Applied techniques for putting pre-visit planning in clinical practice to empower patient-centered care in the pandemic era: a systematic review and framework suggestion

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Abstract

Background: One of the main elements of patient-centered care is an enhancement of patient preparedness. Thus, pre-visit planning assessment tools was emerged to prepare and involve patients in their treatment process.

Objective: The main objective of this article was to review the applied tools and techniques for consideration of putting pre-visit planning into practice.

Methods: Web of Science, Scopus, IEEE, and PubMed databases were searched using keywords from January 2001 to November 2020. The review was completed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses checklist. Then, qualitative analysis was done to suggest an appropriate framework by mapping the main concepts.

Results: Out of 385 citations were retrieved in initial database searches, 49 studies from ten countries were included. Applied pre-visit techniques can be classified into eight categories. Our results showed that almost 81% of studies were related to procedures that were done between each visit, while 42% of articles were related to before visits. Accordingly, the main approach of included articles was patient preparedness. While 38 studies reported this approach is effective, three studies reported the effectiveness of such tools as moderate, only two articles believed it had a low effect on improving patient-centered care.

Conclusion: This survey summarized the characteristics of published studies on pre-visit planning in the proposed framework. This approach could enhance the quality of patient care alongside enhancement patient-provider communication. However, such an approach can also be helpful to control pandemic diseases by reducing unnecessary referrals.

Keywords: Pre-visit, Patient-centered care, Patient care planning, Framework
Background
In the information-driven care era, although the ultimate goal of health systems is still improving the quality of patient care, the patient care model has shifted from personal responsibility to participatory medical decision-making [1]. Thus, the responsibility of the patient’s health is no longer solely with the physician. On the other hand, the role of the patient in promoting his health status cannot be denied [2]. Hence, the patient-centered care (PCC) model was introduced to show the participatory role of the patient and other health care providers in the process of treatment and patient care [3–6]. Since the PCC idea was introduced, various definitions and models have been proposed to distinguish the main elements of this model [5, 7–12]. Up to now, the best model that has been able to explain the main components of such a care model is the model presented by the Picker Institute [13]. This model consists of eight parts that outline the factors affecting the achievement of an optimal patient-centered care model [5, 12, 14].

One of the main elements of the PCC approach is respect for patients’ value by preparation of patients for each visit [6]. Sometimes patients have to spend more time in the waiting room than in a physician’s office [15, 16]. Also, in each appointment, especially in the first visit, more than 5 min should be devoted to determining who the patient is, what is his problems, which drugs she/he used, what is his/her medical history, and so on [17]. This process is so complex in patients who have a chronic condition or patients with multiple chronic conditions with multiple medications [18, 19]. It can be useful to prevent the spread of the disease. Limited time for each visit and patient complexity might have a negative impact on the patient-physician relationship.

In this context, pre-visit planning and visit preparation concepts have been suggested by American Medical Association (AMA) as a solution to address these challenges. It can help physicians when the patient checks in for the first time, he is already behind [20]. This term (pre-visit planning) was introduced by Sinsky et al. in 2014 to collect and organize patient data before a patient visit [21].

The purpose of pre-visit planning is to help the patient and physician to save time and improve care by gathering and organizing information in a structured way. Therefore, a health care provider can pay more attention to interpretation, discussion, and response to a patient during the visit. This idea is not just to plan ahead before each visit. Dr. Sinsky explains that pre-visit planning could include a broader concept that could generally refer to preparing the patient for a face-to-face visit more effectively [21]. The pre-visit planning concept is described in Fig. 1 as a conceptual model.

However, there are various methods to apply this new approach into practice, it usually includes scheduling future appointments and preparing patients before the visit [22]. These techniques are known as pre-visit assessment tools. The use of pre-visit assessment tools focuses on involving the patient and the physician through the patient care process [23]. As it is apparent in Fig. 1, it can occur at end of each visit, arranging for the next visit, programming for the next clinical and paraclinical testing, gathering the necessary information for the subsequent visits, and take steps regarding the handoff of patients [24].

Fig. 1 The conceptual model of pre-visit planning
With pre-visit planning, patients and physicians are prepared to make meaningful use of their time during each visit. Furthermore, patients could have an impressive role in clinical decision-making regarding their treatment process [25]. Hence, several studies have focused on the power of patient-centered care to improve patient care, but no studies have been published to examine the applying pre-visit planning techniques in the context of patient-centered care. The main objective of this study is to review the consideration of pre-visit planning used in patient-centered care. Throughout this paper, the term pre-visit planning will refer to any intervention, care program, patient-centered planning, or even educational plan that is considered to prepare the patient for a face-to-face visit or improve the patient-provider relationship. Specific aims of this survey are as follows: 1) representing an overview of applied methods regarding pre-visit planning with their characteristics in published studies, 2) to investigate the published studies on applying pre-visit planning regarding clinical aspects such as type of disease, 3) to determine the effectiveness of putting pre-visit planning into routine practice, 3) providing an overview of the sample size, approaches, and collected information concerning applied methods and techniques, 4) suggesting a framework in this context.

Method
A systematic search of four databases (Web of Science, Scopus, IEEE, and PubMed) was conducted from January 2001 to November 2020 using keywords alongside Mesh terms. These databases were selected for their inclusion of qualitative studies and health research. The keywords used in the search strategy were drawn from preliminary searches according to our study goals. Those keywords were validated and additional keywords added by checking the terms used in articles identified in preliminary searches. Boolean search strategies were described in Additional file 1: Table A-1. Since no result was found in the IEEE database, it was removed from source databases in Table A-1. This systematic review was completed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist to ensure the inclusion of relevant studies [26].

Inclusion and exclusion criteria for study selection
Articles were included if they met the following criteria: 1) The focus of the study was on applying the pre-visit approach through the patient care process. 2) Population includes all of the patients with any type of disease. 3) This study covered all phases of the patient care process, 4) Published in recent 10 years and matched with the search query, 5) Limited to those published in the English language, 6) Only published articles and reviews in peer-reviewed journals were included, 7) All type of study designs, 8) Improve patient-centered care, 9) Studies that received an acceptable score in terms of quality based on the checklist. Articles excluded if they met the following criteria: 1) The title, abstract, or full text of the article did not relate to pre-visit planning, 2) Thesis, book chapters, letters to editors, short briefs, reports, technical reports, book reviews, review, or meta-analysis, 3) Non-English papers, 4) Publication that their full-text is not available.

Data screening phase
Based on our search strategy; articles were retrieved from databases. Additionally, related studies were added manually by a simple search in Google Scholar and reference checking. All of the citations were imported to EndNote software for better resource management. Then, duplicated articles were removed. In the first phase, all titles and abstracts of articles were examined based on our main objective to select relevant studies by one author (MG). A second reviewer (MGH) reviewed a sample of studies randomly. After that, the full texts of relevant studies were screened thoroughly by two reviewers (MG and MGH). If there was a disagreement between the authors in the selection of relevant studies, the final decision was made by HA. Lastly, some studies remained as eligible articles for qualitative analysis. The extraction forms were designed by researchers to manage and investigate the obtained information. To diminish bias, key subjects of articles summarized and entered into customized extraction forms based on specific classifications. Two authors (MG and MGH) independently extracted the study characteristics based on the classification. The information extracted by the researchers was re-examined to reach an agreement. The next reviewer (HA) assessed and verified the extracted information.

Critical quality appraisal
The methodological quality of the included articles was evaluated using the Qualitative research Critical Appraisal Program (CASP) tool by two authors. This instrument was used in systematic reviews frequently for qualitative synthesis [27]. It was employed for appraising the strengths and limitations of any qualitative research methodology. It was recommended for health-related researches and it is appropriate for novice researchers [28]. Critical appraisal was performed independently by two researchers.

Analysis
To extract some necessary information, specific categories were considered to classify and analyze relevant articles. All of the articles were synthesized regarding general and specific domains. The general domain
comprises the title, author, year of publication, journal name, type of study, the main objectives. Accordingly, the specific domain comprises applied pre-visit techniques, disease, clinic, sample size, country, outcome measures, effectiveness, and collected data. Analysis of the extracted information from eligible articles and framework suggestions were conducted based on these predefined categories.

Results
In total, systematic literature searching of databases yielded 385 citations. Of which 99 articles were removed due to duplication. Next, one hundred and sixty-six papers were excluded after screening titles and abstracts. In the following, 72 papers were excluded after full-text reading. Finally, 49 papers are identified as an eligible article which met our inclusion criteria. The screening process for articles based on the PRISMA checklist is shown in Fig. 2. All included papers had the minimum score (10 from 20) of quality assessment using the CASP tool. Only four papers were excluded based on quality appraisal assessment. Therefore, forty-nine articles were identified as eligible studies for qualitative analysis.

General characteristics
All included studies are published in journals from 2001 to 2020. The trend of publishing articles in this field was following an upward trend. In terms of the type of study, studies were conducted in different designs. Most of which were clinical trial studies. The descriptive analysis regarding the type of study in the included articles is represented in Table 1. In the following, the results of the review of studies by author, year of publication, the main objectives, the sample size, type of pre-visit planning, clinic, the effectiveness of the applied method, and outcome of using the pre-visit planning are summarized in Table 2.
Table 1 The frequency of different types of study

| Study type               | Frequency | Percentage | References                      |
|-------------------------|-----------|------------|---------------------------------|
| RCT                     | 21        | 44.9%      | [22, 23, 29–47]                 |
| Before-after study      | 10        | 18.4%      | [48–57]                         |
| Descriptive study       | 9         | 18.4%      | [25, 58–65]                     |
| Cross-sectional study   | 2         | 4.1%       | [66, 67]                        |
| Mixed method            | 2         | 4.1%       | [68, 69]                        |
| Cohort                  | 1         | 2.0%       | [24]                            |
| Non-Randomized trials   | 1         | 2.0%       | [70]                            |
| Quasi-experimental study| 1         | 2.0%       | [71]                            |
| Sequential prospective study | 1 | 2.0% | [72] |
| Time-series analysis    | 1         | 2.0%       | [73]                            |

Analysis of studies showed that the application of pre-visit planning is the most favorite of developed countries. Of them, the USA has the most contribution among other studies. After that Canada ranks second in the deployment plan is allocated to pre-visit intervention. The distribution of studies concerning the country is shown in Fig. 3.

Different techniques for putting pre-visit into practice

The investigation showed that pre-visit can apply in different ways regarding timing, main approaches, and types. The analysis showed that different types of pre-visit techniques have been employed by authors to facilitate office visits and patient care. All of these plans can be categorized into eight different categories, utilizing an electronic pre-office checklist with 12 studies (24.5%) [25, 29–35, 48, 58, 59, 68], educating patients and support them before each visit in form of online and offline source of information with 12 studies (24.5%) [23, 36–42, 60–62, 66, 74], applying an EHR-linked care program with different checklists and assessment tools with nine studies (18.4%) [22, 43, 44, 49, 63, 67, 70, 71, 73], using paper-based checklists with nine studies (18.4%) [45, 46, 50–52, 64, 65, 69, 72], preparing and assess patient with the pre-visit phone-based intervention with two studies (4.1%) [24, 53], using self-triage or self-assessment tools with two studies (4.1%) [54, 55], using automatic reminders and sheets with one article (2%) [56], and using pre-clinic consultation by other health care team member with one article (2%) to prepare the patient for each visit [57].

According to findings, the most favorite types of pre-visit model were related to using electronic pre-office visit checklists and supporting patients by providing them with the necessary information in the form of online and offline training. In three articles, this information was provided to patients in the form of educational websites [37, 39, 40, 60], while in the other six articles, the information was provided to patients in the form of training sessions before the patient’s visit and referring to the clinic [23, 36, 38, 41, 42, 61, 62, 66].

The next widely applied method was the EHR-linked care program that put pre-visit planning into practice. Ten articles used pre-visit solutions such as electronic checklists, automated reminders, decision-making tools, and reviewable forms that could be implemented by connecting to electronic medical records. In third place, there are paper-based checklists used for patient preparation with nine papers. These checklists included questions about demographic information, the main problems, medical history, general symptoms, illness history, hospitalizations, medications, family history of a specific illness, level of education, location, and questions about the patient’s lifestyle. Other solutions were used in a smaller number of articles. Regarding pre-visit counseling, only one article applied the consultation of clinical pharmacists before the office visit. This approach leads to providing the physician with better information after the initial completion of the medical record.

In terms of timing, pre-visit intervention could be conducted at a different time in the patient care process. Taken together, all of these possibilities could be categorized into four situations. It can be occurred before each visit, between visits, at the end of each visit on the current visit, and in a combination of the previous three models. Our results showed that almost 81% of studies were related to procedures that were done between each visit, while 42% of articles were related to procedures that were done before each visit. Only 10% of studies were conducted at end of the current visit.

In terms of main approaches, the analysis of studies showed that all studies can be divided into three main categories based on the main approaches. These three approaches comprise, improving the current visit and preparing the patient for the next visit, perform some procedures for patient preparedness such as sending reminders or filling pre-visit checklists, and providing more inclusively insight about the patient for the physician before they come in for an office visit. The final analysis of the studies based on the main objectives and the timing is summarized in Table 3. Out of 49 studies, the main approach forty-eight of articles were related to patient preparedness and enhance patient adherence to their treatment.

Out of 49 studies, only one study did not report the sample size of their study. In total, the sample size ranged from 15 to 12,228 with a mean sample size of 1160.3877 (SD = ± 2613.799). In Fig. 4, the distribution of studies based on sample size, year, and different techniques are represented.
| #  | Author                  | Year | Journal                          | Pre-visit model                        | Objective                                                                 | Findings and applied techniques characteristics | Type of medical informatics solution | Collected data                                                                 | Outcome measures                                                                                   | CASP SCORE |
|----|-------------------------|------|----------------------------------|----------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------|------------------------------------|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|------------|
| 1  | Allende-Richter, S. H. et al. [64] | 2018 | Clin Pediatr                     | Paper-based checklist                  | (1) Enhance team working among care team members and (2) Provide early access to existing medical services | Not mentioned                                    | Primary care clinic                           | USA General                         | Pre-assessment tools, Medical history, Family history, Reason for referral, Symptoms, Medication | Patient-provider communication, Perceived involvement in care, Patient satisfaction, Identifying referral appropriateness | 18         |
| 2  | Rivo, J. et al. [24]    | 2015 | Popul Health Manag               | Phone-based pre-office visit preparation | Improving compliance with recommended tests and screenings.               | 7491 patients                                    | Primary care clinic                           | USA Diabetes                         | Decision aid tools, Medical history, Family history, Reason for referral, Symptoms | Patient-provider communication, Perceived involvement in care, Patient expectations in consultations, Adherence to visit scheduling | 17         |
| 3  | Cox, N et al. [57]      | 2018 | J Am Board Fam Med              | A pre-clinic care team consultation    | To evaluate the impact of a pre-visit pharmacist consultation for chronic non-cancer pain | 45 patients                                      | A family medicine residency clinic           | USA Chronic Opioid                   | Decision aid tools, Medical history, Family history, Reason for referral, Symptoms | Patient satisfaction, Patient expectations in consultations, Appointment intake information, Medication and treatment adherence, Mental health topics | 16         |
| 4  | Paget et al. [53]       | 2015 | Health Promot Pract              | Phone-based pre-office visit preparation | To increase patient compliance with scheduled appointments, follow up, and complete exams on time. | 5539 patients                                    | Diabetic clinic                               | USA Diabetes                         | Decision aid tools, Medical history, Family history, Reason for referral, Symptoms | Illness perceptions, Perceived involvement in care, Patient satisfaction, Patient expectations in consultations, Medication and treatment adherence, Adherence to visit scheduling, Visit length | 17         |
| 5  | Bose-Brill, S et al. [70] | 2018 | J Med Internet Res              | EHR-Linked care program               | To determine the impact of pre-visit ACP planning using a secure EHR-linked framework | 419 patients aged between 50 and 93 years         | Routine follow-up visit                        | USA Primary care clinic               | Decision aid tools, Pre-assessment tools, Reminders, Medical history, Family history, Reason for referral, Symptoms, Drug side effects and Medication | Patient-provider communication, Illness perceptions, Knowledge, Patient expectations in consultations, Medication and treatment adherence, Visit length, Identifying referral appropriateness | 15         |
| 6  | Riese, A et al. [48]    | 2015 | Acad Pediatr                    | Electronic pre-office visit checklist  | To determine the efficacy of electronic pre-visit questionnaires (PVCs)   | 183 adolescents                                   | Pediatric primary care clinic                | USA pediatric diseases                | Decision aid tools, Medical history, Family history, Reason for referral, Symptoms, Drug side effects and Medication | Illness perceptions, Perceived involvement in care, Patient satisfaction, Identifying referral appropriateness | 18         |
| 7  | Myers, P et al. [36]    | 2020 | J Plast Reconstr Aesthet Surg   | Online and offline sources of         | To improve patient understanding of                                      | 100 patients                                     | Surgery clinic                               | USA Obesity                          | Decision aid tools, Medical history, Family history, Reason for referral, Symptoms, Medication | Patient satisfaction, Appointment intake information, Quality of life | 16         |
| #  | Author Year Journal  | Pre-visit model | Objective | Findings and applied techniques characteristics | Sample size | Effectiveness | Clinic | Country | Disease Type of medical informatics solution | Collected data | Outcome measures |
|----|----------------------|-----------------|-----------|-----------------------------------------------|-------------|---------------|-------|---------|-----------------------------------------------|--------------|-----------------|
| 8  | Frank, O et al. [50]  | 2014 Aust Fam Physician | Paper-based checklist | To assess whether ongoing programs are acceptable to patients and feasible in busy routine clinical practice. | 14 GP and 130 patients | +++ | General clinic | Australian | General | Pre-assessment tools | Demographic data, Medical history, Family history, Reason for referral, Symptoms, Medication | Patient-provider communication, Patient satisfaction, Patient expectations in consultations, Identifying referral appropriateness | 13 |
| 9  | Lewin, W et al. [51] | 2009 Can Fam Physician | Paper-based checklist | To assess the efficacy of a pre-visit questionnaire (PVQ) | 210 patients aged 13 to 19 | +++ | Primary care | Canada | Psychology | Pre-assessment tools | Demographic data, Medical history, Family history, Reason for referral, Symptoms, Medication | Patient-provider communication, Illness perceptions, Patient satisfaction, Patient expectations in consultations, Identifying referral appropriateness | 18 |
| 10 | Liu, T et al. [25]   | 2018 J Arthroplasty | Electronic pre-office visit checklist | To clarify the patient preference with hip and knee arthritis regarding pre-visit completion | 51 Patients | ++ | Arthroplasty clinics | USA | Hip and Knee Pain | Pre-assessment tools, Decision aid tools | Demographic data, Medical history, Lifestyle, Family history, Lab data, Reason for referral, Symptoms, Medication | Illness perceptions and knowledge, Perceived involvement in care, Patient waiting times, Identifying referral appropriateness | 18 |
| 11 | Stanowski-Drengler, T J et al. [37] | 2019 Ann Surg Oncol | Online and offline sources of information and support | To assess completion, delivery method, and barriers or facilitators to pre-visit completion | 201 patients | ++ | Cancer clinic | USA | Breast cancer | Patient education | Demographic data, Reason for referral, Patient awareness, Symptoms | Illness perceptions, Perceived involvement in care, Appointment intake information | 14 |
| 12 | Wald, J S et al. [47] | 2010 J Am Med Inform Assoc | EHR-Linked pre-visit checklist | To examine the impact of pre-visit electronic journals in primary care as a decision aid | 2027 patients and 272 physicians | +++ | Primary clinic | USA | General | Decision aid tools, Pre-assessment tools, Reminders | Demographic data, Medical history, Lifestyle, Family history, Lab data, Reason for referral, Patient awareness, Drug side effects, Symptoms, Medication | Patient-provider communication, Illness perceptions, Perceived involvement in care, Patient satisfaction, Patient expectations in consultations, Identifying referral appropriateness | 20 |
| 13 | Zanini, C et al. [65] | 2018 Patient Educ Couns | Paper-based checklist | Assess high-quality websites on patients' information and support | 38 patients | +++ | neurology | Switzerland | Chronic pain | Pre-assessment tools | Demographic data, Medical history, Family | Patient-provider communication, Patient expectations in care | 15 |
| #   | Author                        | Year | Journal                       | Pre-visit model          | Objective                                                                 | Findings and applied techniques characteristics                                                                                       | CASP SCORE | Sample size | Effectiveness | Clinic | Country | Disease Type of medical informatics solution | Collected data |
|-----|-------------------------------|------|-------------------------------|--------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|------------|--------------|---------------|--------|----------|---------------------------------------------|-----------------|
| 14  | Grant, R et al. [22]          | 2016 | Contemp Clin Trials           | EHR-Linked care program  | To determine a strategy for improving diabetes care                         | 146 physicians with 2496 of their patients                                                                                           | +++++       | Canada       | Primary care clinic Diabetes                | Decision aid tools, Pre-assessment tools, Reminders    | Demographic data, Medical history, Lifestyle, Family history, Lab data, Reason for referral, Patient awareness, Drug side effects, Symptoms, Medication | +++++         |
| 15  | Frank, O. R et al. [56]       | 2011 | BMC Fam Pract                 | Automatic reminders and sheets | Assess satisfaction with the decision process                               | Sixty patients                                                                                                                       | +++++       | Australia    | Primary care clinic General                | Reminders                                                  | Demographic data, Medication data                         |                   |
| 16  | Rodenbach, R et al. [38]      | 2017 | J Clin Oncol Oncol           | Online and offline sources of information and support | To examine the impact of a decision aid versus high-quality websites        | 24 oncologists and 170 patients                                                                                                       | +++++       | USA          | Oncology clinic Cancer                      | Decision aid, Patient education                          | Demographic data, Drug side effects                        |                   |
| 17  | Hitchings, S, and Baner, J [54] | 2009 | J Fam Plann Reprod Health Care | Self-triage or self-assessment tool | This study examined whether and how a pre-consultation sheet (PCS) can facilitate doctors in identifying targets for medical advice. | 193 patients                                                                                                                        | +++++       | UK           | Sexual health clinics Sexual problems       | Pre-assessment tools                                      | Demographic data, Medical history, Lifestyle, Family history, Lab data, Reason for referral, Patient awareness, Drug side effects, Symptoms, Medication | +++++         |
| 18  | Seath, B et al. [23]           | 2017 | Patient Educ Couns            | Online and offline sources of information and support | To improve patient-provider communication during time-limited primary care visits and represent a strategy for improving diabetes care. | 259 patients                                                                                                                       | +++++       | USA          | Pediatric asthma clinic Asthma              | Patient education                                         | Demographic data, Patient awareness                        |                   |
| 19  | Tucholka, J L et al. [39]     | 2018 | J Am Coll Surg                | Online and offline sources of information and support | To assess the acceptability of a new strategy of pre-consultation prevention summaries and reminders in | 377 patients                                                                                                                       | +++++       | USA          | Breast cancer clinic Breast cancer          | Patient education                                         | Demographic data, Patient awareness                        |                   |

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| #  | Author                  | Year | Journal                      | Pre-visit model                                      | Objective                                                                 | Findings and applied techniques characteristics                                                                 | CASP SCORE |
|----|-------------------------|------|------------------------------|------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------|
| 20 | Aboumatar, H. J et al.  | 2013 | J Gen Intern Med             | Online and offline sources of information and support | Combining patient-oncologist intervention to improve communication in advanced cancer | 41 primary care physicians and 27% of their patients + + + Primary care clinic USA Hypertension Patient education Demographic data, Patient awareness Appointment intake information | 18         |
| 21 | Albada, A. et al.       | 2015 | Patient Educ Couns           | Electronic pre-office visit checklist                | To help reduce waiting times and duplication of work, improve patient pathways and decrease wasted visits | 197 patients + Breast cancer clinic Norway Breast cancer Decision aid tools, Pre-assessment tools, Reminders Demographic data, Medical history, Family history, Reason for referral, Symptoms, Medication Patient-provider communication, Perceived involvement in care, Adherence to visit scheduling, Visit length | 18         |
| 22 | Bruce, J. et al.        | 2018 | J Cancer Educ                | Online and offline sources of information and support | To evaluate teen feedback on an asthma question intervention designed to motivate teens to be more engaged during visits and | 377 patients ++ breast surgery clinic USA Breast cancer Patient education Patient awareness, Symptoms Appointment intake information, Identifying referral appropriateness | 15         |
| 23 | Walker, M. E. et al.    | 2018 | J Hand Surg Asian Pac        | Paper-based checklist                                | To compare patients' knowledge after the pre-consultation delivery of standard websites versus a web-based decision aid (DA) | 71 patients ++ Surgery clinic USA Hand problems Pre-assessment tools Demographic data, Medical history, Reason for referral, Symptoms Patient-provider communication | 14         |
| 24 | Savage, C. et al.       | 2019 | Int J Qual Health Care       | Paper-based checklist                                | To elucidate how HL influences patients' interest in participating in medical visit communication. | 289 +++ questionnaires Primary clinic Sweden General Pre-assessment tools Demographic data, Medical history, Reason for referral, Symptoms Patient-provider communication, Perceived involvement in care | 14         |
| 25 | Judson, T. J. et al.    | 2020 | J Am Med Inform Assoc        | Self-guide or self-assessment tool                   | To prepare for breast cancer genetic counseling. The large academic health system | 950 unique patients +++ CANADA COVID-19 Pre-assessment tools Demographic data, Medical history, Lifestyle, Family history, Lab data, Reason for referral, Drug side effects Symptoms, Medication Perceived involvement in care, Self-care, Self-care, Symptom control | 18         |
| #  | Author          | Year | Journal            | Pre-visit model          | Objective                                                                 | Findings and applied techniques characteristics | Type of medical informatics solution | Collected data | Outcome measures                                                                 |
|----|----------------|------|--------------------|--------------------------|---------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------|----------------|-----------------------------------------------------------------------------------|
|    |                |      |                    |                          | Sample size | Effectiveness | Clinic | Country | Disease | Type of medical informatics solution | Collected data | Outcome measures                                                                 |
| 26 | Albada, A. et al. [30] | 2012 | Genet Med          | Electronic pre-office visit checklist | 200 counselees | +++         | Breast cancer genetic counseling clinic | Netherlands | Breast cancer | Decision aid tools, Pre-assessment tools | Demographic data, Medical history, Lifestyle, Family history, Lab data, Reason for referral, Drug side effects, Symptoms, Medication | Patient-provider communication, Appointment intake information, Adherence to visit scheduling |
| 27 | Purkapile, B. A et al. [45] | 2016 | Ann Fam Med        | Paper-based checklist | 64 encounters | ++          | Primary clinic | USA | General | Pre-assessment tools | Demographic data, Medical history, Lifestyle, Family history, Lab data, Reason for referral, Symptoms, Medication | Patient-provider communication |
| 28 | Krist, A. H. et al. [40] | 2007 | Ann Fam Med        | Online and offline sources of information and support | 497 participants | ++          | Primary clinic | USA | Prostate cancer | Patient education | Demographic data, Patient awareness | Patient expectations in consultations, visit length, Identifying referral appropriateness |
| 29 | Fothergill, K. E et al. [68] | 2013 | Acad Pediatr       | Electronic pre-office visit checklist | 172 parents | ++          | Primary care pediatric | USA | Mental health | Decision aid tools, Pre-assessment tools, Patient education | Demographic data, Medical history, Lifestyle, Family history, Lab data, Reason for referral, Patient awareness, Drug side effects, Symptoms, Medication | Patient-provider communication, Illness perceptions, Appointment intake information, Patient waiting times, Mental health topics |
| 30 | Lee, Y. K et al. [58] | 2017 | J Eval Clin Pract  | Electronic pre-office visit checklist | 15 participants | +++         | Primary care | Malaysia | Chronic disease | Decision aid tools, Pre-assessment tools, Patient education | Demographic data, Medical history, Lifestyle, Family history, Lab data, Reason for referral, Drug side effects, Symptoms, Medication | Illness perceptions, Perceived involvement in care, Appointment intake information, Identifying referral appropriateness |
| 31 | Johansen, M. A. et al. [59] | 2011 | Methods Inf Med    | Electronic pre-office visit checklist | 83 respondents | +++         | visiting university locations | Norway | General | Decision aid tools, Pre-assessment tools, Patient education | Demographic data, Medical history, Lifestyle, Family history, Lab data, Reason for referral, Drug side effects, Symptoms, Medication | Patient-provider communication, Illness perceptions, Patient expectations in consultations |
| 32 | Hu, X et al. | 2012 | J Health Online and | To evaluate | 505 | +++         | primary care | USA | General | Patient | Demographic | Patient expectations in consultations |
| #  | Author and Year | Journal | Pre-visit model | Objective | Findings and applied techniques characteristics | CASP SCORE |
|----|-----------------|---------|-----------------|-----------|-----------------------------------------------|------------|
| 33 | Albada, A. et al. [42] | Fam Cancer | Online and offline sources of information and support | To evaluate how parents and physicians perceive the utility of a comprehensive, electronic pre-visit screening, and its impact on the visit. | Breast cancer genetic counseling clinic | 15 |
| 34 | Frost, J. et al. [31] | BMJ Open | Electronic pre-office visit checklist | To explore the impact of a pre-consultation website in addressing patients’ unmet needs during chronic disease consultations. | Diabetes clinics | 17 |
| 35 | O’Brien, M et al. [32] | BMC Fam Pract | Electronic pre-office visit checklist | To investigate people’s attitude towards providing symptom information electronically before a consultation. | Family physician’s clinic | 20 |
| 36 | Wald, J. S. et al. [43] | AMIA Annu Symp Proc | EHR-Linked care program | To investigate the potential of e-journal to improve patient care during a visit. | Primary care | 16 |
| 37 | Albertson, G. et al. [72] | Am J Manag Care | Paper-based checklist | To tailor information that might help the patient to prepare for their first visit. | Internal medicine clinic | 14 |
| 38 | Wolff, J. L. et al. [46] | J Am Geriatr Soc | Paper-based checklist | To explore whether a pre-visit educational tool could facilitate shared decision making. | Geriatric clinic | 17 |
| #  | Author Year Journal | Pre-visit model | Objective | Findings and applied techniques characteristics | Sample size | Effectiveness | Clinic | Country | Disease Type of medical informatics solution | Collected data | Outcome measures |
|----|---------------------|----------------|-----------|-----------------------------------------------|-------------|--------------|-------|---------|---------------------------------------------|---------------|----------------|}
| 39 | Causarano, N. et al. [41] 2015 Support Care Cancer | Online and offline sources of information and support | To compare the acceptability and feasibility of using brief electronic versus paper screening consultation web-based intervention enables patients with diabetes to articulate their agenda in a consultation | 41 patients | +++ | Plastic surgery clinic | Canada | Breast Cancer | Patient education | Demographic data, Patient awareness | Patient expectations in consultations, Medication, and treatment adherence | 15 |
| 40 | Gant, R. W. et al. [44] 2008 Arch Intern Med | EHR-Inked care program | To evaluate a patient chart information in preparation for a scheduled office visit | 244 patients with DM | +++ | Primary care | USA | Diabetes | Decision aid tools, Pre-assessment tools, Patient education | Demographic data, Medical history, Lifestyle, Family history, Lab data, Reason for referral, Patient awareness, Drug side effects, Symptoms, Medication | Patient-provider communication, Illness perceptions, Medication and treatment adherence, Symptom control | 12 |
| 41 | Brackett, C., & Kearing, S [62]. 2015 Patient | Online and offline sources of information and support | To determine whether a brief pre-visit questionnaire can improve primary care provider communication | 11,493 patients | +++ | Cancer clinic | USA | Cancer | Patient education | Demographic data, Patient awareness | Patient expectations in consultations, Mental health topics, Visit length | 15 |
| 42 | Meropol, N. J. et al. [33] 2013 Cancer | Electronic pre-office visit checklist | To assess the acceptability of a pre-consultation checklist for older patients | 1932 patients | +++ | Cancer clinic | USA | Cancer | Decision aid tools, Pre-assessment tools | Demographic data, Medical history, Family history, Lab data, Reason for referral, Patient awareness, Drug side effects, Symptoms, Medication | Illness perceptions, Perceived involvement in care, Patient expectations in consultations, Visit length | 15 |
| 43 | Kim-Hwang, J. E. et al. [49] 2010 J Gen Intern Med | EHR-Inked care program | Bridging the gap about post-mastectomy breast by applying a new approach | 540 questionnaires | +++ | Primary care | USA | General | Decision aid tools, Pre-assessment tools, Patient education, Reminders | Demographic data, Medical history, Family history, Reason for referral, Symptoms, Medication | Patient-provider communication, Illness perceptions, Perceived involvement in care, Patient satisfaction, Medication and treatment adherence, Adherence to visit scheduling | 16 |
| 44 | Muraywid, B. et al. [63] 2020 J Manag Care Spec Pharm | EHR-Inked care program | To evaluate the impact of a DMISPECIFIC PHR | 700 patients | +++ | Primary care | Colombia | Diabetes | Decision aid tools, Pre-assessment | Demographic data, Medical history, Reason for referral | Patient-provider communication, Illness perceptions, Patient satisfaction | 9 |
| #   | Author, Year | Journal | Pre-visit model | Objective | Findings and applied techniques characteristics | Type of medical informatics solution | Collected data tools, Patient education, Reminders | Outcome measures                                                                 |
|-----|--------------|---------|-----------------|-----------|-------------------------------------------------|-------------------------------------|-------------------------------------------------|----------------------------------------------------------------------------------|
| 45  | Vo, M. T. et al. [34] | 2019 Journal of General Internal Medicine | Electronic pre-office visit checklist | To facilitate shared decision-making by utilizing a web-based survey system before the visit. | 1276 patients + primary care USA Diabetes | Decision aid tools, Pre-assessment tools | Demographic data, Medical history, Lab data, Reason for referral, Symptoms, Medication | Patient-provider communication, Perceived involvement in care, Patient satisfaction |
| 46  | Baker, D. W. et al. [73] | 2011 Journal of the American Medical Informatics Association | EHR-linked care program | To develop an intervention to improve communication between patients and their physicians | 12,288 patients +++ Internal medicine USA General | Decision aid tools, Pre-assessment tools | Demographic data, Medical history, Lab data, Reason for referral, Symptoms, Medication | Patient-provider communication, Perceived involvement in care, Patient satisfaction |
| 47  | Grant, Richard W, et al. [35] | 2019 The Annals of Family Medicine | Electronic pre-office visit checklist | To improve patient values and needs. | 750 English- or Spanish-speaking patients +++ Primary care Canada General | Decision aid tools, Pre-assessment tools | Demographic data, Medical history, Lab data, Reason for referral, Symptoms, Medication | Patient-provider communication, Patient satisfaction, Appointment intake information |
| 48  | Harrington, J. T., & Walsh, M. B [57] | 2001 Arthritis Care & Research: Official Journal | EHR-linked care program | To determine the impact of e-referral and pre-visit planning. | 270 patients +++ Rheumatology USA Rheumatology diseases | Decision aid tools, Pre-assessment tools, Patient education, Reminders | Demographic data, Medical history, Family history, Reason for referral, Symptoms, Medication | Patient-provider communication, Illness perceptions, Perceived involvement in care, Patient satisfaction, Medication and treatment adherence, Adherence to visit scheduling |
| 49  | Gadomski, A. M et al. [71] | 2015 Journal of Adolescent Health | EHR-linked care program | Their objective was to improve health outcomes and reducing costs. | 72 patients +++ pediatric primary care USA Mental health | Decision aid tools, Pre-assessment tools, Patient education, Reminders | Demographic data, Medical history, Family history, Reason for referral, Symptoms, Medication | Patient-provider communication, Perceived involvement in care, Patient satisfaction, Appointment intake information, Medication adherence, Adherence to visit scheduling, Reductions in prescription costs, Mental health topics |
The effectiveness of pre-visit planning

Articles were also reviewed regarding the effectiveness of the applied methods. Out of 49 studies, the authors of 41 articles (83.67%) considered pre-visit planning to be effective in clinical practice. While six studies (12.24%) reported the effectiveness of these tools as moderate, only two articles (4.08%) believed that using this method had very little effect on improving patient-centered care. The effectiveness of studies concerning applied methods is shown in Fig. 5.

The effectiveness has been reported by researchers using various outcome measures in studies. These outcome measures reported in reviewed articles, along with their frequency and their effectiveness, are shown in Table 4.

Different diseases and the main reason for referral

Through this survey, the referred clinic and the main reasons for the referral were also examined in reviewed articles. In terms of the reason for referral and diseases, the most common reason for referral was related to chronic disease and general problems. The frequency of disease regarding applied methods and their effectiveness are represented in Fig. 6. Regarding the type of clinic that was considered for implementing pre-visit planning, the highest frequency was related to primary care clinics. Next, surgical clinics had the largest number of pre-visit programs.

Information and collected data

To implement pre-visit planning, various types of data and information have been collected in studies. These collected data were very diverse. Hence, these different types of information can be divided into nine categories concerning their application. The different types of information regarding applied techniques are shown in Fig. 7.

Determining the main categories of applied techniques regarding medical informatics

Coding of all research studies and extracted themes using thematic analysis leads to discover the main sub-themes in terms of medical informatics. Therefore, all of the employed techniques can be divided into four categories, pre-assessment forms, educational resources, decision aid tools, and reminders as the main themes. The main themes and sub-themed are shown in Fig. 8. Different aspects of such a model were shaped by mapping the main concepts obtained through this survey. The details of applied techniques in terms of the medical informatics view are described in Table 2.

Framework suggestion and IT-based solution

After a qualitative analysis of the results based on pre-determined categories, the main ideas can be summarized in a proposed framework as an electronic-based advanced care program. Based on the results, this model is divided into four main parts in terms of time. This model is represented in Fig. 9. In this model, the main focus is on the patient. The workflow is designed to improve the relationship between physician and patient in the simplest way. It is done by involving the patient in their care, which is one of the main purposes of using pre-visits in studies.

In this model, it is assumed that an electronic system is available to manage patient information. To implement a pre-visit-based program, a section is also considered for patient access to his care plan in the proposed model. Based on this model, the patient can pursue the main goals of pre-visit planning through suggested workflow, such as disease management, treatment adherence, receiving the necessary advice and training, and preparing for each visit. To increase the effectiveness of the devised model, it is suggested that the proposed
### Table 3 Results of study analysis based on main objectives and timing

| Author                     | Pre-Visit Model                          | Main Approaches                                      | Timing        |
|----------------------------|------------------------------------------|------------------------------------------------------|---------------|
| Allende-Richter, S. et al. | Paper-based checklist                    | √                                                    |               |
| Rivo, J. et al.            | Phone-based pre-office visit preparation | √                                                    |               |
| Cox, N et al.              | A pre-clinic care team consultation      | √                                                    |               |
| Page T et al.              | Phone-based pre-office visit preparation | √                                                    |               |
| Bose-Bril, S et al.        | EHR-linked care program                  | √ √ √                                                |               |
| Riese, A et al.            | Electronic pre-office visit checklist     | √                                                    |               |
| Myers, P et al.            | Online and offline sources of information and support | √ √ √                                                |               |
| Frank, O et al.            | Paper-based checklist                    | √                                                    |               |
| Lewin, W et al.            | Paper-based checklist                    | √                                                    |               |
| Liu, T et al.              | Electronic pre-office visit checklist     | √                                                    |               |
| Stankowski, T. J et al.    | Online and offline sources of information and support | √                                                    |               |
| Wald, J. S et al.          | EHR-linked care program                  | √                                                    |               |
| Zanini, C et al.           | Paper-based checklist                    | √                                                    |               |
| Grant, R et al.            | EHR-linked care program                  | √ √ √                                                |               |
| Frank, O. R et al.         | Paper-based checklist                    | √                                                    |               |
| Rodenbach, R. et al.       | Online and offline sources of information and support | √                                                    |               |
| Hitchings, S., and Barter, J. | Self-triage or self-assessment tool     | √                                                    |               |
| Sleath, B et al.           | Online and offline sources of information and support | √ √ √                                                |               |
| Tucholka, J. et al.        | Online and offline sources of information and support | √                                                    |               |
| Abourmatar, H et al.       | Online and offline sources of information and support | √                                                    |               |
| Albada, A. et al. (2012)   | Electronic pre-office visit checklist     | √ √ √                                                |               |
| Bruce, J. G. et al.        | Online and offline sources of information and support | √                                                    |               |
| Walker, M. E. et al.       | Paper-based checklist                    | √                                                    |               |
| Savage, C. et al.          | Paper-based checklist                    | √ √ √                                                |               |
| Judson, T. J. et al.       | Self-triage or self-assessment tool      | √ √ √                                                |               |
| Albada, A. et al. (2015)   | Electronic pre-office visit checklist     | √                                                    |               |
| Purkaple, B et al.         | Paper-based checklist                    | √                                                    |               |
| Krist, A. H.               | Online and offline sources of information and support | √ √ √                                                |               |
Discussion
Summary of findings
This survey summarized the characteristics of published studies on pre-visit planning and its application in various health domains. To our knowledge, this study represents the first overview of the existing evidence about the different pre-visit planning techniques in clinical practice. Forty-nine articles from ten countries were included in this survey. As mentioned in the results, these techniques can classify into eight categories. Among them, the most widely used methods are related

Table 3 Results of study analysis based on main objectives and timing (Continued)

| Author          | Pre-Visit Model                              | Main Approaches | Timing                      |
|-----------------|----------------------------------------------|-----------------|-----------------------------|
|                 |                                              | Improve the current visit | Patient preparedness | providing inclusive insight for physician | Before each visit | Between each visit | At end of the current visit |
| et al.          | information and support                      | √               | √                           | √                           | 10              | 48             | 18 | 21 | 40 | 5 | 50 |
| Fothergill, K.  | Electronic pre-office visit checklist        | √               | √                           | √                           |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Lee, Y. K et al.| Electronic pre-office visit checklist        | √               | √                           | √                           |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Johansen, M.    | Electronic pre-office visit checklists       | √               |                             | √                           |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Hu, X et al.    | Online and offline sources of information and support | √               |                             | √                           |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Albada, A.      | Online and offline sources of information and support | √               |                             | √                           |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Frost, J. et al.| Electronic pre-office visit checklist        | √               |                             | √                           |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| O’Brien, M.     | Electronic pre-office visit checklist        | √               |                             | √                           |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Wald, J. S.     | EHR-linked pre-visit checklist              | √               |                             | √                           |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Albertson, G.   | Paper-based checklist                        | √               |                             |                             |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Wolff, J. L.    | Paper-based checklist                        | √               |                             |                             |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Causarano, N.   | Online and offline sources of information and support | √               |                             |                             |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Grant, R. W.    | EHR-linked care program                      | √               |                             | √                           |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Brackett, C, &  | Online and offline sources of information and support | √               |                             |                             |                 |                |                |                |                |                |
| Kearing, S.     |                                              |                 |                             |                             |                  |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Meropol, N. J.  | Electronic pre-office visit checklist        | √               |                             | √                           |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Kim-Hwang, J.   | EHR-linked care program                      | √               |                             | √                           |                 |                |                |                |                |                |
| E. et al.       |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Muraywid, B.    | EHR-linked care program                      | √               |                             | √                           |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Vo, M. T. et al.| Electronic pre-office visit checklist        | √               |                             |                             |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Baker, D. W.    | EHR-linked care program                      | √               |                             |                             |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Grant, R et al. | EHR-linked care program                      | √               |                             |                             |                 |                |                |                |                |                |
| Harrington, J.  | EHR-linked care program                      | √               |                             | √                           |                 |                |                |                |                |                |
| & Walsh, M      |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Gadomski, A. M  | EHR-linked care program                      | √               |                             | √                           |                 |                |                |                |                |                |
| et al.          |                                              |                 |                             |                             |                  |                |                |                |                |                |
| Total           |                                              | 10              | 48                          | 18                          | 21              | 40             | 5              | 5              | 50 | 50 | 50 |

system should have interacted with existing databases and electronic health systems.
to using electronic pre-office visit checklists and supporting patients by providing them with the necessary information in the form of online and offline educational resources.

Consistent with the present findings, our results showed that applying pre-visit techniques was not restricted to office visits [75]. So, pre-consultation planning can employ before each patient’s consultation, between the patient’s visits, and during the current visit to facilitate complicated patient care process.

One of the remarkable results of this study is that this approach has been used more in developed countries. It may be because it is easier to take a participatory approach to patient care in developed countries due to a high level of patient literacy.

Results in the context of other researches
Our results showed that most studies have been conducted with the main goal of preparing the patient by involving them in their treatment process. Patient preparedness had the most impact on the patient’s perceptions of his disease and overall patient satisfaction [76]. Similarly, Ringdal et al. [77] indicated through their survey that patients were satisfied with their active role as a partner on the healthcare team. Also, this is exactly in line with the main goal of the patient-centered care paradigm regarding the individualized approach to the patient’s treatment [78–80].

However, Geraghty et al. [81] showed through their study that there is a linear relationship between patient satisfaction and visit length. Unfortunately, long waits are common at outpatient clinics [82]. Hence, our
results illustrated that using a pre-visit assessment tool such as a simple checklist or questionnaire is almost effective to maximize the available time during a consultation for making the best decisions by physicians. Also, it can provide better insight for physicians to better communicate with the patient by knowing the patient’s background during the consultation [22, 33, 35, 47, 54, 60, 64, 67, 69, 70, 83–88].

Analysis of results revealed that most studies considered the pre-visit assessment tool as an independent solution that was not connected to existing electronic systems. However, in some studies, a comprehensive care plan has been taken. A pre-visit planning program could be linked to a patient’s electronic medical record as used in some reviewed studies. This approach is similar to the motivational interviewing (MI) technique that is applied to improve patient-centeredness in other studies. Motivational interviewing is a technique to help patients address their chief problems and increase their understanding of their participatory role in the treatment process [89].

**Implications for research and practice**

Planned and targeted care is one of the main components of the patient-centered care model [79]. Hence, implementing pre-visit tools within an advanced planned care program might be more effective in moving towards effective patient-centered care. However, pre-visit planning care is a new approach, no framework or conceptual model was introduced according to this subject. Only a planned care model was introduced by the Health Research and Quality Agency as a comprehensive patient-centered medical home (PCMH) approach in which one of its main components is pre-visit planning [90, 91].
Hence, our findings are summarized in a conceptual model regarding applying the pre-visit assessment tool in electronic-based planned patient care (Fig. 9). However, the EHR-linked pre-visit type was used only in the nine studies, the suggested model is not devised in a stand-alone model. Nowadays, with the advent of the digital age, applying integrative electronic systems and medical informatics-based solutions are inevitable [92].

One of the significant gaps that were mentioned in the studies is the unnecessary referrals of patients to outpatient offices [93, 94]. These unnecessary visits in the event of pandemics can also lead to the spread of disease [95, 96]. In such a framework, avoiding unnecessary referrals was considered to fight the pandemic. Such an approach can be useful to prevent the spread of the COVID-19 disease too.

**Limitations**

Since this study is the first attempt to review and analyze the published articles regarding pre-visit planning, it encounters some limitations. The results of some studies might be published in the form of reports, letters to the editor, or other types of study. Thus, we might not have considered them based on our exclusion criteria. The results showed that most studies point out pre-visit planning conducted by large institutions and reputable organizations; their data are absurdly confounded by the fact that better-funded institutions probably produce better outcomes. Also, some researchers might put pre-visit into practice but they did not publish their attempts in form of any research article or conference paper. It could cause publication bias. Thus, further researches for specific domains in clinical practices might be done in the future.
Conclusion
Using a systematic review approach leads to get a comprehensive overview of literature conducted in the use of various pre-visit approaches. Our results revealed that the direct outcome of planning a pre-visit care program was enhancing the quality of patient care alongside enhancement patient-provider communication. Improving the patient-physician relationship is a key factor in moving towards a patient-centered care paradigm. The qualitative and thematic analysis of the articles also showed that pre-visit planning has the greatest impact on the relationship between physician and patient. It can account for such a useful tool to move toward patient-centered care. However, such an approach can also be helpful to
control pandemic diseases by reducing unnecessary referrals. Thus, the application of pre-visit tools can be considered as one of the key components of designing a patient-centered care system. In this survey, we tried to summarize our findings and our suggestions in a complete patient care framework based on pre-visit planning techniques.

Abbreviations
PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses; PCC: Patient-centered care

Supplementary Information
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Additional file 1: Table A-1. Applied search strategies and their results.

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Authors’ contributions
Conception idea of study: Marjan Ghazisaeeidi, Hamidreza Abtahi, Marsa Gholamzadeh; Acquisition of data: Marjan Ghazisaeeidi, Hamidreza Abtahi, Marsa Gholamzadeh; Analysis and/or interpretation of data: Marsa Gholamzadeh, Marjan Ghazisaeeidi. Drafting the manuscript: Marjan Ghazisaeeidi, Marja Gholamzadeh. Revising the manuscript critically for important intellectual content: Marjan Ghazisaeeidi, Marsa Gholamzadeh, Hamidreza Abtahi. Approval of the version of the manuscript to be published: Marjan Ghazisaeeidi, Hamidreza Abtahi, Marsa Gholamzadeh. The author(s) read and approved the final manuscript.

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Availability of data and materials
The study involves only a review of the literature without involving any data.

Declarations
Ethics approval and consent to participate
The study involves only a review of the literature without involving humans and/or animals. The authors have no ethical conflicts to disclose.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no conflicts of interest.

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