e.g., primary care, home care, medical

57 specialists) and social-care programs (e.g., transportation, meal delivery, social programs) but these

58 sectors are not well integrated [7-13]. A coordinated, interprofessional community-based approach is

59 considered ideal to ensure the physical, mental, and social care needs of older adults with diabetes are met

60 [5, 14, 15]. Care coordination provides "individualized, wrap-around planning and supports" to achieve

61 the goals of older adults and their caregivers by coordinating care within primary care teams, across care

62 teams (e.g., primary care and specialist care providers), and between primary care teams and community

63 services (e.g., adult day program) [7 p.2, 8]. The essential elements of care coordination include: (a)

64 comprehensive needs assessment of a person's need, including medical history and examination and

65 functional and social assessment; (b) individualized care planning jointly with the older adult, caregiver,

66 and the care team, (c) facilitation of access to needed medical care and community-based services; and (d)

67 regular communication and monitoring [9].

68   The optimal approach to care coordination for older adults with diabetes, who would most

69 benefit, and what outcomes should be measured (and are important to older adults), are all poorly

70 understood [16-18]. Furthermore, in the current context of pandemic recovery and an accelerated

71   implementation of virtual care in Canada and internationally, it is important to determine how care

72   coordination for this population could be optimized through virtual platforms [19-23]. To our knowledge,

73   no systematic or scoping reviews have been done to inform best practice guidance for care coordination

74   of older adults with diabetes. Thus, the purpose of this scoping review is to understand the breadth of the

75   literature on how care coordination is implemented in older adults with diabetes to inform practice and

76   future areas of research on in-person and virtual care coordination.

77   **Review Questions**

78   In the literature regarding care coordination for community-dwelling older adults with diabetes and their

79   family caregivers:

80   1. How is implementation of care coordination reported in literature?

81   2. How is care coordination commonly evaluated?

82   **Inclusion Criteria**

83   To be included, studies had to report on care coordination (or case management) activities for

84   community-dwelling older adults with diabetes and their family caregivers. The population included

85   community-dwelling older adults with a mean age ≥65 years, with type 1 or type 2 diabetes, with or

86   without multiple chronic conditions. Quantitative studies, qualitative studies, mixed-methods

87   studies, literature reviews, protocol papers, and grey literature were included [24, 25]. However, grey data

88   (i.e., tweets, blogs, podcasts) were excluded [24]. Care coordination that occurred exclusively within in-

89   patient or long-term care settings were excluded. Conference abstracts, theses, dissertations, and letters to

90   the editor were also excluded.

91

92   **Methods**

93   The study was conducted using established scoping review methods outlined by the Joanna

94   Briggs Institute Manual for Evidence Synthesis Chapter 11 [26]. The objectives, inclusion criteria, and

95   methods for this scoping review were specified in advance and registered as a protocol on Open Science

96   Framework (OSF) on July 13, 2021 [27].

97   **1. Search Strategy**

98   A database search strategy was developed in consultation with a health sciences librarian (refer to

99   Supplementary Table 1). Key words and database terms were created for the concepts of care

100   coordination, older adults, and diabetes. A database search was performed across Medline, EmCare,

101   CINAHL, and Embase. Additional articles were located through hand-searching of reference lists. A

102   targeted grey literature search was undertaken of relevant professional practices websites such as, the

103   International Diabetes Federation (refer to Supplementary Table 2) [28]. Only articles in English or

104   translated to English were included. All published and grey literature were restricted to a publication date

105   from the year 2000 to 2021 to reflect the re-conceptualization of care coordination as broader than

106   coordination of medical care related to the emergence of the concept of integrated health and social

107   care in the research literature [29]. Authors were contacted by email for additional information when

108   required.

109   **2. Sources of evidence screening and selection**

110   Source selection at both title and abstract and full-text screening stage was done independently by

111   at least two reviewers using Covidence software (MN, AS, CA). All disagreements throughout title,

112   abstract, and full-text screening were resolved through a consensus-based discussion between reviewers

113   (MN, AS, CA).

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116   **3. Data extraction**

117   The following variables were independently extracted by three authors (MN, AS, CA): author,

118   year, country, objectives, population, study design, care coordination intervention, care coordination

119   provider, context, reported outcomes, key findings, study limitations, and source of funding. To minimize

120   bias during the data extraction process, two independent authors completed a pilot extraction of four

121   articles (AS, CA) and the extractions were reviewed for quality and consistency by the first author.

122   **4. Data Analysis**

123   Based on the results of the scoping review, the following components were used to narratively

124   present the findings: (a) population identification, (b) care coordination type, (c) comprehensive needs

125   assessment, (d) individualized care planning, and (e) regular communication and monitoring. Outcomes

126   of care coordination were analyzed by frequency and presented in a stacked bar graph. To identify the

127   preferences, barriers, facilitators, and outcomes associated with care coordination, common themes across

128   the qualitative results of the mixed methods and qualitative articles were identified and narratively

129   summarized.

130   **Results**

131   A total of 7,353 articles were identified through the database search, and after duplicate deletion,

132   4,870 articles were screened by title and abstract. After excluding 4,517 articles, 353 full-text articles

133   were screened for eligibility and 37 articles were included. Five additional articles were identified through

134   hand-searching of reference lists, for a total of 42 included articles. No best practice guidelines or other

135   grey literature located met the inclusion criteria. Refer to Figure 1 for an overview of the selection

136   process.

137

138   **Article Characteristics**

139   Included studies were published between 2005 and 2020 and conducted primarily in the in USA

140   (n=32), and in Canada (n=3), China (n=3), Spain (n=1), Sweden (n=1), Italy (n=1), and Australia (n=1).

141   The methodologies used were quantitative (n = 32), qualitative (n = 6), mixed methods (n = 3), or reviews

142   (n = 1). Refer to Table 1 for a summary of the included studies. Of the studies evaluating care

143   coordination interventions (n=32), most (n=23) were evaluating newly designed interventions [30-52],

144   compared to other studies (n=9) exploring the impact of care coordination, which was part of usual care

145   in the settings where the research was conducted [53-61].

146   Care coordination was primarily provided to patients from Veteran Affairs Medical Centres

147   (n=13) [30, 33, 54-63] or as a virtual service delivered by providers outside of the settings of care (n=11)

148   [34, 44-48, 64-68]. Typical settings for care coordination delivery were community (n=8) [35-37, 39, 43,

149   49, 51, 69], primary care (n=5) [31, 32, 40, 52, 70], specialized outpatient clinics (n=3) [41, 42, 53] or

150   from hospital to home (n=2) [38, 71]. The most commonly reported care coordination practitioners were:

151   registered nurses (RNs) (n=18) [33-37, 39, 44-52, 65, 66, 71] or RNs working with nurse practitioners or

152   licensed practical nurses (n=10) [30, 32, 42, 54, 57-60, 63, 68]. In some studies, diabetes educators, non-

153   health care professionals, or clinic staff were the principal care coordinators (n=3) [41, 56, 62]. Two

154   studies employed pharmacists as care coordinators [40, 43].

155   **Implementation of Care Coordination Activities**

156   *Population Identification*

157   The majority (n=35) of studies identified a specific population of persons with diabetes as the

158   intervention target, while the remaining (n=4) studies recruited adults of all ages with diabetes. The

159   following populations were targeted: older adult veterans with diabetes (n=13) [31, 33, 50, 54-63], older

160   adults with diabetes and at least one other chronic condition (n=11) [35-39, 42, 49, 64, 65, 69, 71],

161   Medicare patients in the USA with diabetes with or without other chronic conditions (n=9) [40, 44-48, 53,

162   68, 72], and older adults with poorly controlled diabetes as determined by hemoglobin A1C (A1C) >8-9%

163   (n=2) [30, 41]. The remaining studies included older adults (n=3) [32, 66, 67] and adults of all ages (n=4)

164   [43, 51, 52, 70].

165   *Care Coordination Type*

166   The most common types of care coordination occurred within health-care teams only (n=16) [30,

167   33, 34, 40, 43-48, 50, 54, 57, 58, 66, 67] and care coordination within and across care teams (n=12) [32,

168   37, 42, 51-54, 59-61, 68, 69]. Only nine studies engaged in all three types of care coordination,

169   coordinating within care teams, across care teams, and between care teams and community resources [31,

170   35, 36, 38, 39, 41, 49, 56, 62]. One study coordinated care across care teams and the community [65].

171   *Comprehensive Needs Assessment*

172   Twenty-two studies conducted some form of a needs assessment [30-39, 41, 42, 44-47, 50, 52,

173   53, 58, 65, 66]. Care coordinators conducted baseline medical assessments, reviewed patients' medical

174   and family health history, and engaged in consultative case conferences with registered dietitians or

175   endocrinologists, for example, to determine needs. Coordinators also evaluated other patient needs to

176   connect individuals to community resources, such as transportation or social services. However,

177   assessments of caregiver and social supports was not commonly evident.

178   *Individualized Care Planning*

179   Fourteen studies developed or reviewed individualized care plans as part of care coordination

180   [31, 33, 35-39, 42, 47-49, 52, 65, 68]. Care planning included lifestyle modification plans for weight loss,

181   dietary changes, and physical activity, hospital discharge plans, individualized medication plans, and the

182   establishment of health-oriented goals. Only four studies collaborated with family caregivers on care

183   planning [35, 36, 39].

184

185   *Regular Communication and Monitoring*

186   Regular communication (n=28) was commonly implemented in care coordination. The most

187   common type of communication was between care coordinators and patients. Three studies included in-

188   home visits by care coordinators [35, 36, 39]. However, most communication was done virtually (n=23)

189   including: (1) weekly, bi-weekly, or monthly telephone calls between the coordinator and patient [33, 50-

190   52, 54, 55, 65]; (2) daily messaging regarding health status via an in-home messaging device [31, 50, 54,

191   55, 57-61]; and (3) two-way video conferencing with patients [34, 44-48, 54, 55, 57-59, 66]. Other

192   communications involved consultation and information sharing between care coordinators and primary

193   care physicians [32-34, 37, 42, 43, 47, 48, 51, 52].

194   Regular monitoring of patients was also commonly implemented (n=24) including: monitoring

195   and responding to lab results [30, 31, 33, 34, 37, 44-48, 50-52, 54, 55, 57-61], medication management

196   [30, 33, 34, 49, 50, 54, 59-61, 68], ordering laboratory tests [52] conducting physical examinations [43],

197   and daily virtual monitoring of blood pressure and blood glucose [30, 31, 33, 34, 44-48, 50, 66].

198   *Virtual Care*

199   A variety of technologies were used to deliver care coordination virtually from communication

200   over the telephone [64], remote-monitoring devices [34, 44-48, 66], to videoconferencing [47, 48, 66].

201   The remote monitoring device was a web-enabled computer with four functions: videoconferencing,

202   uploading of data from glucose and blood pressure monitoring devices, patient-facing clinical data, and

203   providing educational websites [34]. The provision of virtual care was comprehensive, similar to in-

204   person delivery, and included developing and reviewing care plans, sharing monitoring outputs with

205   primary care and specialist providers, advising patients of medication changes and upcoming

206   appointments, and providing patient education and coaching [34, 44-48, 50, 65, 66].

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208

209 **Outcomes Assessed**

210   Across the 35 quantitative and mixed-method studies included, 56 unique outcomes were utilized

211 to evaluate care coordination. Patient outcomes (n=31) were the most commonly measured, the most

212 frequent being A1C (n=21) [30-33, 35, 40, 41, 43-45, 47-51, 54, 58, 63, 70, 73, 74], blood pressure

213 (n=12) [33, 37, 40, 41, 43-46, 48-50, 73], low density lipoprotein (n=11) [32, 33, 40, 41, 43-46, 48, 52,

214 70], health-related quality of life (n=5) [35, 36, 49, 51, 57], and self-efficacy or diabetes self-care

215 activities such as following complex insulin regimes or understanding the role of exercise (n =5) [35, 36,

216 39, 41, 48]. Outcomes related to providers, such as satisfaction with care coordination, were less

217 frequently collected in the literature (n=7) [32, 34, 53, 54, 56, 62, 63]. Some of the included literature

218 examined system related outcomes: all-cause hospital admissions (n=10) [31, 37, 38, 40, 49, 51, 54, 57,

219 58, 60], emergency department visits (n=6) [32, 37, 42, 49, 57, 58], length of hospital stay (n=6) [31, 37,

220 38, 42, 57, 61], health-service use costs (n=5) [32, 35, 39, 55], and specialty care use (n=4) [40, 57, 58,

221 63]. An average of 5.3 different outcomes were used in each study. Figure 2 displays the frequency and

222 type of outcomes used in each study.

223 **Preferences, Facilitators, and Barriers of Care Coordination**

224   Some of the included studies (6 quantitative and 3 mixed-method studies) reported preferences,

225 facilitators, and barriers related to care coordination.

226   *Preferences:* Overall, patients desired an individualized, caring, and supportive relationship with

227 their care coordinator [35, 65, 66, 69]. Accordingly, some patients felt that only one person should serve

228 as the principal care coordinator. Furthermore, continuity of provider relationship was more important

229 than convenience; patients would remain with a provider even if the location was inconvenient or wait

230 longer for available appointments with their preferred provider [69, 71]. Patients and caregivers also

231 valued efficient information sharing between their health-care providers and easy access to providers,

232 including prompt appointments when needed, and the options of email or telephone contact [37, 69, 71].

233   Primary care providers also expressed a preference for delegating responsibility to care coordinators they

234   knew, had worked with, and trusted [64, 68].

235   *Facilitators:* Older adults found the provision of education as a helpful component of care

236   coordination. Patients reported greater empowerment associated with education on disease-related topics,

237   or even just more detailed explanations during medical consultations [71]. Patients were motivated to

238   engage in and adhere to the intervention if they received encouragement and emotional support from their

239   care coordinator [66, 71]. Participants with greater perceived self-efficacy or self-control believed a care

240   coordination program would benefit them [65, 66].

241   *Barriers:* Multimorbidity was perceived by patients as a hindrance to recommended self-

242   management strategies and providers also highlighted challenges in providing individualized care to meet

243   all the needs of patients with complex chronic diseases [64, 68, 71]. Additionally, patients highlighted

244   financial barriers to suggested diabetes management (e.g., cost of medications, transportation) and lack of

245   ability to easily access primary and specialist care as advised [65, 71]. Some providers felt that mental-

246   health support was beyond the scope of care coordination [64, 68]. Other barriers identified by providers

247   included logistical challenges such as communication between staff, high workload, and lack of time for

248   care planning [37, 56, 64].

249   **Discussion**

250   To inform an understanding of care coordination approaches, this scoping review synthesized

251   literature from the past two decades regarding what is known about the elements, outcome measures,

252   preferences, facilitators, and barriers of care coordination for older adults with diabetes. Regular

253   communication and monitoring were the most frequently described activities in the review. Individualized

254   care planning and consideration of caregivers was not as frequently reported. To assess the impact of care

255   coordination, the outcomes of A1C (n=21), all-cause hospital admissions or emergency department visits

256   (n=16), and blood pressure (n=12) were most often used. Qualitative findings revealed that older adults

257   desired individualized, caring, and supportive relationships with their care coordinator, but some

258   providers cited time as a barrier to individualizing care.

259   This review found that there is great heterogeneity in the way care coordination is enacted for

260   older adults with diabetes. This aligns with previous findings that care coordination can be

261   operationalized in many ways [10], and there is no consistent definition or framework for care

262   coordination used in practice or research [75]. The included evidence also indicates that the role of a care

263   coordinator in facilitating intersectional collaboration between health and community systems was not

264   well investigated in this population. Relatedly, health system outcomes used to evaluate care coordination

265   interventions in this review focused on the impact on acute care and did not measure system indicators of

266   integration, such as home and community care support use, quality of care performance measures, or

267   intersectoral communication and information sharing [76]. This is problematic as older adults with

268   complex chronic conditions would benefit from care coordination activities to make connections to

269   community programs, such as exercise groups, social clubs, food banks, or caregiver support [5, 14, 15,

270   18].

271   Reported care coordination interventions were primarily directed to older adults with multiple

272   chronic conditions or older veterans in Veteran Affairs (VA) settings. These populations are optimal

273   targets for care coordination due to the multidimensional care needs they may be experiencing. Veterans

274   Health Administration in the US operates the largest national integrated health-care system and have

275   continuous quality improvement as part of their mandate, which may explain the amount of research with

276   this population [77]. As well, veterans are known to have a greater prevalence of diabetes, and an

277   increased risk for complications such as stroke, heart attack, amputation, kidney failure, and blindness

278   [78]. Veterans experience challenges receiving care from multiple primary care physicians, nurses, and

279   specialists [78]. Thus, care coordinators can support older veterans with diabetes to achieve integration

280   and successful navigation through both VA and non-VA healthcare services [79].

281

282   Across the reviewed literature, comprehensive geriatric assessment including individualized care

283   planning and a determination of caregivers' needs and abilities was not routinely reported, with a few

284   exceptions [35-37, 39]. Consequently, what is known about care planning in this population is

285   predominantly diabetes-centric [18]. However, best practice guidelines recommend that comprehensive

286   assessment and related care planning be conducted with older adults with diabetes, in particular, those

287   living with frailty and type 1 diabetes [1, 5, 18]. This practice is become increasingly important as older

288   adults are living longer with type 1 diabetes [17]. Knowledge gaps remain around understanding the

289   impact of care coordination on issues such as function, falls, or well-being, and how more holistic

290   assessment and care planning could be enacted in a model of care coordination for older adults with

291   diabetes [17].

292   Less research evidence (nine studies) was available regarding the preferences, barriers, and

293   facilitators of care coordination for older adults, as reported by patients, providers, and caregivers. An

294   important review finding was that a caring and trusting relationship between the patient and the care

295   coordinator is of primary importance to older adults, rather than merely access to a care coordinator [69,

296   71]. The value of a person-centred approach where providers get to know the person behind their chronic

297   conditions is a common theme in qualitative research on older adults' experiences [4, 80, 81]. These

298   issues of trust and continuity in the care coordination relationship warrant more exploration, particularly

299   in the context of virtual delivery. For example, in some of the included research, care coordination was

300   provided by an external service, outside of the traditional circle of care and as such, there may not be the

301   opportunity for continuity or relationship building.

302   From the provider perspective, some evidence suggested that providing or coordinating support

303   for mental health concerns was considered outside of the scope of care coordination activities. Providers

304   also noted time as a barrier to meet the needs of older adults. Similar findings have been noted by primary

305   care providers supporting older adults with multiple chronic conditions [4, 81-83]. Given the complex

306   needs of older adults with diabetes, care coordinators would need to be knowledgeable of community

307   resources to address diverse needs and have time afforded in their practice to make these connections for

308   their patients and monitor the impact.

309   Virtual care has been used in models of care coordination for diabetes care in the USA for many

310   years. During the pandemic, virtual care and facilitating policies have expanded globally, including in

311   primary and specialist care settings [19, 21, 23]. The reviewed literature highlights the potential to deliver

312   care coordination elements (comprehensive assessment, individualized planning, clinical monitoring, and

313   provision of education and coaching) virtually or to supplement face-to-face care coordination over the

314   phone or with virtual platforms. Patients and providers did describe some challenges with virtual care,

315   such as computer or equipment problems or some patients' preference to connect in-person [65].

316   **Implications and Future Directions**

317   This scoping review has generated a number of areas for future research on in-person and virtual

318   care coordination. Future research or quality improvement projects are needed to identify which groups

319   might realize the biggest impact from the support of a care coordinator. Cited authors have recommended

320   targeting older adults with limited friend or family support, lower income, depression or other mental

321   health conditions [36, 47, 65, 70]. These identification strategies could include technologies, such as

322   artificial intelligence, to identify older adults through electronic health records or other administrative

323   data bases. For example, in Ontario, Canada primary care electronic health records are being used to

324   identify persons with diabetes overdue for retinopathy screening [84]. Standardized comprehensive

325   assessment instruments (i.e., interRAI Contact Assessment, Home Care Assessment, and Self Report

326   Check-Up) are used across Canada to systematically identify those in most urgent need of home care

327   services, and could also be used to locate older adults in diabetes care programs who may need more

328   intensive support [85, 86]. An identification process would be facilitated by establishing one electronic

329   health record for each patient, rather than multiple records by care setting.

330   A fulsome model of care coordination must be described and implemented, building on the work

331   of comprehensive models of care delivery identified in this review [31, 35, 36, 38, 39, 49, 56, 62]. Care

332   coordination for older adults with diabetes would benefit from a more holistic evaluation that includes

333   older adult and caregiver experiences, quality of life, physical and cognitive function, integration of

334   health and social services, and care transitions in addition to biomedical markers of improvement in

335   diabetes [13, 17]. Social determinants of health, such as socioeconomic status, ethnicity and social

336   supports, impact persons with diabetes, yet there is a lack of research addressing the social determinants

337   as part of care coordination [87]. Ameliorating health inequities is central to the purpose of care

338   coordination, leveraging both health- and social-care sectors to meet the physical, mental, and social care

339   needs of both older adults and their caregivers [9]. Further research is also required to evaluate the impact

340   of care coordination interventions on caregivers, who face significant challenges in supporting older

341   adults with diabetes [4].

342   **Limitations**

343   There are several limitations to this scoping review. While we adhered to the JBI methodology

344   for scoping reviews, by only including studies written in English, we could be missing other international

345   work. Further, "care coordination" may not be the term used in different contexts and countries. While we

346   used a variety of search terms beyond care coordination including "multidisciplinary care team," and

347   "case management," it is possible we did not locate all documents from additional countries.

348   Additionally, the care coordination activities implemented in the included research may have included

349   elements (such as a comprehensive assessment) that were not explicitly described in the publication, and

350   thereby not summarized in this review. Some of the reviewed studies included adults of all ages, although

351   the mean age of participants was ≥ 65 years of age, and as such the care coordination elements might not

352   have been designed with an older population in mind. In circumscribing our search, we excluded

353   conference abstracts, theses, and dissertations, which may have been a source of information not yet

354   published.

355   **Conclusion**

356   Care coordination for older adults with diabetes is operationalized in a multitude of ways,

357   including through in-person and virtual means. Despite this heterogeneity, interventions included regular

358   communication and monitoring within and across healthcare teams. However, the findings of this study

359   highlighted that interventions focus on managing diabetes, rather than aiming to enhancing quality of care

360   overall. Additionally, there is a lack of patient and provider perspectives on the preferences, barriers, and

361   facilitators of care coordination. Future research should emphasize the care coordinator and patient

362   relationship and increase efforts to provide individualized and integrated health and social-service care.

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364   **Acknowledgments**

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Identification

Records identified through database searching
(n = 7353)
- Medline: n = 1005
- Embase: n = 4209
- Emcare: n = 1885
- CINAHL: n = 254
- Google Custom Canadian Government Documents database: n = 0

Additional records identified through other sources
(n = 5)
Reference lists: n = 5
CADTH grey literature search: n = 0

Screening

Records after duplicates removed
(n = 4870)

Records screened
(n = 4870)

Records excluded
(n = 4517)

Eligibility

Full-text articles assessed for eligibility
(n = 353)

Full-text articles excluded, with reasons
(n = 311)
- Availability: n = 23
- Language: n = 6
- Setting: n = 2
- Intervention: n = 48
- Patient population: n = 215
- Study design: n = 16
- Duplicate: n = 1

Included

Studies included
(n = 42)
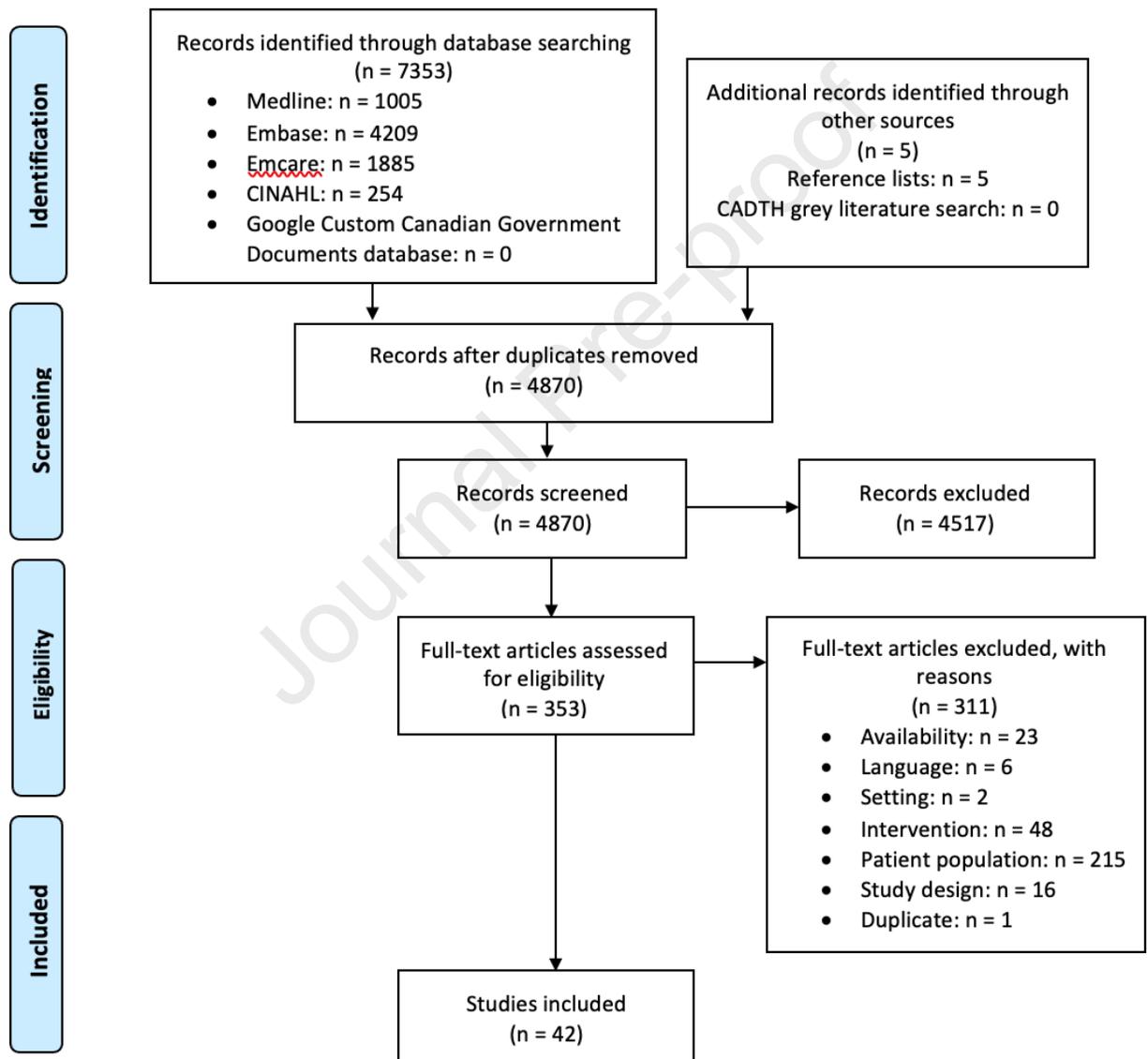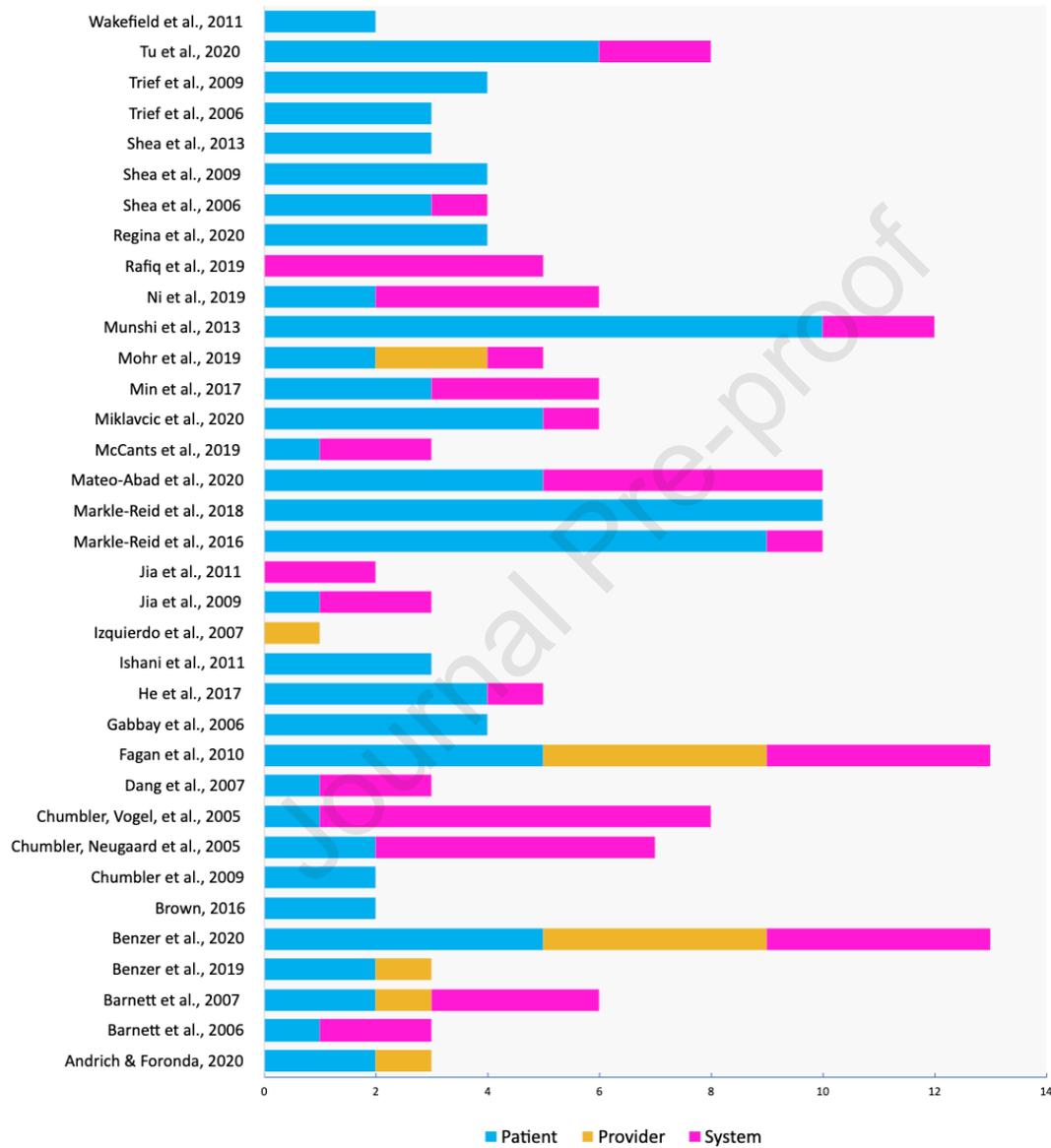
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382 **Figure 1**: A flow chart detailing the study selection process adapted from Page et al., 2021 [88].

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Figure 2: The frequency of outcomes assessed in studies of care coordination interventions across 35

mixed-method and quantitative studies.

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Table 1

Data Extraction Table for the Included Studies (n=42).

Author, Year, Country	Aim	Methodology	Population Characteristics	Care Coordination	Reported Outcomes
Andrich & Foronda, 2020, USA	To improve glycemic control and QoL of Medicare patients aged 65 and older with T2DM.	Practice improvement project CP	Medicare outpatients of endocrinology clinic (n=24), mean age 74 years, 62.5% male, A1C at or greater than 7% (mean 7.7% SD=8).	NPs provided one session of diabetes self-management education and support and goal setting, with 4 weeks follow-up, and care coordination (referrals to specialists, information sharing, psychosocial support, and behavioral encouragement provided weekly, or as needed).	Fasting blood glucose decreased from 146.2 (SD=18.7) to 136.0 (SD=17.1) mg/DL ($p < 0.05$). Overall diabetes-specific quality of life improved significantly ($p < 0.05$).
Barnett et al., 2006, USA	To assess health care use among Veterans with T2DM in care coordination-home telehealth program.	Retrospective concurrent matched cohort study CP	Veterans from VA Medical Centres at high risk for hospitalization or ED visits (n=391 treatment, n= 391 control), mean age 68.1 years (treatment).	Nurse care coordinators (RN or NP) monitored telehealth data, called patients, performed patient assessments, placed new medication orders, helped manage medications, scheduled appointments, and reminded patients of appointments.	Treatment group had statistically significant reduction in likelihood of all-cause (38.8% to 30.0%) and DM-related hospitalizations (35.3% to 26.9%).
Barnett et al., 2007, USA	To assess cost-utility of care coordination-home telehealth program.	Retrospective, pre-post cohort study CP	Veterans from VA Medical Centres at high risk for hospitalization or ED visits (n=470), mean age 68.2, 99% male.	RN or NP care coordinators monitored telehealth data, called patients, performed patient assessments, placed new medication orders, helped manage medications, scheduled appointments, and reminded patients of appointments.	The overall mean incremental cost-effectiveness ratio for the program at 1-year was $60,941; the program was cost-effective for one-third of participants.

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Author, Year, Country	Aim	Methodology	Population Characteristics	Care Coordination	Reported Outcomes
Bayliss et al., 2008, USA	To explore processes of care desired by elderly patients with multiple morbidities that may present competing demands for patients and providers.	Qualitative study	Community-dwelling older adults aged ≥ 65 years, and had (at minimum) diabetes, depression, and osteoarthritis, (n = 26), 46% between ages 65-74, 54% between ages 74-84, 50% male.	N/A	Participants' desired processes of care included: the need for convenient access to providers, providers with a caring attitude who listened and acknowledged their needs, clear communication of individualized care plans, support from a single coordinator of care who could help prioritize their competing demands, and continuity of relationships.
Bazzano et al., 2018, USA	To understand the perspectives of health-care providers and system administrators and identify challenges and facilitators to the successful implementation of non-face-to-face chronic care management programs.	Qualitative study	Care providers including physicians (n = 12), nurses (n=4), and staff, administrators, or billing specialists (n = 4).	N/A	Health system personnel view non-face-to-face care as potentially providing value for patients and addressing systemic needs yet challenging to implement in practice. Barriers include large time commitment, and patient needs extending beyond the program, while facilitators include the strategic use of resources in an already constrained environment.
Bazzano et al., 2019, USA	To investigate views on non-face-to-face care management held by elderly patients with diabetes and other chronic conditions.	Qualitative study	T2DM patients with at least one comorbid condition, in an in-home virtual setting, (n = 30), mean age 68.3 years, 33% male.	Registered nurse (and other clinic staff) care coordinators made regular phone calls between patients, developed and reviewed care management plans, and connected patients to resources when needed.	Patient engagement and enthusiasm influenced positively by perceived self-sufficiency and self-efficacy. Patients preferred support in changing behaviours surrounding diet and nutrition, as opposed to simply education. Finally, patients expressed the value of speaking with providers in-person (compared to non-face-to-face), and of having

Author, Year, Country	Aim	Methodology	Population Characteristics	Care Coordination	Reported Outcomes
					personal, caring relationships with PCPs.
Benzer et al., 2019, USA	To determine how cardiovascular and mental health comorbidities relate to patient-centered coordinated care in the Department of VA.	Observational study using patient surveys.	Veteran patients from 29 VA medical centres with T2DM and cardiovascular and mental health comorbidities (n = 5807), mean age 67.92 years, 90.8% male, 4.2% sex not reported.	Clinician and clinic staff coordinated care through organizational processes, procedures, and information exchange, as well as formal relationships between organizations such as contracts; formal relationships among parts of organizations such as services or clinics; and informal relationships among people.	Based on the patient perceptions of integrated care survey, mental health comorbidities were significantly associated with lower patient experiences of coordinated care. Higher severity comorbidities were associated with higher knowledge fragmentation, lower treatment-related communication, higher information flow to specialists, and better hospital transitions.
Benzer et al., 2020, USA	To determine VA patients' and clinicians' experiences of coordination across VA and non-VA settings.	Mixed methods CP	Veteran patients with T2DM and either cardiovascular or mental health comorbidity from 8 VA sites, or non-VA clinics, n = 5807, mean age 67.92, 90.8% men. *Same sample as Benzer et al., 2019.	The effectiveness of care coordination by clinicians and clinic staff across VA and non-VA settings depends on the degree to which VA prioritizes coordination is prioritized, how it structures its regional non-VA networks, what mechanisms it implements to facilitate coordination, what barriers to coordination it removes, and how VA measures the coordination components of quality of care.	Based on the patient perceptions of integrated care survey, veterans who received both VA and non-VA care reported significantly worse care coordination experiences (0.11-0.24 lower scores) than veterans only receiving care within the VA department. Clinicians identified challenges such as limited information exchange capabilities, and bureaucratic and opaque procedures which adversely impacted clinical decision-making.
Brown et al., 2016, USA	To describe the successful implementation of a new	Quasi-experimental design	Patients with high-risk diabetes from a virtual RN outreach clinic in the VA Department	Phase 1: RNs and NPs coordinated care, including establishing individualized A1C goals, providing education,	Phase 1: Time to achievement of A1C goals was significantly improved in intervention group (p<0.001) compared to historical

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	model of chronic disease management.	NI	(phase 1: n = 24 intervention, n = 28 historical controls; phase 2: n =155), mean age 66 years, 93.5% male, A1C > 9% (mean 9.646, SD 1.73).	coaching and support, adjusting medications, and reviewing of patients' self-monitored blood glucose data transmitted via home telephone devices daily. Phase 2: RNs received additional education to provide medication titration. NPs entered insulin adjustment orders.	controls. Phase 2: Mean baseline A1C was reduced from 9.6% to 7.7% in the intervention group.
Chumbler, Neugaard et al., 2005 USA	To report on the impact of a VHA program that implemented care coordination enhanced by CCHT in a large group of veterans with DM across four sites.	Retrospective, single-group study design CP	Veteran patients who were frail with diabetes in the VA department, that are at high risk for expensive care service visits, in an in-home virtual setting, (n = 445), mean age 68.4 years, 98.7% male.	Patients answered questions daily using an in-home messaging device containing disease management dialogues, and care coordinators reviewed responses daily to determine the risk for health care emergencies. The patient was treated holistically; in the case of comorbidities, care coordinators monitored difficult-to-manage conditions more intensely. Rarely, two-way audio-visual communication was used.	The intervention resulted in a statistically significant reduction in the proportion of patients who were hospitalized (50% reduction), reduction in emergency room use (11% reduction), reduction in average bed days of care (decreased an average of 3 days), and improvement in health-related quality of life in the domains of role-physical functioning, bodily pain, and social functioning.
Chumbler, Vogel, et al., 2005, USA	To examine the effectiveness of a VA patient-centered CCHT program as an adjunct to treatment for veterans with diabetes	Retrospective, concurrent matched cohort study design CP	Veterans with diabetes in the VA department at high risk for expensive, multiple care visits, in an in-home virtual setting, (n = 800 total, 400 treatments, 400 comparison group), mean age 68.2 years (treatment).	RN or NP care coordinators managed treatment, equipped veterans with self-management skills, and attempted to increase preventative service use. They also monitored patients' daily responses to a dialogue box that asked them health status questions, to determine whether it was necessary to call the patient	1-year post-enrollment, there was a significant difference between treatment and comparison groups in terms of need-based primary care visits, increasing in treatment group by 7.6% and decreasing in comparison group by 12% (p<0.01). In a subgroup analysis that was controlled for A1C, the treatment group had a lower likelihood of

Author, Year, Country	Aim	Methodology	Population Characteristics	Care Coordination	Reported Outcomes
				or facilitate a provider appointment.	hospitalizations than patients in the comparison group.
Chumbler et al., 2009, USA	To assess the effectiveness of the CCHT programme in reducing mortality.	Retrospectively matched intervention and control groups CP	Veterans with diabetes from the VA department, in an in-home virtual setting, (n = 387 treatment, n = 387 control), mean age 68 years (treatment), mean age 68 (control).	Patients answered questions daily about symptoms and health status using an in-home messaging device, and RN and NP care coordinators monitored answers daily. Based on this, coordinators placed telephone calls to the patient, made physician referrals, consulted physicians, placed orders for new medications, helped manage medications, and scheduled VA clinic appointments.	There were significantly more deaths in the control group (26%) compared to the intervention group (19%). There was longer survival for the intervention group compared to the control group (mean survival time 1348 vs 1278 days, p = 0.015). The telemonitoring program was associated with reduced 4-year all-cause mortality (hazard ratio = 0.7, p = 0.013).
Dang et al., 2007, USA	To evaluate telemedicine in diabetes management and education in older adults from different ethnic backgrounds.	Pilot study of a care program NI	Community-dwelling patients with DM, receiving primary care, aged 60 years or older, (n = 41), mean age 72 years.	NPs and licensed social workers coordinated care, which included assessment, planning, coordination, and follow-up of multiple health-care services for patients, and ensuring the services were received. They also monitored patient data received via an in-home messaging device daily, which included patients' responses to questions regarding blood sugar, and answers to educational questions.	Mean A1C was 7.6% before enrollment, and 7.3%. after 9 months (p = 0.09), with the greatest fall occurring in African Americans (0.65%, p = 0.05). Total hospital admissions decreased from 31 pre-enrolment to 25 post-enrolment (p = 0.0002). Bed days of care decreased from 368 to 149 (p = 0.0002).
Fagan et al., 2010, USA	To examine the effects of an intervention comprising (1) a practice-based care coordination program,	Quasi-experimental, longitudinal study	Older adults with diabetes in 9 primary care practices, (n = 20,943 total, n = 1587 intervention, n = 19,356	RNs, licensed practical nurses, and medical assistants coordinated care on-site, and served as a liaison between PCPs and call centre nurses.	Intervention sites had significantly greater improvements in A1C (p<0.0001) and LDL (p<0.01) compared to the control group. Measures for quality of care,

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	(2) augmented by pay for performance for meeting quality targets, and (3) complemented by a third-party disease management on quality of care and resource. use for older adults with diabetes.	NI	comparison), mean age 74.6 years (intervention), 42.2% male (intervention).	Coordinator duties included the following: alert physicians to quality improvement opportunities, request hospital or specialists' records, and review and convey information to call center nurses so that they could follow up with patients.	utilization, and cost were not significantly different between the two study groups.
Gabbay et al., 2006, USA	To measure the impact of a patient-oriented structured approach to care coordination and patient education and counseling on improvements in BP, glycemic control, lipids, complication screening, and DM-related distress.	RCT NI	Primary care patients with T2DM managed by insulin or hypoglycemic agents, (n = 332 total, n = 150 intervention, n = 182 control), mean age 65 years (intervention), 57% males (intervention), baseline A1C 7.4%.	The RN coordinated care including the following activities: behavioral goal setting, individualized care planning, providing self-management education and surveillance, making phone calls with patients, referrals to specialists, dietitians, or certified diabetes educators, ordering protocol-driven laboratory tests, tracking clinical outcomes, and making clinical recommendations.	After 1-year, BP significantly decreased from 137/77 to 129/72 in the intervention group, compared to an increase in BP in the control group from 136/77 to 138/79. problem areas in diabetes scores, assessing diabetes-related distress, significantly improved in the intervention group (23 to 10). Complication screening significantly improved in the intervention compared to control group. A1C and LDL did not significantly change.
He et al., 2017, China	To investigate the frequency of follow-up visits and contents of care for case management of patients with T2DM in Chongqing China, in terms of regional practice guideline; and analyze factors	Observation study using patient surveys	Primary care patients with T2DM of either a township near a hospital, or far from one (n = 496), 76.4% above 60 years, 40.32% male.	N/A	Over 1-year, 65% of participants had 4 or more follow-up visits. The proportion of patients having recommended tests was 8%, 54%, 45%, and 44% for A1C, blood lipid test, screening for nephropathy, and eyes, respectively.

Author, Year, Country	Aim	Methodology	Population Characteristics	Care Coordination	Reported Outcomes
	associated with the use of care.				
Ishani et al., 2011, USA	To determine whether nurse case management with a therapeutic algorithm could effectively improve rates of control for hypertension, hyperglycemia, and hyperlipidemia compared with usual care among veterans with diabetes.	RCT NI	Diabetic patients in primary care through the VA medical centre or affiliated out-patient clinics, in-home virtual intervention setting, (n = 278 intervention, n = 278 usual care), mean age 64.9 years (intervention), 99.6% male (intervention), average A1C 8% (intervention).	Nurse case managers established lifestyle modification goals and personal action plans with patients, adjusted patient medications, made telephone calls, reviewed patients' in-home BP measures, reviewed patient progress for blood glucose, lifestyle, and BP goals, monitored adverse events associated with therapy, and notified PCPs of medication changes.	A greater number of individuals in the intervention group achieved control over all three outcomes of A1C, LDL, and BP compared to the usual care group (21.9% vs 10.1%, p<0.01). A greater number of intervention patients compared to usual care patients achieved individual treatment gaols for A1C (73.7% vs 65.8%, p = 0.04), and BP (45% vs 25.4%, p<0.01), but not for LDL (57.6% vs 55.4%, p=0.61).
Izquierdo et al., 2007, USA	To examine the detection and remediation of medically urgent situations among older patients receiving telemedicine case management for diabetes.	RCT NI	Older patients with diabetes living in upstate New York, receiving an in-home virtual intervention, (n =338), 43% male, mean A1C 7%.	Nurse case managers coordinated care, coupled with dietitians and endocrinologists. Case managers reviewed patient responses to an in-home telemedicine unit, engaged in tele-visits every 4-6 weeks to discuss medications, BP and glucose readings, and made clinical recommendations to PCPs.	Over 36 months, 67 medically urgent situations were identified and addressed (1.9 events/month). Some of these were potentially life-threatening, including drug contraindications (n = 24), other medical urgent situations (n = 19), and medically urgent conditions like unstable angina (n = 24).
Jia et al., 2009, USA	To assess the longitudinal effect of the VA CCHT program by determining the extent to which it was associated with a lower probability of preventable	Retrospective matched treatment-control study. CP	Veteran patients with diabetes from a VA medical centre that were of high treatment priority, (n = 387 treatment, n = 387 control), mean age 67.6 years, 98.3% male.	NP and RN care coordinators monitored patient responses received daily from an in-home messaging device, made telephone calls to patients, arranged referrals with physicians, scheduled VHA clinic appointments, placed new	After 4 years, the treatment group had significantly fewer preventable hospitalizations (0.7 vs 1.0), lower crude death rate (19.4% vs 26.4%), and longer survival time (1,349.4 days vs 1,278.2 days) than the control group.

Author, Year, Country	Aim	Methodology	Population Characteristics	Care Coordination	Reported Outcomes
	hospitalization use by veterans with DM over a 4-year period.			medication orders, helped with medication management, reminded patients of clinic appointments, and assisted with technology difficulties.	
Jia et al., 2011, USA	To assess the effects of the CCHT programme for diabetes on the average number of inpatient stays and outpatient clinic visits over a follow-up period of 48 months.	Longitudinal study with quasi-experimental design\n\nCP	Veterans with diabetes of VHA medical centres, (n = 387 treatment, n = 387 control), mean age 68 years (treatment), 99% male (treatment).	Care coordinators monitored patient information received daily from a home telehealth device regarding symptoms and health status, made telephone calls to patients, arranged referrals with physicians, scheduled VHA clinic appointments, placed patient medication orders, helped with medication management, reminded patients of clinic appointments, and assisted with technology difficulties.	Compared with controls, intervention patients were less likely to be admitted for inpatient care at 6-months ($p<0.001$) and 12-months ($p<0.01$) follow up, and were consistently more likely to visit outpatient clinics ($p<0.001$) during the whole 48-month follow-up period. The likelihood of increase in outpatient utilization tended to decline over time.
Lo et al., 2016, Australia	To explore the perspectives of patients and their carers on the factors influencing healthcare of those with co-morbid diabetes and CKD.	Qualitative study	Participants with comorbid DM and CKD from Australian tertiary hospital health-services, (n = 58), median age 66 years, 70.69% male.	Focus groups conducted to understand patient perspectives on care coordination provided by PCPs, potentially coordinating with specialists, pharmacists, social workers, nurse educators, and more.	Patient level factors influencing care were self-management, socioeconomic status, and adverse experiences related to comorbid diabetes and CKD. Health service level factors affecting care were prevention and awareness of comorbid diabetes and CKD, poor continuity, and coordination of care, patient and carer empowerment, and poor recognition of psychological comorbidity.
Markle-Reid et al.,	To examine the feasibility of implementation in	Mixed methods\n\nNI	Community dwelling older adults with T2DM, diagnosed with ³2	RN and RD coordinators offered 4 in-home visits, 6 monthly group sessions, facilitated access to	Participants and providers viewed the program as acceptable and feasible. Participants had a higher short-form

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2016, Canada	practice (primary) and the feasibility of study methods and potential effectiveness (secondary) of the Aging, Community, and Health Research Unit - Community Partnership Program.		additional chronic conditions, receiving in-home care, (n = 36), 33% were 65-69 years, 14% were at least 80 years of age, 44% male.	services and supports, cand coordinated communication among participants, caregivers, program team, and PCPs. Coordinators also met monthly with a team for case conferences to develop client-centred care plans.	health survey physical component summary score at 6-months compared to baseline (difference of 3.0), and median costs for diabetes care increased over 6-months.
Markle-Reid et al., 2018, Canada	To compare the effect of a 6-month community-based intervention with that of usual care on QoL, depressive symptoms, anxiety, self-efficacy, self-management, and healthcare costs in older adults with T2DM and 2 or more comorbidities.	RCT NI	Community dwelling older adults with T2DM, diagnosed with ≥ 2 additional chronic conditions, (n =200 total, n = 101 intervention, n = 99 control), 32.5% between 65-69 years, 40% between 70-74 years, 27.5% > 75 years, 42.5% male (intervention)	RN and RD care coordinators provided up to 3 in-home visits, and monthly group wellness sessions. Coordinators also engaged in monthly case conferences with team members, as well as ongoing nurse-led care coordination.	The 6-month intervention significantly improved QoL and self-management, and reduced depressive symptoms, without increasing total healthcare costs.
Mateo-Abad et al., 2020, Spain	To evaluate, in the Basque Country, the impact of Care Well integrated care model for older patients with multimorbidity.	Mixed methods NI	Complex patients $\geq$ 65 years with 2 or more chronic conditions (with at least one of them chronic obstructive pulmonary disease, congestive heart failure, or DM), treated across home, hospital, primary care, and virtual settings, (n = 200 total,	Nurse case managers worked with a multidisciplinary care team to identify frail older individuals, conduct comprehensive baseline assessments, define therapeutic plans, coordinate hospital discharge, communicate with healthcare providers, and empower patient through home-based care.	The intervention reduced the number of hospitalizations and emergency department visits and increased the number of primary care contacts. Clinical changes such as significant decreases in body mass index and blood glucose levels were observed. The satisfaction level was high for stakeholders.

Author, Year, Country	Aim	Methodology	Population Characteristics	Care Coordination	Reported Outcomes
			n = 101 intervention, n = 99 control), mean age 79.4 years, 63% male, mean A1C 6.8.		
McCants et al., 2019, USA	To determine the impact of integrated case management services compared to usual treatment for patients diagnosed with diabetes and concomitant CHF.	Retrospective, descriptive study NI	Adults with CHF and DM, between hospital and home settings, (n = 68 total, n = 49 intervention, n = 19 treatment as usual), mean age 77.8 years (SD=11.7) (intervention), 53.1% male.	Social worker and nurse case managers prioritized discharge needs, assessed, planned, implemented, evaluated, and interacted to devise cohesive care plans in order to reduce costs and increase quality of care, and coordinated transportation and home health.	81.6% of intervention participants did not readmit within 30 days, while only 47.4% of treatment as usual participants did not readmit (p = 0.012).
Miklavcic et al., 2020, Canada	To evaluate the effect of a 6-month community-based intervention versus usual care on physical functioning, mental health, depressive symptoms, anxiety, self-efficacy, self-management, and healthcare costs in older adults with T2DM and 2 or more comorbidities.	Pragmatic RCT NI	Older adults with T2DM and 2 or more chronic conditions, from in-home and community agency settings, (n = 132 total, n = 70 intervention, n = 62 usual care), 58% between 65-74 years, 42% ³ 75 years of age, 45% male.	RN and RD care coordinators provided up to 3 in-home visits, 6 monthly community group sessions, and coordination through linking the client to community services.	No significant group differences were seen in the change from baseline and 6-months in physical functioning (p-value = 0.56), mental functioning (p-value = 0.30), or other secondary outcomes.
Min et al., 2017, USA	To test for measurable improvement over time in diabetes care quality and utilization during the implementation of PCMHs at the University of Michigan	Longitudinal cohort study NI	Patients with diabetes in primary care, (n = 2221), mean age 71.6 years (pharmacy-led PCMHs), mean age 70.0 years (nurse-led PCMHs), 45.5% male	Pharmacist and nurse care coordinators provided self-management support, and improved patient communication, which included standing lab-order sets, note templates, patient	Quality of care improved, and utilization decreased over 2.5 years. Both pharmacy and nurse-led coordination improved LDL and DBP by 2.5 years, although the trajectory differed. Only the

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	Health System in 2009, including 1 year pre- and 1 year post implementation		(pharmacy-led PCMHs), 43.6% male (nurse-led PCMHs).	handouts, database, and flow sheets to track improvement.	pharmacy-led approach decreased primary care visits.
Mohr et al., 2019, USA	To examine how organizational coordination measures, reported by primary care providers (PCPs), were associated with patient experiences of care coordination.	Cross-sectional surveys	Veteran patients with T2DM, and one of hypertension, congestive heart failure, depression/anxiety, or severe mental illness or PTSD, from the VHA, (n = 3183 patients matched to n = 233 PCPs), 71.9% ³ 65 years, 91.1% male, 46.8% had A1C >7.	RNs and licensed practical nurses provided care coordination.	Patient ratings of specialist knowledge management and knowledge integration were significantly lower when either PCPs did not use feedback coordination, or rated feedback coordination lower. Teamwork was significantly related to specialist knowledge management (b=0.06), knowledge integration (b=0.04), and knowledge fragmentation (b=-0.04).
Munshi et al., 2013, USA	To evaluate whether assessment of barriers to self-care and strategies to cope with these barriers in older adults with diabetes is superior to usual care with attention control (same frequency of contact but no advice provided).	RCT NI	Patients with poorly controlled T1 or T2DM, from a specialized diabetes outpatient clinic, (n = 100 total, n = 70 intervention, n = 30 attention control), mean age 75 years, 43% male (intervention), baseline A1C >8%.	A diabetes educator care coordinator evaluated barriers to self-care, identified strategies to cope with barriers, and made phone calls to educate, guide and follow-up with patients. The control group educator made phone calls to participants, only discussing non-diabetes related life events.	Over 12 months, A1C decreased by 0.45% in the intervention group versus 0.31% in the control group. At 12 months, it decreased further in the intervention group (0.21% vs 0%) compared to the control group. The intervention group showed additional benefits in measures of self-care, gait and balance, and endurance compared with the control group. Diabetes-related distress improved in both groups.
Ni et al., 2019, China	To evaluate the effect of community-nurse-led multidisciplinary team management on A1C, QoL, hospitalization,	Quasi-experimental trial NI	Community individuals with T2DM aged 35 years or older, in an in-home virtual setting, (n = 179 total, n = 88	A nurse-led multidisciplinary team coordinated care, which included organizing group health education classes, providing individualized counselling via	During the 24-month period, the intervention group significantly reduced A1C (1.08%) compared to the control group which achieved an increase of 0.45% (p<0.001). The

Author, Year, Country	Aim	Methodology	Population Characteristics	Care Coordination	Reported Outcomes
	and help-seeking behavior in people with T2DM.		intervention, n = 91 control), mean age 66.5 years, A1C 7.08% (intervention).	telephone and face-to-face follow-up visits, and providing pamphlets and self-monitoring workbooks. Coordinators also served as liaisons between participants and PCPs.	intervention group showed significant increases in QoL scores, significant percentage increase in seeking help from nurses, and significantly more decrease in hospitalizations compared to the control group.
Rafiq et al., 2019, Sweden	To describe the characteristics of heart/cardiac-, nephrology-, diabetes mellitus-patients and to explore the initial effects of a multidisciplinary and person-centered care on total care utilization.	RCT NI	Patients at the outpatient centre with T1 or T2DM, kidney disease, and cardiovascular disease, (n = 42 intervention, n = 35 control), mean age 74.2 years (intervention), 83.3% males (intervention).	A multidisciplinary care team led by nurse managers, supported by registered practical nurses coordinated care by developing sustainable care management plans, engaging in twice-weekly case conferences with senior consultants, and ensuring patients received all necessary treatment at a single location.	Heart/cardiac-, nephrology-, diabetes mellitus-patients were sicker than control group participants, but service utilization indicators were similar between the two arms. No between group differences were statistically significant other than an increase in telephone visits in the intervention group.
Regina et al., 2020, Italy	To explore the potential of pharmacy services by community pharmacists in the management of T2DM alongside general and specialists' medical practitioners to improve quality of diabetes care.	Observational, non-controlled pilot study NI	Participants with T2DM from a rural community pharmacy, aged ≥18 years, (n = 40), mean age 64.5 years, 50% male.	Over 12 months, the pharmacist case manager received an individualized care plan from the participants' physician. The pharmacist carried out examinations (electrocardiogram, fundus examination, self-analysis of blood and urine), booked examinations at accredited units, reported results to the physician.	Patient adherence to the care plan significantly increased (98% in the first quarter and 100% in the remaining 3 quarters). Mean percentage change was -4% for A1C (SD=5), -10% for LDL (SD=7), -13% for SBP (SD=4), -9% for DBP (SD=2). 3. 80% of participants reported better patient information and easier accessibility to services.
Shea et al., 2006, USA	To examine the impact of the IDEATel intervention on clinical outcomes including hemoglobin A1C, BP,	RCT NI	Older adults ³55 years, living in medically underserved areas of New York state, receiving in-home	Nurse case managers (supervised by diabetologists) regularly communicated with patients via a web-enabled computer and an existing telephone line, remotely	Over one year, the intervention group had significantly improved net reductions in A1C (0.18% net change, p = 0.006), SBP and DBP (3.4 and 1.9 mmHg net change,

Author, Year, Country	Aim	Methodology	Population Characteristics	Care Coordination	Reported Outcomes
	and lipid levels compared to usual care.		virtual care, (n = 1665, n = 844 intervention, n = 821 usual care), mean age 71 years, 36.5% male (intervention).	monitored glucose and BP daily, provided patients with access to their own clinical-data, and provided access to an educational website.	p<0.001), and LDL (9.5 mg/dL net change, p<0.001) compared to the control group.
Shea et al., 2009, USA	To examine the effectiveness of a telemedicine intervention to achieve clinical management goals in older, ethnically diverse, medically underserved patients with diabetes.	RCT NI	Older adults ³55 years, from medically underserved areas of New York state, receiving in-home virtual care, (n = 1665, n = 844 intervention, n = 821 usual care), mean age 71 years, 36.5% male (intervention). *Same sample as Shea et al., 2006.	Nurse case managers (supervised by diabetologists) regularly communicated with patients via a web-enabled computer and an existing telephone line, remotely monitored glucose and BP daily, provided patients with access to their own clinical-data, and provided access to an educational website. *Same care coordination as Shea et al., 2006.	Over 5 years of follow-up, the intervention significantly reduced A1C (p=0.001) by 0.29, LDL (p<0.01) by 3.84, and SBP and DBP by 4.32 mmHg and 2.64 mmHg (p = 0.024 and p<0.001).
Shea et al., 2013, USA	To examine the social impact of the telemedicine intervention effects in lower and higher socioeconomic status participants in the IDEATel study.	RCT NI	Older adults ³55 years, living in medically underserved areas of New York state, receiving care in an in-home virtual setting, (n = 1665, n = 844 intervention, n = 821 usual care), mean age 71 years, 36.5% male (intervention). *Same sample as Shea et al., 2006.	Nurse case managers (supervised by endocrinologists) regularly communicated with patients via a web-enabled computer and an existing telephone line, remotely monitored glucose and BP daily, provided patients with access to their own clinical-data, and provided access to an educational website. Case managers contacted PCPs if a change in management was required. *Same as Shea et al., 2006.	A1C was higher in lower-income participants at baseline. However, after 5 years, the intervention did not seem to increase disparities. The lowest income group showed greater intervention effects in A1C (p = 0.004) and SBP (p=0.023).
Trief et al., 2006, USA	To investigate the effect of comorbid depression on glycemic control and	RCT NI	Older adults ³ 55 years with diabetes, living in medically underserved	Nurse case managers, under the supervision of an endocrinologist, monitored BP and blood glucose	At baseline, there was a significant correlation between depression and A1C. However, after 1 year, the

Author, Year, Country	Aim	Methodology	Population Characteristics	Care Coordination	Reported Outcomes
	on response to a telemedicine case management intervention for elderly, ethnically diverse diabetes patients.		areas, in an in-home virtual setting, (n= 1665 total, n = 844 intervention, n = 821 usual care), mean age 70. 8 years, 37.2% male, mean A1C 7.4%.	via a home telemedicine unit, video-conferenced with patients, provided patients with access to individualised graphic displays and educational content, and consulted with PCPs to make treatment planning decisions.	intervention group reported a greater reduction in A1C compared to the control group, but depression did not predict changes in A1C.
Trief et al., 2008, USA	To understand the experiences of older patients with diabetes who participated in a telemedicine case management intervention.	Qualitative study	Older adults with DM that participated in in-home, virtual care coordination, (n = 40), mean age 67.93 years, 57.5% were male, mean A1C 7.38%.	Nurse case managers coordinated care with the help of dietitians, including monitoring patient blood glucose and BP via web-enabled home-telehealth units, videoconferencing with patients to educate and facilitate goal setting, providing support, and consulting with PCPs who made the final treatment decisions.	Most patients enrolled in the program primarily because healthcare providers encouraged them. Patient goals were to improve diabetes control, and they valued an emphasis on monitoring of health outcomes, and supportive contact with staff.
Trief et al., 2009, USA	To assess whether diabetes self-efficacy relates to glycaemic control (primary), and to BP and cholesterol (secondary), and whether a change in self-efficacy relates to change in these medical outcomes in a group of older, ethnically diverse individuals.	Analysis of pre-existing longitudinal data NI	Older adults [3] 55 years with T2DM, in an in-home, virtual setting, (n=1665), mean age 70.82 years, 37.18% male, mean A1C 7.38%. *Same sample as Trief et al., 2006.	Nurse and dietitian case managers collaboratively formulated a plan with patients to address BP, blood glucose, and lipid control, monitored these outcomes through patient data uploaded using a home telemedicine unit, and regularly video-conferenced with patients to educate and discuss goals.	The intervention significantly improved self-efficacy over time (p<0.0001). An increase in diabetes self-efficacy over time was related to improvement in glycemic control (p<0.0001), but not in blood pressure or lipid levels.
Tu et al., 2020, China	To evaluate the effect of a nurse-coordinated hospital-initiated transitional	A single-blinded cluster-RCT NI	Older adults with DM receiving care between hospital wards and community centres, (n =	Discharge nurses, community nurses, and PCPs coordinated hospital-initiated transitional care, including providing	The intervention group demonstrated a significant decrease in mean SBP (10.7 mmHg) DBP (4.1 mmHg) compared to the control group. There

Author, Year, Country	Aim	Methodology	Population Characteristics	Care Coordination	Reported Outcomes
	care programme on hypertension control for older people with diabetes in China.		270 total, n = 135 intervention, n = 135 control), mean age 70.9 years, 54.8% male.	individualized post-discharge support, and referring patients to specialist clinics for timely medication adjustment.	were significant improvements in A1C, hypertension and diabetes knowledge, treatment adherence, QoL, hospital readmission, and emergency department visits in the intervention group compared to the control group.
Wakefield et al., 2011, USA	To evaluate the efficacy of a nurse-managed home telehealth intervention to improve outcomes in veterans with comorbid diabetes and hypertension.	RCT NI	Veterans with comorbid T2DM and hypertension in VA department primary care, (n = 302 total, n = 107 usual care, n = 93 high-intensity intervention, n = 102 low-intensity intervention), mean age 68 years, 98% male.	RN care coordinators monitored patient responses on a home telehealth device daily for 6-months to determine if patients required follow-up. The low-intensity group received standard prompts, while the high-intensity group also received additional health questions and educational content.	Over 6-months, A1C in both intervention group decreased significantly compared to the control group (p=0.03 and 0.02 for low and high intensity groups), but differences were not maintained at 12-months. High-intensity subjects had a significant decrease (p=0.001) in SBP compared to the control group at 6- and 12-months.
Walker et al., 2017, primarily studies from USA, 1 from Austria, 1 from UK	To explore home telemedicine interventions for the treatment of older adults with diabetes.	Systematic Review	Studies including older adults with a mean age ³ 65 years, with T1 or T2DM, with and without other chronic conditions, receiving virtual care.	Care coordination interventions involved education, closed-loop feedback and communication, a home telemedicine device or unit, remote monitoring, use of a telephone or telephone line, and motivational interviewing or coaching.	The included studies suggest that case management or coordination can effectively decrease admissions, costs per person per year, mortality, and cognitive decline in older adults with diabetes.
Yeager et al., 2018, USA	To provide insight into patient and provider experiences, specifically for the care of patients with diabetes and multiple chronic comorbidities.	Qualitative study	Patients ³ 65 with DM and at least 1 other chronic condition, and healthcare providers implementing the program in a virtual setting, (n = 14 patients, n = 19 providers).	Nurse case managers coordinated care through telephone, text, email, or patient portals, and had responsibilities such as answering patient questions, prescription management, appointment scheduling, billing and finance, self-care plans, and coordination	Providers identified challenges such as the large time commitment required to coordinate care for complex patients, low patient literacy and technology proficiency, and high patient psychosocial needs. Providers believed the program benefitted patients, and that it improved

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Author, Year, Country	Aim	Methodology	Population Characteristics	Care Coordination	Reported Outcomes
				with and referral to other providers such as specialists or diabetes educators.	continuity of care. Patients reported positive experiences such as the program being applicable to their needs.

A1C, glycated hemoglobin; *BP,* blood pressure; *CCHT*, Care Coordination Home Telehealth; *CKD*, chronic kidney disease; *CP*, current practice; *DBP*, diastolic blood pressure; *DEC*, Diabetes Education Centre; *DM*, diabetes mellitus; *IDEATel,* Informatics for Diabetes and Education Telemedicine Project; *LDL*: low-density lipoprotein; *mmHg,* millimeters of mercury; *N/A*, non-applicable; *NI*, new intervention; *NP,* nurse practitioner; *PCMH*, patient centred medical home; *PCP*, primary care provider; *QoL*, quality of life; *RCT*, randomized control trial; *RD*, registered dietitian; *RN*, registered nurse; *SBP,* systolic blood pressure; *T1,* type 1; *T2DM*, type 2 diabetes mellitus; *VA*, Veterans' Affairs; *VHA*, Veterans Health Affairs.

Supplementary Table 1

Database Search Strategies

Database: Medline

Date: June 8, 2021

Hits: 1005

#1	Case Management/ OR Patient Care Team/ OR Home Care Services/ OR ((coordinat* or co-ordinat*) adj2 (care or healthcare)).mp. OR case manage*.mp. OR patient manage*.mp. OR care coordinat*.mp. OR care co-ordinat*.mp.
#2	Aged/ OR Age Factors/ OR elderly.mp. OR geriatric.mp. OR older adult*.mp. OR senior*.mp.
#3	Mellitus, Type 2/ OR Diabetes Complications/ OR Diabetes Mellitus/ OR Diabetes Mellitus, Type 1/ OR diabetes.mp.
#4	1 AND 2 AND 3

Database: Embase

Date: June 8, 2021

Hits: 4209

#1	case management/ OR patient care/ OR ((coordinat* or co-ordinat*) adj2 (care or healthcare)) OR patient manage*.mp OR care coordinat*.mp. OR care co-ordinat*.mp. OR case manage*.mp
#2	aged/ OR frail elderly/ OR older adult*.mp. OR elderly.mp. OR geriatric.mp. OR aged.mp. OR older people.mp. OR older adult*.mp. OR senior*.mp.
#3	diabetes mellitus/ OR diabetes.mp.
#4	1 AND 2 AND 3

Database: CINAHL

Date: June 8, 2021

Hits: 254

#1	((MH "Multidisciplinary Care Team") OR (MH "Case Management") OR ("care coordinat*") OR ("patient manage*") OR ("care co-ordinat*") OR ("case manage*"))
#2	((MH "Aged") OR (MH "Frail Elderly") OR ("older adult*") OR ("elderly") OR ("geriatric*") OR ("senior*") OR ("aged") OR ("older people"))
#3	) ((MH "diabetes mellitus, type 1") OR (MH "Diabetes Mellitus") OR (MH "Diabetes Mellitus, Type 2) OR (MH "Diabetes Education") OR (MH "Diabetic Patients") OR ("diabetes mellitus, type 1") OR ("Diabetes Mellitus") OR ("Diabetes Mellitus, Type 2") OR ("Diabetes Education") OR ("Diabetic Patient*") OR ("diabetes"))

#4	1 AND 2 AND 3

Database: EmCare

Date: June 8, 2021

Hits: 1885

#1	case management/ OR patient care/ OR ((coordinat* or co-ordinat*) adj2 (care or healthcare)) OR patient manage*.mp OR care coordinat*.mp. OR care co-ordinat*.mp. OR case manage*.
#2	*.mp aged/ OR frail elderly/ OR older adult*.mp. OR OR elderly.mp. OR geriatric.mp. OR aged.mp. OR older people.mp. OR older adult*.mp. OR senior*.mp. OR age factors.mp
#3	diabetes mellitus/ OR diabetes.mp. OR diabetic complication/ OR diabetes complications.mp OR diabetes melltus, type 1.mp OR diabetes mellitus, type 2.mp
#4	1 AND 2 AND 3

Supplementary Table 2

Grey Literature Search

Performed in June-July 2022

No articles identified

Searched a variety of combination of the following terms:

community; care transitions; care coordination; coordination of care; case management; multidisciplinary; telemedicine; integrated care; older adult; geriatric; diabetes; complex care needs; telemedicine; integrated care.

Table 1: Targeted Website Search

Agency or organization	URL/website
ACT Center, Accelerating Care Transformation	https://www.act-center.org/resources
Agency of Healthcare Research and Quality	https://www.ahrq.gov/
Age Well	https://agewell-nce.ca/research/research-programs-and-projects
American Diabetes Association	https://diabetes.org/
American Nurses Association	https://www.nursingworld.org/
Canadian Home Care Association	https://cdnhomecare.ca/
Canadian Nurses Association	https://www.cna-aiic.ca/en/home
College of Nurses of Ontario	https://www.cno.org/
Community Health Nurses Canada	https://www.chnc.ca/en/
Community Health Nurses Initiatives Group (RNAO Interest Group)	http://www.chnig.org/
Diabetes Canada	https://www.diabetes.ca/
Health Quality Ontario	https://www.hqontario.ca/
Infoway	https://www.infoway-inforoute.ca/
International Diabetes Federation	https://idf.org/
International Research Community on Multimorbidity	https://crmcspl-blog.recherche.usherbrooke.ca/
March of Dimes	https://www.marchofdimes.ca/en-ca

National Institute for Health and Care Excellence (NICE)	https://www.nice.org.uk/
National Transitions of Care Coalition (NTCC)	https://www.ntocc.org/knowledge-and-resource-center
Ontario Telemedicine Network (OTN)	https://otn.ca/
Registered Nurses' Association of Ontario	https://rnao.ca/
SE Health (SEHC)	https://research.sehc.com/resources
VHA Home Healthcare	https://www.vha.ca/research/

Table 2: Grey Literature Database Search

Database	URL/website
Open Grey	https://opengrey.eu/
Google Custom Canadian Government Documents Search	https://guides.library.utoronto.ca/c.php?g=713728 &p=5091657

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