Barriers to and facilitators of the implementation of multi-disciplinary care pathways in primary care: a systematic review

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Abstract

Background: Care pathways (CPWs) are complex interventions that have the potential to reduce treatment errors and optimize patient outcomes by translating evidence into local practice. To design an optimal implementation strategy, potential barriers to and facilitators of implementation must be considered. The objective of this systematic review is to identify barriers to and facilitators of the implementation of CPWs in primary care (PC). Methods: A systematic search via Cochrane Library, CINAHL, and MEDLINE via PubMed supplemented by hand searches and citation tracing was carried out. We considered articles reporting on CPWs targeting patients at least 65 years of age in outpatient settings that were written in the English or German language and were published between 2007 and 2019. We considered (non-)randomized controlled trials, controlled before-after studies, interrupted time series studies (main project reports) as well as associated process evaluation reports of either methodology. Two independent researchers performed the study selection; the data extraction and critical appraisal were duplicated until the point of perfect agreement between the two reviewers. Due to the heterogeneity of the included studies, a narrative synthesis was performed. Results: 14 studies (seven main project reports and seven process evaluation reports) of the identified 8,154 records in the search update were included in the synthesis. The structure and content of the interventions as well as the quality of evidence of the studies varied. The identified barriers and facilitators were classified using the Context and Implementation of Complex Interventions framework. The identified barriers were inadequate staffing, insufficient education, lack of financial compensation, low motivation and lack of time. Adequate skills and knowledge through training activities for health professionals, good interprofessional communication and individual tailored interventions were identified as facilitators. Conclusions: In the implementation of CPWs in PC, a multitude of barriers and facilitators must be considered, and most of them can be modified through the careful design of intervention and implementation strategies. Furthermore, process evaluations must become a standard component of implementing CPWs to enable other projects to build upon previous experience.

Background

A care pathway or clinical pathway (CPW) is an evidence-based structured multi-disciplinary care plan that describes all relevant diagnostic and therapeutic steps in the care of patients with a specific health problem in chronological order. A CPW is used to translate evidence into local practice by considering regional conditions and demands [1, 2] as the final step of implementing evidence-based knowledge into practice. Due to the standardization of care, a CPW has the potential to reduce treatment errors, impact patient outcomes and quality of care and increase the effectiveness of health care systems [1, 3]. CPWs have been implemented in international practice since the 1980s [4] and are increasingly being used worldwide, especially in inpatient care in Australia, the USA, Canada, Europe and Asia [5], for example, with the HEART Pathway [6], the Liverpool CPW for patients with cancer [7] or CPWs for total knee arthroplasty in surgery [8]. Due to the epidemiological and demographic changes in the Western world, primary health care systems must change, and it is important to align quality of care and evidence-based practice with economic aspects and patients’ expectations. CPWs might be an answer to addressing unwanted variation in primary care (PC) [9, 10]. However, there is still low utilization of CPWs in PC, even though general practitioners see them as highly relevant [11]. Due to the different demands and contexts of outpatient versus inpatient settings, successful implementation strategies may not be easily transferable from one setting to another [2]. To develop successful implementation strategies for CPWs in PC, information about potential barriers and facilitators should be taken into account. Thus, our review addresses the following review question: Which barriers and facilitators to implementing multi-professional CPWs for people aged ≥ 65 years in PC have been reported in the literature?

Methods

Search strategy

A systematic search of literature was carried out in three electronic databases, Cochrane Library, CINAHL, and MEDLINE via PubMed. Additional sources were identified via hand searches, citation tracing and internet searches for grey literature. The initial search took place in December 19th, 2017, and a search update was conducted in July 15th, 2019. The search strategy was based on the Medline search strategy used for a Cochrane review titled Clinical pathways for primary care: effects on professional practice, patient outcomes, and costs [2], which is currently in process.

An overview of all search strategies used, terms, filters and number of results can be accessed in Additional file 1.

The review protocol was registered at PROSPERO 2018 CRD42018087689 and is available from https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42018087689.

Reporting of this systematic review followed the PRISMA checklist [12].

Selection criteria

To identify publications with relevant interventions, we used the following definition:

(1) the intervention must be a structured, multi-disciplinary care plan that
(2) details the steps in the course of a treatment in the plan, algorithm, pathway, guide or the like and
(3) must be applied to translate evidence into practice in the local context [2].

The aim of the included studies had to be the standardization of care for a specific health problem in a specific group of patients [2]. We did not include diagnostic, screening, detection, risk prediction or primary preventive CPWs or pharmacological guidelines. The target population of CPWs provided by health professionals (HPs) had to be people aged ≥ 65 years. We operationalized this as a reported mean age of the study population of at least 60.0 years or 80% of
the population aged over 60 years. The setting was defined as PC. We also considered outpatient hospital care, hospital stays less than 24 hours and the
transition from PC to other settings for inclusion. Studies in nursing homes were not included.

**Study designs considered for inclusion**

We included randomized controlled trials (RCTs), non-randomized controlled trials (NRCTs), controlled before-after studies (CBAs) and interrupted time series (ITS) studies, according to the Effective Practice and Organisation of Care (EPOC) study design criteria [13]. Further inclusion criteria were articles in the
German or English language that were published from 2007 to 2017 or, for the update, to 2019. The included papers had all been published; preliminary results
or pilot/feasibility studies were excluded. There were no restrictions on specific outcomes, because this review aims to explore all relevant articles on this
topic. In general, we did not exclude studies with a high risk of bias (RoB), indicating lower quality, but we did consider the RoB in the rating. An overview of all
selection criteria based on PICO construct is given in Table 1.

| Domain          | Selection criteria                                                                 |
|-----------------|-------------------------------------------------------------------------------------|
| Participants    | People aged ≥ 65 years                                                              |
| Setting         | Primary care setting                                                                |
|                 | - outpatient hospital care                                                          |
|                 | - hospital stays < 24 hours                                                         |
|                 | - transition from primary care to other settings                                    |
| Intervention    | Criteria for considering an intervention as care pathway                            |
|                 | - structured and stepwise detailed multi-disciplinary plan                          |
|                 | - translation of evidence into the local context                                    |
|                 | - standardization of care for a specific health problem in a specific group of patients |
| Comparator(s)   | No restrictions                                                                      |
| Study designs   | Main project reports                                                                |
|                 | - randomized controlled trials                                                      |
|                 | - non-randomized controlled trials                                                  |
|                 | - controlled before-after studies                                                   |
|                 | - interrupted time series                                                           |
|                 | Additional process evaluation reports                                               |
|                 | No restrictions                                                                      |
| Outcome         | No restrictions                                                                      |
| Publication period | 2007 to 2019                                                                          |
| Language        | - German                                                                             |
|                 | - English                                                                           |

The titles, abstracts and subsequent full texts of the identified studies were screened and assessed for eligibility independently by two researchers (ES, VR). Disagreement between them was resolved through discussion, and a third reviewer (MM) was consulted if necessary. The study selection process, including
deduplication, was documented, made consistent between the researchers and managed by using the Cochrane technology platform Covidence.

Since we assumed that it is possible, that barriers to and facilitators of implementation are not reported within the main publication of the respective project
(main project report) but in independent publications, we carried out citation tracing of eligible articles to identify and include associated process evaluation
reports.

**Data extraction and analysis**

After the exclusion of non-eligible articles through the removal of obviously irrelevant reports based on the title and abstract screening and through the
examination of the retrieved full texts of the potentially relevant reports, the remaining studies were extracted by using a previously piloted template based on
the EPOC good practice data extraction form [14] supplemented by items from the data extraction tool of the Context and Implementation of Complex
Interventions (CICI) framework [15]. If there were more relevant articles published for one original project, the various related records were extracted in one
form. Data extraction forms are available from the authors on request.

The data collection process was performed by two independent researchers: ES extracted the data from all studies, and this process was duplicated by VR
until the point of perfect agreement between the two reviewers. Discrepancies in the comparison of the forms were resolved by discussion and consensus.

Due to the large diversity of study characteristics and heterogeneous interventions and outcomes, a meta-analysis was not possible. Thus, a narrative
synthesis following the guidance for undertaking reviews in health care from the Centre for Reviews and Dissemination (CRD) [16], as well as a synthesis in
tabular form (see Table 7 and Additional file 2) was undertaken.
### Table 7
Overview of the reported barriers and facilitators

| CONTEXT | Domain* | Barriers | Facilitators |
|---------|---------|----------|--------------|
| Geographical context | - | - | - |
| Epidemiological context | Multi-morbidity [31, 33, 35] People aged ≥ 85 years [33] Mental health problems [34] | - | - |
| Socio-cultural context | Cultural background [33, 35] Low health literacy [35] Gender [33, 35] Frequency of general practice visits [33, 35] | - | - |
| Socio-economic context | Low socio-economic status [33, 35] | - | - |
| Ethical context | - | - | - |
| Legal context | - | - | - |
| Political context | Lack of financial incentives/compensation [24, 33, 35] | - | - |

| IMPLEMENTATION | Domain* | Barriers | Facilitators |
|----------------|---------|----------|--------------|
| Implementation theory | - | - | - |
| Implementation process | - | - | - |
| Implementation strategies | Overload of information in training activities for health professionals [32] | Training and educational activities for health professionals [23, 24, 33] Handbook as a clear guideline for health professionals [35] |

| Implementation agents | Health professionals |
|-----------------------|----------------------|
| Knowledge and skills | Insufficient knowledge [24, 32, 33] Lack of competence [32] Lack of experience [32] | Professional skills [32, 33, 35] Organizational skills [32] Communication skills [32] Empathic capacity [32] |
| Behaviour-related factors | Lack of motivation [24] Initial difficulties in implementation due to changes in routines [32, 35] Negative attitudes towards intervention [33] Reluctance regarding an intervention component [24, 35] | Positive expectations regarding intervention [33, 35] Type of recommendation [30] |
| Interaction-related factors | Communication and collaboration issues [33] Difficulties in organizing team meetings [32] Insufficient involvement of professionals [33] | Interdisciplinary communication and cooperation [32–34] Intradisciplinary communication and cooperation [24, 33] Sufficient involvement of family caregivers [29] Clear responsibilities [32, 33] |
| Application of the intervention | Time expenditure [32, 33, 35] Complexity of intervention [32, 33] | Individual, flexible, tailored intervention [33, 35] Practicable layout [35] Good fit of the intervention to daily practice [35] |

| Patients | - |
| External assessment | - |
| Behaviour-related factors | Low treatment adherence [30, 33, 35] | - |
| External factors influencing adherence | Transportation issues [31] Scheduling problems [31] | - |

| Self-assessment | - | Positive expectations regarding intervention [32, 33] |
| Behaviour-related factors | High temporal expenditure effort [32] High bureaucratic effort [23] Difficulties in distinguishing the involved disciplines [32] | Interventions tailored to individual needs [23, 29, 33] Possibility for adaptation [32] Close monitoring of changing situations [29] Provision of written advice [23] Use of technical devices for outcome measurement [23] |

*CICI framework domains are bolded, additional categories are in italics.

Figure 1 PRISMA flow chart
**Critical appraisal**

The critical appraisal was carried out by two independent researchers (the critical appraisal was conducted in its entirety by ES and then duplicated by VR until the point of perfect agreement between the two reviewers), and a third reviewer (MM) was involved if necessary.

We used the Cochrane Collaboration’s tool for assessing RoB for (N)RCTs and CBAs by completing the RoB table via Review Manager (RevMan) 5.3 software [17]; in cluster randomized trials, we also considered the risk of particular bias as recommended by the Cochrane Handbook for Systematic Reviews of Interventions [18]; in ITS we used the seven standard criteria [19]. We judged each domain as being at low, high, or unclear risk (Additional file 3) and created a RoB summary figure (see Fig. 2) and a graph to illustrate the proportion of studies with each of the judgements (see Fig. 3).

For the process evaluation reports, we used the Critical Appraisal Skills Programme (CASP) Checklist for qualitative research [20] and the Mixed Methods Appraisal Tool (MMAT) [21]. An overview of critical appraisal tools used for the included study designs is given in Table 2.
Table 2
Overview of critical appraisal tools used for different study designs

| Study design* | Critical appraisal tool | Used quality assessment criteria/questions |
|---------------|-------------------------|--------------------------------------------|
| Randomized controlled trials | Cochrane Collaboration's tool for assessing risk of Bias [18] (RoB) | - random sequence generation (selection bias)  
- allocation concealment (selection bias)  
- blinding of participants and personnel (performance bias)  
- blinding of outcome assessment (detection bias)  
- incomplete outcome data (attrition bias)  
- selective reporting (reporting bias)  
- other bias |
| Qualitative studies | Critical Appraisal Skills Programme [20] (CASP) | - Was there a clear statement of the aims of the research?  
- Is a qualitative methodology appropriate?  
- Was the research design appropriate to address the aims of the research?  
- Was the recruitment strategy appropriate to the aims of the research?  
- Was the data collected in a way that addressed the research issue?  
- Has the relationship between researcher and participants been adequately considered?  
- Have ethical issues been taken into consideration?  
- Was the data analysis sufficiently rigorous?  
- Is there a clear statement of findings? |
| Mixed-methods studies | Mixed Methods Appraisal Tool [21] (MMAT) | Screening Questions (for all types)  
- Are there clear qualitative and quantitative research questions (or objectives), or a clear mixed methods question (or objective)?  
- Do the collected data allow address the research question (objective)? E.g., consider whether the follow-up period is long enough for the outcome to occur (for longitudinal studies or study components).  
Qualitative  
- Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (objective)?  
- Is the process for analyzing qualitative data relevant to address the research question (objective)?  
- Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected?  
- Is appropriate consideration given to how findings relate to researchers’ influence, e.g., through their interactions with participants?  
Quantitative descriptive  
- Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)?  
- Is the sample representative of the population understudy?  
- Are measurements appropriate (clear origin, or validity known, or standard instrument)?  
- Is there an acceptable response rate (60% or above)?  
Mixed methods  
- Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed methods question (or objective)?  
- Is the integration of qualitative and quantitative data (or results) relevant to address the research question (objective)?  
- Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results) in a triangulation design? |

*Since we finally did not include any other studies than RCTs (main project reports), we refrained from listing details of other critical appraisal tools.

Results
Study selection
The search generated 8,154 hits. After removing duplicates and irrelevant publications based on the title and abstract screening, we assessed 367 full-text articles for eligibility, six of which originated from the additional hand and citation searching. After the exclusion of 353 articles (see Fig. 1 for the PRISMA flow chart), a total of 14 studies (seven main project reports and seven process evaluation reports) were included in the synthesis.

Characteristics of included studies
One out of the seven included main project reports (14.3%) was a RCT [22], the other six (85.7%) were cluster RCTs (cRCTs) [23–28]. Two out of these seven studies (28.6%) included nested process evaluation components in the main report [23, 24]. For the remaining five main project reports (71.4%), additional process evaluation reports were published separately, which we considered within this analysis. Among those, one used qualitative methods [29], two used quantitative methods [30, 31] and four used a mixed-methods approach [32–35]. Details on the characteristics and results of the included studies can be found in Additional file 2.

The studies were published between 2008 and 2017 and took place in PC settings in three different countries: five out of seven (71.4%) in the Netherlands [24–28], one (14.3%) in the UK [23] and one (14.3%) in Canada [22].
The included projects comprised 5,822 participants (3,634 patients in intervention groups; 2,188 patients in control groups).

The mean ages in the intervention groups ranged from 67.1 to 81.7 years and from 66.0 to 82.8 years in the control groups. One study only reported overall age range, which was 60 to 75 years, and did not report mean age [23].

All projects compared CPWs with usual care to assess their effectiveness. Three out of seven projects (42.9%) tested a CPW for persons with specific health conditions, which were type 2 diabetes [24], chronic obstructive pulmonary disease (COPD) [27], and heart failure [22]. The other projects (n = 4; 57.1%) targeted on community-dwelling people [23, 25, 26, 28]. More detailed information about the study characteristics and the results of single studies can be found in Additional file 2.

Despite the general diversity of the seven CPWs, there were commonalities with regard to the development and structure of the interventions. The development of all interventions was evidence-based, and four out of seven studies (57.1%) reported the involvement of clinicians. Four projects (57.1%) undertook a previous pilot/feasibility study. A total of five CPWs (71.4%) started with an patient assessment, six provided an individually tailored treatment (85.7%) and one the application of locally adapted recommendations (14.3%). Six out of the seven CPWs (85.7%) included scheduled evaluation or monitoring of patient outcomes on a regular basis. Education and training for health care providers was included in six CPWs (85.7%). More detailed information about the structure of the interventions is displayed in Table 3. No project provided a clear and comprehensive distinction between intervention components and used implementation strategy. For details of the components of the seven CPWs, see Additional file 2.

Table 3
Main components of the interventions reported in the included main project reports

| Source, year | Development and piloting | Components of the intervention: recipient | Components of intervention: provider |
|--------------|--------------------------|------------------------------------------|------------------------------------|
|              | Evidence-based | Involvement of clinicians | Previous feasibility/pilot study | Assessment | Individually tailored treatment | Locally adapted recommendations | Regular evaluation/monitoring | Training activities |
| Azad et al., 2008 [22] | \ | not reported | \ | \ | \ | X | \ | \ |
| Bleijenberg et al., 2016a [26] | \ | \ | \ | \ | \ | \ | \ | \ |
| Harris et al., 2015 [23] | \ | not reported | not reported | not reported | \ | X | \ | \ |
| Melis et al., 2008 [28] | \ | not reported | \ | \ | \ | X | \ | not reported |
| Metzelthin et al., 2013b [25] | \ | \ | \ | \ | \ | \ | \ | \ |
| van Bruggen et al. 2008 [24] | \ | \ | not reported | not reported | \ | \ | \ | \ |
| Weldam et al., 2017b [35] | \ | not reported | \ | \ | \ | X | \ | \ |

\ = Yes; X = NO

Detailed information about characteristics of excluded studies and reasons for exclusion are available from the authors upon reasonable request.

Outcome measures

Five out of seven projects (71.4%) used patient-relevant primary outcomes, such as disability [25], daily functioning [26], functional performance in activities of daily living and mental well-being [28], quality of life and functional capacity for older females living with heart failure [22] and health status of COPD patients [27]. Two of seven studies (28.6%) investigated surrogate endpoints, such as changes in average daily step count [23] and the percentage of people with poor glycaemic control [24].

Quality of evidence

Details of the judgements about each RoB item in the included (cluster-)randomized controlled studies and across these trials are shown in Additional file 3, Fig. 2 and Fig. 3. We judged the RoB in 85.7% (n = 6) of included trials in generation of the allocation sequence, in 71.4% (n = 5) in incomplete outcome data, in 42.9% (n = 3) each in blinding of outcome assessment, in selective reporting and in cluster randomized trials and in 14.3% (n = 1) in allocation concealment as low. We assessed 42.9% of included studies (n = 3) as being at high RoB in blinding of participants and personnel, 28.6% (n = 2) each in cluster randomized trials and in other bias like a small sample size, and 14.3% (n = 1) each in blinding of outcome assessment, incomplete outcome data and selective reporting. Due to a lack of information in almost all studies, the authors judged a total of 43.6% (n = 24/55) of RoB domains as being unclear (38.2% as low risk: n = 21/55; 18.2% as high risk: n = 10/55).
The problem of poor reporting was also relevant in the quality assessment of the process evaluation reports (see Tables 4 for CASP and Table 5 for MMAT). None of the studies that use qualitative methods adequately described the relationship and interaction between the participants and the researcher. This also applies to qualitative parts of mixed-methods studies. One qualitative study (33.3%) did not report approval of an ethics committee or institutional review board.

Table 4
Quality assessment results of aspects of the qualitative studies (CASP Checklist)

| Quality assessment question                                               | Bleijenberg et al., 2015 [29] | Harris et al., 2015 [23] | van Bruggen et al., 2008 [24] |
|--------------------------------------------------------------------------|-------------------------------|--------------------------|-------------------------------|
| Was there a clear statement of the aims of the research?                 | 1                             | 1                        | can't tell                    |
| Is a qualitative methodology appropriate?                                | 1                             | 1                        | 1                             |
| Was the research design appropriate to address the aims of the research? | 1                             | 1                        | can't tell                    |
| Was the recruitment strategy appropriate to the aims of the research?    | can't tell                     | can't tell                | can’t tell                    |
| Was the data collected in a way that addressed the research issue?       | 1                             | 1                        | can’t tell                    |
| Has the relationship between researcher and participants been adequately considered? | can’t tell                    | can’t tell                | can’t tell                    |
| Have ethical issues been taken into consideration?                       | can’t tell                     | 1                        | 1                             |
| Was the data analysis sufficiently rigorous?                             | 1                             | can’t tell                | can’t tell                    |
| Is there a clear statement of findings?                                  | 1                             | can’t tell                | 1                             |

1 = Yes; [X = NO]
Table 5
Quality assessment results of aspects of the mixed-method studies (MMAT)

| Quality assessment question | Bleijenberg et al., 2013b [33] | Bleijenberg et al., 2016b [34] | Weldam et al., 2017b [35] | Metzelthin et al., 2013a [32] |
|-----------------------------|--------------------------------|--------------------------------|--------------------------|-----------------------------|
| **Screening Questions (for all types)** |                                |                                |                          |                             |
| Are there clear qualitative and quantitative research questions (or objectives), or a clear mixed methods question (or objective)? | 1                              | 1                              | 1                          | 1                           |
| Do the collected data allow address the research question (objective)? E.g., consider whether the follow-up period is long enough for the outcome to occur (for longitudinal studies or study components). | can't tell                      | 1                              | 1                          | 1                           |
| **Qualitative** |                                |                                |                          |                             |
| Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (objective)? | 1                              | 1                              | 1                          | 1                           |
| Is the process for analyzing qualitative data relevant to address the research question (objective)? | 1                              | 1                              | 1                          | 1                           |
| Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected? | 1                              | 1                              | 1                          | 1                           |
| Is appropriate consideration given to how findings relate to researchers’ influence, e.g., through their interactions with participants? | can’t tell                      | can’t tell                      | can’t tell                  | can’t tell                   |
| **Quantitative descriptive** |                                |                                |                          |                             |
| Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)? | 1                              | 1                              | 1                          | 1                           |
| Is the sample representative of the population understudy? | 1                              | 1                              | 1                          | 1                           |
| Are measurements appropriate (clear origin, or validity known, or standard instrument)? | can’t tell                      | can’t tell                      | can’t tell                  | can’t tell                   |
| Is there an acceptable response rate (60% or above)? | 1                              | 1                              | 1                          | 1                           |
| **Mixed methods** |                                |                                |                          |                             |
| Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed methods question (or objective)? | 1                              | 1                              | 1                          | 1                           |
| Is the integration of qualitative and quantitative data (or results) relevant to address the research question (objective)? | 1                              | 1                              | 1                          | 1                           |
| Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results) in a triangulation design? | 1                              | can’t tell                      | can’t tell                  | 1                           |

\(\text{1 = Yes; [X = NO]}\)

**Factors influencing the success of implementation**

The classification of barriers to and facilitators of successful implementation of CPWs in PC was based on the context, implementation and setting dimensions of the CICI framework [15].

An overview of barriers and facilitators in the individual studies is shown Table 7. Barriers were most frequently identified within the dimensions of implementation agents (n = 7) and setting (n = 4). Facilitators were most frequently determined within the implementation agents (n = 6) and implementation strategies (n = 4) (see Table 6).
Source of main project report, year | Barriers | Implementation
--- | --- | ---
Geographical context | Epidemiological context | Socio-cultural context | Socio-economic context | Ethical context | Legal context | Political context | Implementation theory | Implementation process | Implementation strategies
Azad et al., 2008 [22] | X | |
Bleijenberg et al., 2016a [26] | X | X | X | X |
Harris et al., 2015 [23] | |
Melis et al., 2008 [28] | |
Metzelthin et al., 2013b [25] | X |
van Bruggen et al., 2008 [24] | X |
Weldam et al., 2017a [27] | X | X | X | X |

**Context**

Three out of seven CPWs (42.9%) considered aspects of the epidemiological context such as multi-morbid [31, 33, 35] patients aged at least 85 years [33] with mental health problems [34] as barriers to applying an intervention.

28.6% (n = 2) of the CPWs reported the cultural background [33, 35], a low health literacy [35] and gender [33, 35] as potential barriers that could be attributed to the domain of socio-cultural context. Such patient-related characteristics can lead to a time lag in the application of an intervention. Additionally, the frequency of general practice visits [33, 35] have been reported to have a negative impact by two CPWs (28.6%) and could therefore be seen as barrier according to two CPWs.

Additionally, two out of seven CPWs (28.6%) considered a low socio-economic status [33, 35] within the domain of socio-economic context as barriers to applying an intervention.

Furthermore, aspects related to the political context, such as a lack of an incentive systems [24] or adequate reimbursement models [35] or absent monetary compensations [33], were reported in three out of seven CPWs (42.9%) as potential barriers for the effective implementation of an intervention.

No barriers or facilitators within the domains geographical, ethical and legal context could be identified. None of the CPWs described facilitators in any of the dimensions of the domain context.

**Implementation**

Within the domain of implementation strategies the involved HPs of three out of seven CPWs (42.9%) emphasized the importance of training activities and reported appropriate training and education in applying an intervention [23, 24, 33] as facilitator. One CPW (14.3%) considered an overload of information during training activities as potential barrier [32]. According to the results of one CPW, a handbook as facilitator can serve as a clear guideline for HPs to promote a structured application of intervention [35].

The domain of implementation agents can be divided into the two areas of HPs and patients.

On the one hand, HPs' insufficient or even lack of knowledge about how to perform intervention components such as assessments or tests [24, 32, 33], their lack of competence in general [32] and their insufficient experience and job training [32] were considered barriers regarding knowledge and skills in three out of seven CPWs (42.9%). On the other hand, 42.9% (n = 3) of included CPWs identified knowledge and skills such as professional [32, 33, 35], organizational [32] and communication skills [32] and empathic capacity [32] as serving as facilitators to the implementation of the approach. The behaviour-related factors of attitude and awareness, such as a lack of motivation of end-users [24] (14.3%; n = 1) and initial difficulties in implementation due to changes in routines [32, 35] (28.6%; n = 2) were reported as barriers, which can reduce the success of intervention. Further barriers were negative attitude towards the intervention, such as doubts about the expected results [33] in one out of seven CPWs (14.3%), and reluctance regarding an intervention component due to a lack of
agreement [24, 35] in 28.6% (n = 2) of included CPWs, e.g., the prescription of multiple drug regimes [24]. In contrast, a positive attitude towards the effectiveness of the intervention [33, 35] is reported to be a facilitator according to two out of seven CPWs (28.6%). One CPW (14.3%) stated that interventions that provide recommendations to both patients and GPs increased adherence among HPs and affected patients and are therefore facilitators [30].

Interaction-related factors were identified in five out of seven CPWs (71.4%) as influencing aspects. In this regard, HPs named communication and collaboration issues [33] and difficulties in organizing team meetings [32] as barriers. HPs considered good interdisciplinary communication and cooperation [32–34] in 28.6% (n = 2) of included CPWs as well as clear roles and task definition [32, 33] in two out of seven CPWs (28.6%) as facilitators. In addition to the consideration of the multi-professional team, the positive impact of interdisciplinary communication and cooperation was identified in 28.6% (n = 2) of included CPWs as a facilitator [24, 33], e.g., by making comparisons with peers [24]. The integration of family caregivers into the intervention, if possible, was identified as facilitator in one CPW (14.3%) [29], whereas insufficient involvement of single professions was mentioned as barrier in one CPW (14.3%) [33]. According to three out of seven CPWs (42.9%), further barriers in application of the CPW arise due to the extent of intervention, such as time-consuming parts [32, 33, 35] and overly complex intervention components [32, 33]. Two out of seven CPWs (28.6%) reported an individual, flexible, tailored intervention customized to patients’ needs, wishes and preferences providing the HPs as major facilitator in application [33, 35]. Another facilitator in implementation is a good fit of the intervention to the day-to-day work of the delivery agents [35]. A practicable layout of the intervention can ease adoption in daily practice [35] as facilitator according to one included CPW (14.3%).

In addition to HPs, patients as consumers of the intervention, were also considered to affect implementation success. Aspects in this domain were partly identified by the patients themselves (self-assessments) and partly by HPs based on their experiences with affected patients (external assessments): regarding behaviour-related factors, HPs in three out of seven CPWs (42.9%) assumed patients’ motivational issues to be a reason for their low treatment adherence and therefore as barrier [30, 33, 35]. Furthermore, external factors such as transportation issues, sometimes due to adverse weather conditions or scheduling conflicts with other appointments, affected the adherence of intervention recipients and serve as barriers [31]. Similar to HPs, patients in two out of seven studies (28.6%) also indicated that positive expectations regarding interventions [32, 33] were a facilitator. The delivery was also affected by the structure of the intervention components. Participants of one CPW (14.3%) perceived high temporal expenditure due to time-consuming participation to be a barrier [32]. Recipients of each one CPW (14.3%) classified high bureaucratic effort [23] and difficulties in distinguishing the involved disciplines [32] as barriers. On the other hand, two out of seven CPWs (28.6%) reported tailored interventions meeting patients’ current needs [23, 29, 33]; one CPW (14.3%) the possibility for adaptations to avoid excessively restricting their own decision making, e.g., through self-management approaches [32]; and one CPW (14.3%) close monitoring of changing situations, which transmits a sense of security [29], as facilitators. Furthermore, in one CPW (14.3%) the provision of written advice such as a handbook [23] and the use of technical devices for outcome measurement [23] were seen as facilitators by consumers. In addition, patients considered interactions with HPs through personal meetings [23, 32] in two out of seven CPWs (28.6%), good professional-patient relationships [29, 32, 33] in 28.6% (n = 2) of CPWs and good internal exchange between HPs [29] in one CPW (14.3%) to be facilitators.

Within the domain of implementation outcomes two CPWs (28.6%) reported a barrier in problems occurred during the identification of the appropriate target group as the first step of the intervention [32, 33], e.g., due to dysfunctional screening methods [32].

No barriers or facilitators within the domains implementation theory and implementation process were reported. In addition, no facilitators within the domain of implementation outcomes were mentioned by included CPWs.

**Setting**

Barriers reported in four out of seven CPWs (57.1%) within the work environment in the dimension of setting are inadequate staffing due to the general lack of available staff [31, 33], e.g., due to illness or part-time employment [31] and lack of sufficiently educated staff [33]. Structural conditions lead to time pressure [24, 33–35], e.g., due to excessive workload in daily practice [34, 35], which negatively affects the situational performance of intervention components. Additionally, two CPWs (28.6%) mentioned a lack of space as barrier [31, 35]. Also, one CPW (14.3%) cited discontinuity problems in GPs as a barrier [29]. Transparency about referral possibilities promoting the familiarity of HPs with these options was identified as a facilitator [33].

**Discussion**

This study analysed barriers to and facilitators of the implementation of CPWs in PC to gain a better understanding of the factors needed for their successful implementation.

We found that the implementation of interventions into practice requires changes and adaptations in the knowledge, attitudes and behaviour of HPs to achieve a positive impact on outcomes. The finding on the negative influence of personal factors of HPs, such as their lack of knowledge and their attitudes, is in line with findings from a review about barriers and strategies in guideline implementation [36] and a review of staff-reported barriers and facilitators to implementation of hospital-based, patient-focused interventions [37]. Our results show that appropriate training activities for HPs are particularly relevant, as confirmed by a larger feasibility study evaluating a local coronary heart disease treatment pathway in PC [38]. Two systematic reviews focusing on in-hospital settings showed similar results [36, 37]. We found that HPs considered the use of a structured, step-by-step explanatory handbook as a facilitator [35]. This finding is in line with the results of a feasibility study in PC [28]. Findings from another feasibility study suggested that additional material such as small portable cards with inclusion criteria, telephone numbers and listed referral options are helpful [39]. A meta-analysis of the effectiveness of implementation strategies for non-communicable disease guidelines in primary health care concluded that the simple provision of educational materials without training is ineffective [40]. In line with our findings, a review on secondary care found that providing information about successful examples can lower implementation barriers and enhance adherence [37]. Regarding the results showing that HPs have difficulties accepting interventions due to negative attitudes or reluctance regarding intervention components, similar studies also stated that it seems to be advisable to integrate local end-users into the development and
implementation process [36, 38], which is in line with the Medical Research Council (MRC) guidance that recommends involving local end-users to promote successful long-term establishment of effective intervention in practice [40].

Our results show that intervention success also depends on patients’ acceptance and adherence, e.g., due to the risk of a lack of understanding of recommendations. The identified facilitators such as precise and thoroughly explained recommendations [30] as well as the provision of written advice for patients [23] seem to be easy to use in practice. Reasons for negative attitudes towards interventions must be analysed individually to find solutions to promote acceptance and adherence. We also found that the application of an intervention can be made more difficult and time consuming due to several unavoidable patient-related factors, such as age [33], multi-morbidity [31, 33, 35] and cultural background [33, 35]. To counteract this difficulty, patients’ abilities and behaviour must be taken into account.

We identified a good fit of the intervention with the day-to-day work of the delivery agents as a facilitator [35]. To promote a good fit, other studies suggested the integration of interventions into practice software in PC [38] or the use of tablets or smartphones in in-hospital settings [36]. Metzelthin et al. [32], in relation to a process evaluation of the implementation of a nurse-led care approach for community-dwelling frail older people, observed that digitalization of forms may additionally favour interdisciplinary exchange of data. Our results showed that clearly defined responsibilities with regard to tasks and roles are the basic prerequisite for multi-professional communication and cooperation to promote efficient healthcare delivery [32, 33], which is in line with findings for in-hospital settings [36].

Since we identified a lack of time [24, 33–35] as well as overly time-consuming [32, 33, 35] and complex [32, 33] intervention components as barriers, the CPW application should not be associated with too much effort, especially since HPs are already under time pressure. Recommendations and tools have to be plausible, clear and transparent and be presented in a user-friendly, simplified and short form, consistent with findings for in-hospital settings [36, 37]. Furthermore, they must be evidence-based, which is in line with findings in PC [38] as well as with secondary care setting [36]. Thus, Kramer et al. [38] stated that recommendations must conform to the advice of guidelines or other (inter)national guidance to avoid contradictory or overlapping recommendations, whereas an integration into a larger geographic context may facilitate implementation.

A lack of financial incentives and compensation [24, 33, 35] were reported to be important barriers. To overcome this issue, projects should plan to use case payments, and new reimbursement options should be considered to facilitate long-term implementation.

Notably, the retrieved studies originated from a few different studies, and most of them were conducted in the Netherlands [24–28]. This might be due to the influence of the health care system on implementation success, e.g., due to the small gate-keeping impact of GPs in Germany [38] and the free access to medical specialists [42]. Thus, the impact at the system level should always be considered, which emphasizes the importance of the integration of contextual factors into the development and implementation process.

**Limitations**

This systematic review has some limitations. Despite the general interest of GPs in CPWs, there is a low utilization of CPWs in PC [11]. Therefore, the sample used in our work is relatively small, and generalization might not be valid. In addition, the poor quality of reporting in terms of missing information for many core items made a straightforward assessment of internal validity difficult and might have led to inappropriate downgrading. We are, however, confident that our rigorously applied approach and reporting of all steps makes the conclusions transparent. A further issue is the evaluation of the main inclusion criterion. The terms care pathways and critical pathways were not consistently used in the literature. We tried to overcome this issue by applying a broad definition of CPWs [2] to allow for consistency among the compared studies. Furthermore, it seems to be not well established that CPWs are complex interventions [41] and must therefore be developed and evaluated in a specific manner. This fact explains the lack of systematic investigation of the contexts, in terms of barriers and facilitators that would allow thorough evaluation of the external validity of implemented interventions.

**Conclusions**

In the implementation of CPWs in PC practice, a multitude of barriers and facilitators must be considered, and most of them can be modified through careful design of intervention and implementation strategies. We observed a lack of transparent and comprehensive reporting of the intervention components, their implementation strategies and contexts. There is an urgent need to improve the quality of research on CPWs and to follow the established guidelines in conducting and reporting research involving comprehensive process evaluations to produce reliable and transferable evidence to make this promising technology available for practice.

**List Of Abbreviations**

- CASP Critical Appraisal Skills Programme
- CBA Controlled before-after study
- CG Control group
- CICI Context and Implementation of Complex Interventions
- COPD Chronic obstructive pulmonary disease
- CPW Care pathway
Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
Not applicable.

Availability of data and materials
Data extraction forms are available from the authors on request.

Competing interests
The authors declare that they have no competing interests.

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Authors’ contributions
ES and MM wrote the study protocol and registered the review with PROSPERO. ES, VR, PB, MM and TR conceived the structure of the systematic review. ES, VR, TR and MM designed the search strategy. ES and VR independently screened the titles and abstracts and assessed the eligibility for inclusion of all identified publications. ES extracted the data and performed a quality assessment of all included studies, and this process was partly duplicated by VR. MM was consulted in case of conflicts. ES corresponded with all other study authors and wrote the drafts of the review. All authors revised the manuscript critically for important intellectual content and read and approved the final version.

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Additional Files

Additional file 1 Overview of literature database search strategies, used search terms, filters and number of results

Additional file 2 Summary of the characteristics and results of the included studies

Additional file 3 Methodological quality of included main project reports

Figures
Figure 1

Overview of literature database search strategies, used search terms, filters and number of results.
Figure 2
Summary of the characteristics and results of the included studies

| Study               | Random sequence generation (selection bias) | Allocation concealment (selection bias) | Blinding of participants and personnel (performance bias) | Blinding of outcome assessment (detection bias) | Incomplete outcome data (attrition bias) | Selective reporting (reporting bias) | Other bias | Cluster randomized trials |
|---------------------|---------------------------------------------|-----------------------------------------|--------------------------------------------------------|-----------------------------------------------|---------------------------------------|------------------------------------|------------|--------------------------|
| Azad et al., 2008   | +                                           | +                                       | ?                                                      | ??                                            | ?                                     | +                                 | +          | ?                        |
| Bleijenberg et al., 2016a | ?                                           | ?                                       | ?                                                      | +                                             | +                                     | ?                                 | ?          | ?                        |
| Harris et al., 2015 | ?                                           | ?                                       | ?                                                      | +                                             | ??                                    | +                                 | ?          | ?                        |
| Melis et al., 2008  | ?                                           | ?                                       | ?                                                      | +                                             | ?                                     | ?                                 | ?          | ?                        |
| Metzethin et al., 2013b | ?                                           | ?                                       | ?                                                      | +                                             | ?                                     | ?                                 | ?          | ?                        |
| van Bruggen et al., 2008 | ?                                           | ?                                       | ?                                                      | +                                             | ?                                     | ?                                 | ?          | ?                        |
| Weldon et al., 2017a | ?                                           | ?                                       | ?                                                      | +                                             | ?                                     | ?                                 | ?          | ?                        |

Figure 3
Methodological quality of included main project reports
Supplementary Files

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