# Patient Education in Health Care: Exploring Strategies for Effective Comprehension, Recall, and Compliance

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## ABSTRACT

**Introduction:** Patient education is recognized to be essential in orthotic and prosthetic care. However, there are no current standardized methods of educating patients. This literature review looked at the most effective current methods of educating patients in terms of comprehension, recall, and compliance.

**Methods:** Inclusion and exclusion criteria for articles were determined. Search strategy was developed using keywords, MeSH terms, and Boolean operators and applied to three different databases (Medline Ovid, Embase, and Web of Science).

**Results:** After searching on Medline Ovid, Embase, and Web of Science, 833 articles were found after deduplication, with 49 articles included in the final review.

**Conclusions:** The review found that delivering the education in terms of behavioral advice and multimodal methods was the most effective. Patients' preference of education delivery, mood, attitude toward their condition, and relationship with their provider also need to be considered. Further research needs to be done on effective methods of delivering patient education.

**Clinical Relevance:** This research has the potential to lead to future studies in educating patients who utilize orthotic and prosthetic devices. The aim of the project is to eventually standardize or create best practice guidelines for patient education in the field of Orthotics and Prosthetics with the intent of improving comprehension, recall, and compliance. (*J Prosthet Orthot.* 2025;37:e18–e28)


KEY INDEXING TERMS: patient education, health care, orthotics, prosthetics, understanding, comprehension, recall, self-management, compliance, adherence

## INTRODUCTION

In orthotics and prosthetics, devices are created to assist people in their day-to-day lives. However, effectiveness of treatment is limited if patients cannot properly utilize their devices. Educating patients on proper device use and self-management behavior has been shown as the first step in preventing future complications.[1] Patients should be empowered to manage their own care and recognize their own part in health-related habits, which includes device wear and care.

Understanding the usage and precautions of their own devices is critical in setting up patients for success and helps them reach their goals. It has even been found that "patient education is linked to overall satisfaction with care."[2] Although patient education is understood to be an essential part of successful orthotic and prosthetic plans of care, there are currently no standardized methods of providing education to these patient populations. The current paradigm in patient education is to tailor the education to each patient's needs, considering functional, behavioral, or cognitive impairment, environmental barriers, and level of motivation.[3]

Current methods of educating patients include verbal instructions, written materials, online resources, videos, or a combination of techniques. The purpose of this literature review was to investigate the most effective methods of educating patients in health care in terms of comprehension, recall, and compliance. Our hope is that this research project will be used as a basis for future studies on orthotics- and prosthetics-specific education, development of best practices for different patient populations, and for the development of clinical practice standards in the field.

## METHODS

### SEARCH STRATEGY/ARTICLE SELECTION

Research and instruction librarians from the Texas Medical Center (TMC) Library assisted with the search and were consulted for guidance throughout the review. A preliminary search was performed to determine feasibility of the study and yielded 76 articles. Relevant research articles were obtained utilizing Boolean operators, keywords, and Medical Subject Headings (MeSH) terms applied to multiple online databases, including Ovid MEDLINE, Embase, and Web of Science. Once feasibility was determined, the authors consulted the TMC librarians to devise a more concise search that would narrow the scope of the study. This search strategy was utilized for finding articles in the final article.

When performing the database search, articles were filtered by title and abstract. Key search terms included "patient education,"

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Disclosures: The authors have no financial disclosures or conflicts of interest to report.



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Author contribution: E.C. contributed to the investigation, methodology, resources, writing–original draft, and visualization. J.S. contributed to the conceptualization, supervision, writing–review and editing, and project administration.

Table 1. Search strategy used in databases

| Search Strategy | |
|---|---|
| 1. Patient Education as Topic/ | 15. (effectiv* or efficac* or success*).ti,ab,kw,kf. |
| 2. (patient* adj3 (educat* or instruct*)).ti,ab,kw,kf. | 16. 14 or 15 |
| 3. 1 or 2 | 17. 3 and 13 and 16 |
| 4. Patient Compliance/ or "Treatment Adherence and Compliance"/ | 18. orthotic devices/ or braces/ or foot orthoses/ |
| 5. (compliance* or comply* or complies* or adher*.ti,ab,kw,kf. | 19. (orthotic* or orthos* or prosthetic* or prosthes* or brace*). ti,ab,kw,kf. |
| 6. 4 or 5 | 20. (artificial* adj2 (limb* or leg* or arm*)).ti,ab,kw,kf. |
| 7. Mental Recall/ | 21. *exercise movement techniques/ or *exercise therapy/ or *musculoskeletal manipulations/ |
| 8. (recall* or retain* or retention* or remember* or recollect*).ti,ab,kw,kf. | 22. ((physical* or exerci* or musculoskelet* or "musculo-skelet*") adj3 (therap* or movement* or manipulat* or technique*)). ti,ab,kw,kf. |
| 9. 7 or 8 | 23. 18 or 19 or 20 or 21 or 22 |
| 10. Comprehension/ | 24. 17 and 23 |
| 11. (comprehend* or comprehension* or understand*).ti,ab.kw.kf. | 29. 6 or 9 or 12 |
| 12. 10 or 11 | 30. 28 and 29 |
| 13. 6 or 9 or 12 | 31. limit 30 to English language |
| 14. Comparative Effectiveness Research/ | |

Keywords and phrases as well as the Boolean operators utilized in order of use to narrow the scope of the results.

"adherence," "recall," "comprehension," and "comparative effectiveness." The final strategy (Table 1) was subsequently translated to the other databases to ensure validity of the search, resulting in 912 results before and 833 results after deduplication. Full texts of the articles obtained via searching for the titles on MEDLINE, Embase, and Web of Science to retrieve the full text version.

The studies were initially refined by the authors by relevance of title and abstract, which resulted in 231 articles. The articles were then screened by the authors against selection criteria to determine eligibility for this review. Authors screened the articles for inclusion utilizing the following criteria:

- articles were related to patient self-management,
- included the population of people with amputations or pilot studies intended for people with amputation,
- were written in English, and
- had at least five participants.

Articles were excluded if any of the following was true:

- not full text or were conference abstracts,
- trial protocols,
- content was specific to prosthetic implants, and
- not written in English.

After filtering, 49 articles were left for the systematic review (Figure 1).

## RESULTS

Of the 49 articles selected, four articles were found relating to comprehension, five articles were related to recall or self-management, 33 were related to compliance, and seven had mixed themes (Figure 2). A total of 3.8% (n = 2) of articles were related to written instructions, 7.7% (n = 4) of articles were related to verbal instructions, 7.5% (n = 4) of articles were related to audio-visual, 22.6% (n = 12) of articles were related to group sessions, 9.6% (n = 5) of articles were related to app/online instructions, 40.4% (n = 21) were related to multimodal interventions, and 7.5% (n = 4) articles were related to other methods (Figure 3).

Of the articles classified as other, the teaching methods were diaries to monitor exercise and treatment compliance, cognitive behavioral therapy (CBT) techniques, written material, and a discussion of material at the education session, weekly phone calls and home visits for education, and a collaborative education

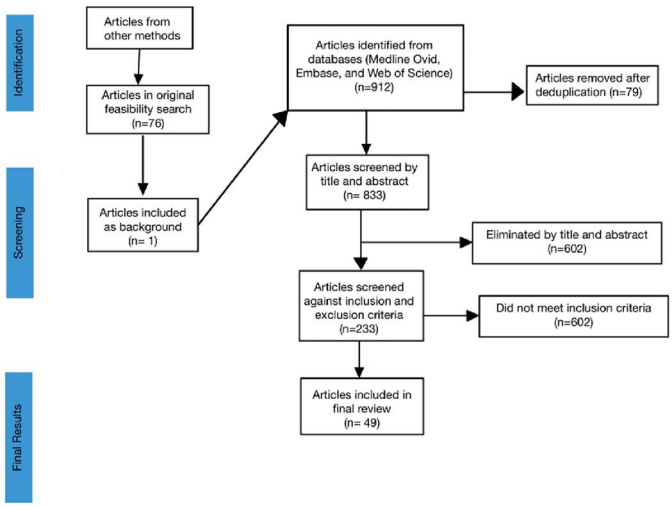



Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart of inclusion and exclusion criteria.

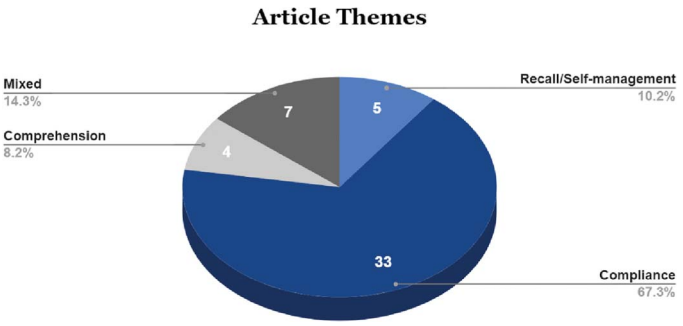



Figure 2. Percentage and number of articles categorized by comprehension, recall/self-management, compliance, and mixed themes.

approach. Of the multimodal interventions, a combination of written, verbal, and illustrations was represented (Table 2).

## DISCUSSION

### COMPREHENSION

Patients need to be able to understand the education that they have been given to effectively follow a plan of care. Patients may be less likely to follow instructions if they do not fully understand their condition. Ten studies in this review suggested that patient education is linked to a reduction in perceived pain when it enhances their comprehension, recall, and compliance.[6,13–21] This benefit clearly shows that patient education is a critical part of implementing health care interventions and increasing patient satisfaction with care.

Two articles found that a group education class may be effective in increasing comprehension.[22,23] Islam et al.[23] found that 80.5% of participants in a video health education program reported that the video was effective in improving their perspective on treatments. In total, 79.3%–89.4% adhered to their recommended treatment after video intervention. Two articles found that written material and discussion helped with an increase in patient comprehension.[24,25]

Written materials must also be communicated in a way that patients without a health care background can comprehend. For written materials, the National Institutes of Health (NIH) recommends improving written comprehension by writing at

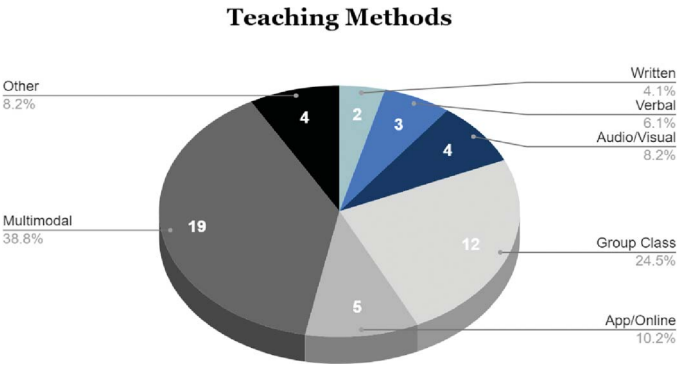



Figure 3. Chart of percentages and article numbers of teaching methods found from the literature search.

Table 2. List of teaching methods classified as "other" and "multimodal

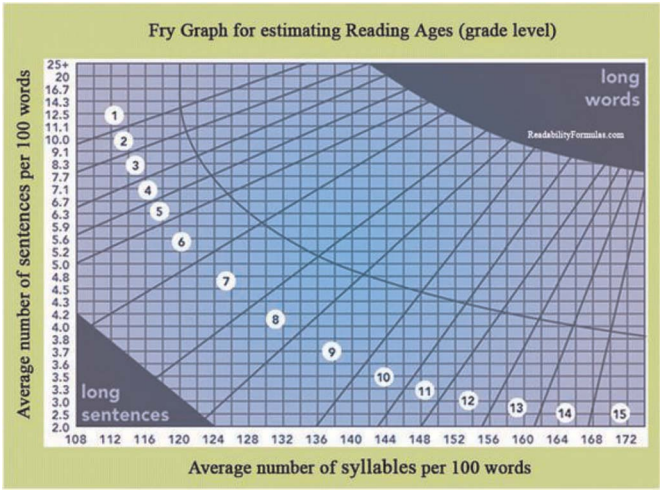
| Description of Teaching Methods |
|---|
| Diaries (monitor exercise/treatment compliance)[4,5] |
| Cognitive behavioral therapy (CBT) techniques[6–9] |
| Online resource + self-report diary[10] |
| Written material and a discussion of material at education session[6] |
| Weekly phone calls and home visits for education[11] |
| Collaborative education approach[5] |
| Multimedia, filming the patient complete an exercise[12] |

a 6th grade reading level and avoiding jargon.[26–28] The grade level of writing is an objective metric to quantify complexity in writing and represents the number of years of education needed to easily understand a piece of written content. A study on the readability of surgical informed consent forms found that "the reading level required was so high that most Americans would not be able to understand the form," and many consent forms were written at a graduate school level.[25] This shows that there is a need to assess the reading level of written instructions to improve patient comprehension.

From the initial feasibility search, the five most common established measures for assessing readability of written materials include the Simplified Measure of Gobbledygook (SMOG),[29] Fry Readability Graph,[30] Flesch Reading Ease Score,[31] Gunning Fog Index,[32] Flesch-Kincaid Grade Level Assessment,[31] and the New Dale-Chall Formula[33] (Table 3). These readability tests can be applied to any written patient education materials, and there are several online resources available to input sample text and calculate the scores. However, not all polysyllabic words are complex words, and this can unintentionally affect the scores. For example, the word "interesting" has three or four syllables depending on pronunciation but is a commonly used word in the English language. Additionally, short words can be complex, especially if they are not commonly used. A caveat to using these scales is that jargon in the field of orthotics and prosthetics is unavoidable. Using readability scales for patient education may require some tact as some words may count as complex or adding a definition after will increase the sentence length and complexity. For describing orthotics and prosthetics devices and componentry in appointments, it is essential to meet patients where they are in their understanding.

Readability is not the only factor for comprehension. Anxiety has been suggested as a confounding factor in education. One study provided information to patients before a spinal injection procedure with 22 listed potential risks and asked the patients a series of questions immediately after the procedure. A total of 12% of participants remembered zero to two potential risks, 72% recalled from three to five potential risks, and only 16% could recall more than five potential risks.[25] Being informed of their medical treatment process can help patients cope with their anxieties. However, patients can have difficulty comprehending the initial instruction if they have higher levels of anxiety. Clinicians should consider patient mood and stress level since anxiety can make information harder for patients to remember.[25]

**Table 3.** Descriptions and equations for the SMOG, Fry Readability graph, Flesch-Kincaid Reading Ease score, Gunning Fog Index, Flesch-Kincaid Grade Level assessment, and the Dale-Chall formula.

| Reading Scales Definitions | |
|---|---|
| SMOG | SMOG (Simplified Measure of Gobbledygook)[29] is an assessment tool that utilizes a hand-scored method. SMOG allows an evaluator to determine the grade level of patient education by counting 10 sentences at the beginning, the middle, and the end of a document.<br><br>SMOG grade = 3 + $\sqrt{}$polysyllabic count |
| Fry Readability Graph | The Fry Readability Graph[30] is a formula used to calculate the US grade level required to understand a piece of text<br>  <br><br><br>Directions for use:<br>1. Randomly select three 100-word segments of your text.<br>2. Count the number of syllables in each 100-word segment and calculate the average.<br>3. Count the number of sentences in each 100-word segment and calculate the average.<br>4. Plot the average number of sentences and the average number of syllables on the graph.<br>5. The area in which the average number of sentences and syllables cross is the grade reading level of the text.<br>Figure 4. Fry Graph for estimating reading ages. The score is determined by plotting the average number of sentences per 100 words and average number of syllables per 100 words.[34] |
| **Flesch Reading Ease** | The Flesch Reading Ease[31] score is between 1 and 100. The higher the reading score, the easier a piece of text is to read.<br><br>Formula: RE = 206.835 – (1.015 × ASL) – (84.6 × ASW)<br><br>RE = readability ease<br><br>ASL = average sentence length (i.e., the number of words divided by the number of sentences)<br><br>ASW = average number of syllables per word (i.e., the number of syllables divided by the number of words) |
| Gunning-Fog Index | The Gunning Fog[32] formula generates a grade level between 0 and 20. It estimates the education level required to understand the text on a first reading. The formula for Gunning Fog is:<br>$0.4\left[\left(\frac{total\ words}{total\ sentence}\right) + 100\left(\frac{complex\ words}{total\ words}\right)\right]$<br>Complex words are those containing three or more syllables.<br>**Gunning-Fog Index** — **Reading Level by Grade**<br>17 — College Graduate<br>16 — College Senior<br>15 — College Junior<br>14 — College Sophomore<br>13 — College Freshman |

*Continued on next page*

Table 3. (Continued)

**Reading Scales Definitions**

| | | |
|---|---|---|
| | 12 | High School Senior |
| | 11 | High School Junior |
| | 10 | High School Sophomore |
| | 9 | High School Freshman |
| | 8 | Eight Grade |
| | 7 | Seventh Grade |
| | 6 | Sixth Grade |

**Flesch-Kincaid Grade Level Assessment**

The Flesch-Kincaid Grade Level[31] is a readability formula which assesses the approximate reading grade level of a text. The Flesch-Kincaid Grade Level is equivalent to the US grade level of education.

Formula: $0.39\ (ASL) + 11.8\ (ASW) - 15.59$

ASL = average sentence length (the number of words divided by the number of sentences)
ASW = average number of syllable per word (the number of syllables divided by the number of words)
Nw = number of words | Nsy = number of syllables

**New Dale-Chall Test**

The New Dale-Chall Formula[33] calculates the US grade level of a text sample based on sentence length and the number of "hard" words. These "hard" words are words that do not appear on a specially designed list of common words familiar to most 4th-grade students.

$$\text{Score} = 64 - \left(0.95 \times 100 \times \frac{N_{wd}}{N_w}\right) - (0.69 \times ASL)$$

PDW = percentage of difficult words
$n_w$ = number of words
$N_{wd}$ = number of "difficult" words not matching the Dale-Chall list of "familiar" words
ASL = average sentence length (in words)

| Score | Grade Level | Reading Level | Ages |
|---|---|---|---|
| ≥57 | 1 | Very Easy | 5–6 years old |
| ≥53 | 2 | Easy | 7–8 years old |
| ≥49 | 3 | Fairly Easy | 9–10 years old |
| ≥44 | 4 | Standard | 11–12 years old |
| ≥39 | 5–6 | Fairly Difficult | 13–14 years old |
| ≥33 | 7–8 | Difficult | 15–16 years old |
| ≥27 | 9–10 | Very Difficult | 17–18 years old |
| ≥21 | 11–12 | Extremely Difficult | 18+ years old |
| ≥21 | College | Professional | 20+ years old |

The different themes examined here have implications beyond comprehension alone. Pakhale et al.[35] found that when adults with cystic fibrosis misunderstand treatment recommendations, it likely affects their treatment compliance. Understanding the instructions given to them can have an impact on patient comprehension. Health care professionals need to utilize effective communication strategies to ensure information is understood by the patient.

## RECALL AND SELF-MANAGEMENT

Although a patient may be able to comprehend instructions when initially received, recall allows them to manage their care independent of their health care provider. CBT and self-efficacy were first proposed by Albert Bandura in 1977 in terms of social-cognitive theory, where self-efficacy is an individual's belief in their ability to complete a task or reach a desired outcome.[6,13,14] One literature review used a combination of counseling and patient diaries to keep track of self-management and monitoring of blood glucose.[4] They found that participants had "almost 100% compliance with diary and proper data recording" and "87% patients continued using [self-monitoring] during follow-up, [had] increased compliance to medication use."[4] One article in that review found that compliance dropped consistently after 1 month with a daily self-monitoring intervention. The same study found a larger decrease in compliance with daily self-monitoring that included tailored education and motivational messaging.[4] Another article found that 6–20 sessions of intervention focusing on CBT produced significant short-term effects on pain severity, pain coping, self-efficacy, and functional status in five controlled trials of CBT when compared with treatment as usual or no treatment control groups.[16]

Five studies looked at self-management programs and their effects on short- and long-term benefits.[11,36–39] A 2-week compliance program comprising weekly phone calls, and counseling through home visits showed less decline at 20 weeks in exercise compliance. However, there were no differences in daily activity

at 20 weeks or any differences in any primary variable at 1 year.[11] McDonald et al.[37] completed a literature review that found a 12-hour, 2-day educational course increased the number of exercises increased 3 weeks after implementation, but "[t]he number and frequency of exercises significantly decreased at 6 months." Both articles found that the intervention enhanced exercise compliance and exercise capacity in the short term but produced no long-term benefit. However, a study done by Focht et al.[36] found that a 12-week exercise intervention comprising exercise counseling and self-management skills increased exercise participation compared with the control group ($P < 0.05$) at 3-month follow-up. That study also demonstrated increased self-efficacy outcomes compared with the standard-of-care group. A randomized control trial found that teaching an exercise program through video had 56.8% of participants at 12 months exercising regularly.[39] A literature review done by Van Netten et al.[38] looked at the effect of a foot care kit, administering 2 hours of diabetes education and a quiz to patients and caregivers on foot care self-management. The authors reported a higher number of self-care behaviors for the intervention group after 1 year (86.35 vs 75.86 points, $P < 0.05$), and the behaviors were maintained by the second year (87.24 vs 71.43 points, $P < 0.01$).[38] However, this finding had a high risk of bias, and this outcome was not powered.

Stitik et al.[20] demonstrated that written materials can improve recall of knowledge up to 6 months after the education intervention. Gupta and Sehgal[40] and Weeks et al.[41] looked at videotape and written instructions and their impact on recall. They found that video and written instructions resulted in "similar performance accuracy and memory recall in both groups," and dynamic modeling of an exercise via video was more effective at improving recall than pictures, respectively. A study by Reo and Mercer[42] found that using video and live modeling had better immediate and delayed retention than a written handout alone. For more complex movements or tasks, the information may be overwhelming in a clinical setting. More exposures to the modeling may also ensure retention of information.[40,41]

Everett completed a study on understanding informed consent and found that patients tended to forget information when they receive information under stress and had difficulty with mental recall upon questioning immediately after the treatment.[25] It is critical to gauge the patient's mood and level of stress to judge the amount of information to deliver to them during the appointment. Two articles found that group education sessions had mixed effects on improving patient recall months after treatment.[15,37] In some cases, while the intervention increased their comprehension and initial recall, it had no change in compliance over a several-month period.

These articles found that group sessions had mixed effects on improving patient recall months after treatment. A literature review by McDonald et al.[37] demonstrated that compliance to a 6-week supervised group health education program "reduced over time." The review found "86% of prescribed minutes of exercise [were] completed in the first 6 weeks," but reduced to 63% over the first 9 months, and to 51% over the following 9-month period.[37] Similarly, they found that compliance to once a week supervised exercises "reduced over time from 74% [attendance] in the first 9 months to 62% in the second 9-month period studied."[37] Within Brus et al.,[15] one study educated 38 rheumatoid arthritis patients in a group patient education setting on the disease and its treatment. The intervention reportedly increased their knowledge but provided no change in compliance.

## COMPLIANCE

Compliance is essential in practice as devices require consistent use and care to ensure effectiveness of treatment. As Touillet et al.[3] put it, "[t]he goal of health education is to change a patient's long-term behavior." A successful patient education program should enable the patient to acquire the knowledge needed to integrate the treatment into their lifestyle and to optimize control of their condition or impairment.[3]

Patient compliance to treatment plans can be less than ideal and "can vary by type of treatment recommended."[35] Poor compliance rates "have been associated with a greater number of… hospitalizations and higher health care costs."[35] Compliance is essential for reducing the risk of complications and potential future health care costs. Self-reported compliance tends to have higher values, and "true compliance" is likely to be lower than self-reported compliance.[35] Because patient self-reports can be inaccurate, this is something clinicians should consider when gathering outcome measures and patient self-reported information during appointments.

### *USING MULTIMODAL METHODS*

Instructions given in appointments may involve a complicated combination of information, actions, and recommendations for patient behavior that may be difficult for patients to remember. Written and illustrated "instructions may enhance compliance by increasing understanding, stimulating memory processes, and enhancing information recall."[7] One study investigated giving written and illustrated printouts of exercise prescriptions to patients over the course of 14 days. The intervention resulted in a "mean compliance rate of 77.4%," which was calculated by dividing the self-reported exercise completion by the number of prescribed exercises and multiplying by 100.[7] A combination of both written and verbal instructions can help with increasing compliance[43] along with the addition of illustrations.

Multimedia instructions, such as a blend of videos, images, audio, and interactivity, are another potential education approach. A 2018 study found that multimedia exercise instructions may be more effective than written instructions in improving compliance; however, the evidence was low quality.[12] Another study found no statistically significant difference in compliance between two methods of home exercise program instruction (videotape or individual instruction) after 1 year.[8]

### *ELECTRONIC INTERVENTIONS*

Online and app interventions are more novel approaches to patient education that show promise. Patients in a study that compared preference of online video to written instructions reported both methods were easy to understand and convenient, but online videos were found to be statistically significantly more helpful ($P = 0.03$).[44] A study that used a messaging app to deliver information and appointment reminders showed an

increased rate of compliance and better outcomes in the intervention group.[45] Another study that used an app-based chat room for patients showed similar results and increased compliance in adolescent patients.[46] A different study found that Web-based patient education in combination with making plans for their care helped with home-based compliance.[10] Another study that made health instructions into a game found better compliance in dietary and movement training than a verbal teach-back intervention and control group.[47] However, a study completed by Koppenaal et al.[48] found no statistically significant difference in compliance between a face-to-face and a combination of face-to-face and a smartphone app after 3 months.

### *EDUCATION AS BEHAVIORAL ADVICE*

A study done by Crooke et al.[9] looked at how clinicians delivered information to patients. They found that when information "is delivered as behavioral advice (such as goal setting, contracting, self-monitoring, cues, or rewards) or cognitive (decision making, health education, or providing information), the behavioral advice is significantly more effective" in increasing physical activity behavior.[9] They also found that while delivering a prescription through written material may be beneficial, moderate evidence providing written instructions to enhance brief advice does not change the impact of the advice.[9]

### *PATIENT RETENTION OF DELIVERED EDUCATIONAL MATERIAL*

A few of the studies explored the length of time information required to ensure retention of material. One literature review found that "'brief intervention' is poorly defined in the literature," and that patient education "should be tailored to the individual's circumstances, abilities, goals, and health using a variety of techniques."[7] Fifteen studies in that review found moderate evidence that patients who received brief advice had an "increase in self-reported physical activity levels."[7] However, the evidence was inconclusive on a difference in effect between interventions less than 5 minutes and interventions longer than 5 minutes.[7] Some studies in that literature review found an "initial 3–5 minutes consultation with follow-up is enough to bring about a short-term change in physical activity levels."[7] No significant difference in outcomes were found with number of sessions, length of session, or the type of education intervention.[7]

### *STRUCTURED EDUCATIONAL SESSIONS*

Twelve articles looked at the effect of structured educational sessions for patients.[3,18,19,22,36,49–55] Although three studies found an increase in compliance with group education especially in the short term,[11,53,55,56] three of the articles did not find statistically significant differences with the education interventions studied.[11,53,54] The ideal number of patients to include in group education sessions was not discussed. However, one study did find statistically significant differences in compliance for subgroups.[53] These subgroups included males, patients younger than 65, obese, and smokers/past smokers. The background research in the Soares Pires et al.[53] sleep study found conflicting evidence about the influence of gender and age on compliance. Most of the studies have found women and older patients tend to have increased compliance, and smoking has been associated with lower compliance. These subgroups associated with lower compliance would most likely benefit most from patient education sessions.[53] This is important to consider when choosing appropriate approaches for patients.

### *COSTS OF IMPLEMENTING EDUCATION*

As for monetary impact of implementing patient education, only one article reported the cost of the intervention. A 12-week compliance intervention that included weekly phone calls and home visits had a mean cost per patient of $134 ± $36 (range of $76 to $221). This total included about $3 for printing of material (per unit) and accounted for time spent on phone calls and travel expenses.[11] This shows that the cost of new self-management interventions can be inexpensive for clinics to implement. The cost of training clinicians and developing patient education interventions should be further explored in future studies.

### *BEHAVIORAL-BASED INTERVENTIONS TO INCREASE LONG-TERM COMPLIANCE*

Four studies showed behavior-based patient education linked to long-term compliance.[9,15,57,58] Behavioral interventions included "repetition and practicing the desired skills in small groups, providing feedback on performance, and using a range of options to allow participants to choose individually tailored solutions, including contracts, goal setting, and problem solving."[58] A series of education sessions that included written materials and taught "factual knowledge, develop skills, and help in coping with chronic disease" had an overall increase in compliance "[o]ne year after the educational program ended."[15]

### *PATIENT FACTORS AFFECTING COMPLIANCE*

Several patient factors have been linked to compliance. A study by McDonald et al.[37] found that there was "a moderate but statistically significant correlation with participants with higher disease severity, having higher compliance to the number… [and] frequency of therapeutic exercises." Patients' attitudes about their illness and the treatment plan have a correlation with compliance.[59,60] When patients have an acute injury or illness, they tend to have more investment in their care, since recovery is expected. The Sluijs et al.[60] study also found that when patients perceive their illness as more serious, "they appear to be more compliant than patients with less serious illnesses." However, patients with acute illnesses tend to be more compliant than those with chronic illnesses; since recovery is expected, they may tend to comply with their prescribed exercise regimen more.[60] This contradicts the findings in the study by McDonald et al.[37] This study found that increased "disease severity and longer diagnostic delays were associated with increased compliance."[37]

### *INFLUENCE OF THE PRACTITIONER AND EXPECTATION MANAGEMENT ON COMPLIANCE*

Additionally, compliance was seemingly linked to practitioner attitude. Patients appreciated it when they felt like they were listened to and like a part of shared decision making, which involved discussing feasible goals and a schedule tailored to the patient's condition and preferences with a practitioner.[49,61] Findings in Cole et al.[58] looked at "learning principles, shared expectations,

encouragement, and positive affective tone and behaviors by the clinician." The study showed that the strategy of collaboration with a clinician helped "address any dissatisfaction and assign responsibility to the patient while emphasizing a team approach [with] involved health professionals."[58] A study completed by Nicholson et al.[2] "suggest[s] that [clinicians] should focus on developing effective patient-centered communication and education skills to enhance the therapeutic alliance with their patients." Setting expectations about outcomes and treatment plan was found to be linked to higher compliance,[7,15] although Schneiders et al.[7] did not find this statistically significant between written and verbal instructions and only verbal instructions. Brus et al.[15] found that both realistic self-efficacy expectations and outcome expectations were a good indicator of compliance. These findings show that patient attitude about their condition, realistic expectations about treatment outcomes and self-management, practitioner attitude, and a collaborative education approach can help enhance patient compliance.

## SELF-EFFICACY

Across the articles mentioned in the comprehension, recall, and compliance sections, a common theme was patient self-efficacy. Self-efficacy is the judgment of person's "own capabilities to carry out specific tasks necessary to achieve a desired goal."[16,53] Burckhardt et al.[16] spoke on steps for increasing patient self-efficacy. One of the first steps is for the patient to perform the desired behavior or "engage in a specific cognition." Patients can collaborate with clinicians to form realistic goals within the patient's own assessment, like washing a prosthetic liner once a day for a week. When the patient meets that goal, "a sense of mastery will begin to develop that will lead the patient to set higher goals."[16] Patients require the opportunity to repeatedly "practice techniques until they master them, using incremental successes" to help build confidence.[16] Clinicians can also ask patients to rate how confident they are on a Likert scale of 1–10 on completing a task, with 1 being not at all confident and 10 being extremely confident. Patients who rate their confidence as higher on the scale for smaller tasks may be more motivated to continually complete new goals. Burckhardt et al.[16] also found that another technique to build self-efficacy in patients is behavior modeling, which involves "watching someone else who is similar succeed in performing a valued activity." This is where clinicians, or local or regional support groups, can be beneficial in matching patients to others who are the same gender, age, and doing well in their course of treatment. Persuasive tactics may tend to be more effective when a peer provides them than when they are given by a clinician who does not share the condition. It should be noted that the effectiveness of talking patients into believing they can achieve their goals is "limited if the clinician and patient do not have a solid, trusting relationship."[16] Clinicians must also be wary of not having the desired frequency of contact and their patients creating dependent relationships. Patients and clinicians need to be able to communicate effectively and collaborate to set reasonable goals. Increasing self-efficacy can help with increasing desired outcomes and behavior changes, and there are several techniques clinicians can utilize to build a patient's self-efficacy, like mastery of experiences, modeling, and social persuasion.[16]

## LIMITATIONS

There were several limitations with this study. Although the research does show the benefits of self-efficacy and CBT techniques, results are inconclusive if this is really the most effective or there was a larger concentration of research done in this area, which would be a result of confirmation bias. Six articles used patient self-reporting as their method of measuring compliance. This may be inaccurate as patients tend to overestimate their compliance due to vulnerability of social desirability and they are subject to recall bias.[2,5,8,10,35,57] A bias in the literature may also exist toward the patient populations studied, as there were several studies on managing symptoms of various chronic conditions. Results from different articles showed contradictory results on factors relating to compliance.

It is also unclear on the generalizability of these findings to various patient populations since several different patient populations were represented in this study. There was also a lack of evidence and research into education and language barriers. Additionally, there was a lack of research in this search on delivering information to pediatric patients and/or their caregivers. There was also a lack of evidence on delivering information to patients with cognitive impairments or learning disabilities. More research needs to be done in this area to effectively deliver information to patients with a different primary language than the clinician. Lastly there was no date range for exclusion, and some of the information may be outdated.

# CONCLUSIONS

Patient education is an essential part of patient appointments and plans of care according to the American Board for Certification in Orthotics, Prosthetics & Pedorthics (ABC). Per ABC guidelines, practitioners in pedorthics, orthotics, and prosthetics are required to document that patient education and instruction took place during appointments. Practitioners are required to inform patients on "preparatory care…functional exercise, gait training, [and] functional training (both self-care and work related)" that are performed.[62] However, the scope of practice does not mention specific methods to deliver the instructions for these activities.[62]

Patient education is a core curriculum requirement in educational programs for orthotics and prosthetics per the Commission on Accreditation of Allied Health Education Programs (CAAHEP) guideline standards.[63] According to CAAHEP standards, graduates of master of science orthotics and prosthetics programs are required to "[d]emonstrate the ability to provide effective education to patients, their support networks, health care professionals, and the public at large."[63] However, there is again no mention of methods of educating patients nor mention of how to measure this competency.

The current paradigm in patient education is to tailor the delivery of education to each patient's needs, considering functional, behavioral, or cognitive impairment, environmental barriers, and level of motivation.[3] From the results of this literature

review, CBT techniques and improving self-efficacy can help with patient compliance to treatments. Additionally, multimodal interventions (written, verbal, and visual) can assist in comprehension, recall, and compliance. The challenge for implementing these findings can be taking the time to develop standard processes, training clinicians, and finding time to implement these during patient appointments.

Further research needs to be done in the field of patient education, specifically with patients with amputations and limb loss. More research needs to be done with regards to orthotic interventions and a more diverse patient population, and with various methods of educating patients. Additionally, more research should be done in terms of verbal, visual, and tactile cueing for exercise and gait training with devices. One article that did not specifically look at the outcomes examined in this article was a trial on the biomechanics of microprocessor knees where users were given verbal and tactile cues for gait training over the course of one to three training sessions.[64] Verbal and tactile cues could be investigated further to help improve patient outcomes. Future studies need to be done specifically investigating education for ambulation training.

Patient education is essential for health care professionals to incorporate in patient appointments. Time and consideration need to be spent by clinicians and practices to improve their methods of delivering information to those in their care.

## ACKNOWLEDGMENTS

Special thanks to the research and instruction librarians from the Texas Medical Center (TMC) Library who assisted with performing the literature search and were consulted throughout the project.

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