Self-Monitoring and Self-Titration of Antihypertensive Medications Result in Better Systolic Blood Pressure Control


Study Overview

Objective. To examine the effect of self-monitoring of blood pressure and self-titration of antihypertensive medications among hypertensive patients with cardiovascular disease, diabetes, or chronic kidney disease.

Design. Unblinded randomized controlled trial.

Setting and participants. The study was conducted in central and east England. Patients with poorly controlled blood pressure with a last recorded systolic blood pressure of at least 145 mm Hg at 59 UK primary care practices were invited to participate. Patients had to be at least 35 years old and have at least 1 of the following comorbidities: transient ischemic attack or stroke, stage 3 chronic kidney disease, or history of coronary artery bypass graft surgery, myocardial infarction, or angina. Patients were excluded if they could not self-monitor blood pressure, had dementia or failed a cognitive screen using the short-orientation memory concentration test, had postural hypotension, took more than 3 antihypertensive medications, had an acute cardiovascular event within the previous 3 months, were receiving care from a specialist for their hypertension, were pregnant, or had a terminal disease. Participants were randomized to the self-management intervention or usual care.

Intervention. Patients in the self-management group were asked to monitor their blood pressure using an automated blood pressure monitor and to titrate their blood pressure medications using an individualized 3-step plan devised by the patient with their family physician. They were trained to do these tasks in 2- or 3-hour sessions. Patients were instructed to take their blood pressure twice each morning for the first week of each month; if 4 or more blood pressure readings during the measurement week for 2 consecutive months were higher than the target blood pressure, patients were to follow their individualized plan to change their medications. The target blood pressure was 120/75 mm Hg, following British guidelines for patients with stroke, diabetes, chronic kidney disease, or coronary heart disease. If patients exhausted all 3 steps for medication titration, they were to return to their family physician for additional instructions. Patients in the usual care group had a routine blood pressure check and medication review appointment with their family physician, which was followed by follow-up care at the...
discretion of the family physician for blood pressure measurement, blood pressure targets, or adjustment of medication.

**Main outcome measure.** The primary outcome was systolic blood pressure at 12 months. The difference in outcomes between the intervention and usual care groups was examined while accounting for baseline blood pressure and other clinical factors. Six blood pressures were taken at 1-minute intervals after an initial 5 minutes of rest. Blood pressure was taken by an electronic automated blood pressure machine. The mean of the second and third readings were used as primary outcome. Outcome assessor was not blinded to group assignment. The primary analysis included all cases with complete data, and a sensitivity analysis with multiple imputations was also performed. Preplanned subgroup analyses included older vs. younger age-groups, men vs. women, and other risk groups.

**Main results.** Among 10,764 patients assessed for eligibility, 3353 were excluded as they were considered by their family physician to be housebound, have a terminal illness, or not be a suitable candidate. Among the 7411 invited to participate, 4207 did not respond to the invitation and 2003 declined participation (with a third who did not want to alter their own medications, and a third who did not want to measure their own blood pressure). Among the 1201 who attended the baseline clinic, 138 withdrew their consent and 508 were deemed ineligible. A total of 555 were randomized, and 220 in the intervention group and 230 in the control group completed the study and provided outcome data (81%). Patients in the self-management group had a 9.2 mm Hg–lower systolic blood pressure at 12 months (95% CI, 5.7–12.7) compared with the usual care group. The self-management group also had a larger increase in the intake of antihypertensive drugs compared with controls, with an increase in both doses and number of medications. Although adverse symptoms were common in both groups, there were no significant differences in adverse symptoms between groups.

**Conclusions.** Self-management of hypertension among patients with stroke, cardiovascular disease, and other high-risk conditions is safe and effective in achieving better blood pressure control.

**Commentary**

Hypertension is a major public health problem. Significant resources have been devoted to advance hypertension management through research, practice improvements, and guideline developments; however, blood pressure control among those with hypertension in the United States remains suboptimal—with only about half achieving adequate control [1].

Advances in technology have made home blood pressure monitoring possible. It offers several advantages to traditional office-based blood pressure management [2], and several studies have shown home blood pressure telemonitoring and team care can achieve better outcomes than office-based management [3]. A significant contribution of the current study is that it demonstrated that the self-management approach is both safe and effective even in high-risk patients, who are perhaps the most likely to have adverse events from treatment but also the most likely to derive benefit from adequate treatment of hypertension.

Although the self-management approach has promise, it also has potential drawbacks. Specifically, as demonstrated by the low enrollment rate in this study, this intervention may not be suitable for all patients. About two-thirds of those who responded to the initial enrollment attempt ultimately declined participation because they did not want to modify their own medications or did not want to perform the tasks of home blood pressure monitoring. This perhaps is a realistic assessment of who may ultimately benefit from this approach—patients who wish to have an active role in managing their medical problems and have the ability to do so. For the clinician, it is important to identify patients who are able to manage the complex task of adjusting their medication regimen; otherwise, the potential for harm may be magnified.

Engaging patients in the management of their chronic disease is a growing trend in chronic disease management. Bringing management of hypertension to patients’ homes, as the accompanying editorial in the issue pointed out, reflects patient-centeredness at its best and represents an important step toward the adaptation of treatment for patients who want to actively take part in their own care [2].

**Applications for Clinical Practice**

Self-management of blood pressure in patients at high risk of cardiovascular disease appears feasible. As the
editorialists note, this study is an important step toward adaptation of treatment for patients who want to actively take part in their own risk-factor control [2]. More research is needed to study the effects of self-titration on long-term outcomes and to identify the appropriate protocols that can be applied by clinicians in the community, both for patient selection and education and medication adjustment.

—William Hung, MD, MPH

References

Quality of Life in Aging Multiple Sclerosis Patients


Study Overview

Objective. To evaluate the association between clinical and demographic factors and health-related quality of life (HRQOL) among older people with multiple sclerosis (MS).


Setting and participants. Patients with MS aged 60 years or older were recruited from 4 MS centers in Long Island, NY. Patients with severe cognitive impairment as determined by the health care practitioner were excluded. Participants were asked to complete 3 surveys at 3 different time-points. In the first survey, participants completed the Morisky Medication Adherence Scale and the Patient Multiple Sclerosis Neuropsychological Screening Questionnaire (P-MSNQ). The second survey was the Multiple Sclerosis Quality of Life-54 (MSQOL-54), and the third survey included the Beck Depression Inventory-II (BDI-II) and a disability status self-assessment scale. Cognitive function was measured at the time of recruitment using the Symbol Digit Modalities Test (SDMT).

Analysis. The Andersen Healthcare Utilization model was used to structure the multivariate regression analysis. This model identifies multiple domains affecting quality of life, and the variables from the surveys were categorized according to domain: predisposing characteristics (demographic variables), enabling resources (caregiver support and living situation), needs (eg, health-related measures), and health behaviors (medication use, adherence).

Main results. A total of 211 completed the first survey, 188 the second, and 179 the third. 80% were female and 95% were white. Average age was 65.5 (SD 5.6) years. 56% of respondents’ self-reported scores on the SDMT classified them as cognitively impaired. Risk of neuropsychological impairment, depression, and disability status were significantly associated with a decreased mental and physical HRQOL. Significantly, there was a strong association between predisposing characteristics and QOL. Being widowed and remaining employed were the strongest predictors of better physical QOL and having an education level of high school or less was a predictor of lower mental HRQOL.

Conclusion. Clinicians should measure HRQOL in older MS patients regularly and assess for depression and cognitive impairment.

Commentary

Quality of life is an important marker of MS patients’ well-being as they cope with this chronic illness [1]. The progression of the disease and its symptomatology often negatively affect HRQOL. However, multiple psychosocial factors, such as coping, mood, self-efficacy, and perceived support, affect QOL of patients with MS more than biological variables such as weakness or burden of radio-
logic disease [2]. For example, many self-report HRQOL indices are strongly predicted by measures of depression [3]. In addition, many studies have found a positive association between physical disability and reduced QOL [4,5]. Further, while perceived HRQOL may be a meaningful outcome in itself, it may also be a predictor for outcomes such as disability-related changes [6].

MS leads to disability and loss of function in all age-groups, but only a few studies have focused on HRQOL among elderly patients with MS. As patients with MS age, they may develop comorbidities such as hypertension and diabetes that may affect HRQOL. However, in a previous study comparing QOL between older and younger patients with MS, elderly and younger patients with MS had similar QOL even though the elderly patients had more physical limitations [7].

The strength of the current study was using the Andersen Healthcare Utilization regression model in the analysis, since it factors in multiple influences on health status. The striking evidence that employment and being widowed were linked to better physical QOL suggest that older MS patients may have better adaptation and adjustment to their illness. Researchers have shown that the widowed elderly often take on more responsibilities and tasks when they lose their partner, which leads to increased self-esteem and QOL [8]. Another advantage of the study was the fact that the investigators evaluated the different exposure variables and their associations with mental and physical QOL while identifying multiple confounding variables. Additionally, the use of 2 cognitive assessment tools provided a stronger assessment of patients’ cognitive function.

The main weakness of the study was using a cross-sectional study design with convenience sampling. The convenience sample was based on voluntary participation, which may result in self-selection bias. In addition, the self-report design is subject to the usual limitations of self-reporting for data collection: participants may exaggerate symptoms in order to make their situation seem worse or may under-report the severity or frequency of symptoms in order to minimize their problems. While the overall sample size was 211, not all respondents completed all the surveys, and response rates varied by questions. Thus, missing data may have affected results, but which data are missing is not discernable from the paper. That patients were from a single geographic area and had relatively high education levels (44% with college or above) are among the factors that limit the generalizability of the study. Another limitation is the use of the Beck Depression Inventory, which was not specifically designed for use in the elderly. In addition, the results of this study might have been affected by unmeasured confounding variables, for example daily physical activity, which can be a factor that modifies between depression, cognition, and QOL.

Applications for Clinical Practice

This study reinforces the importance of monitoring older MS patients for factors that may influence their HRQOL. The presence of depression, disability, and cognitive impairment should be assessed for regularly. Clinicians should encourage and empower elderly patients to continue with activities, including employment, that promote their mental and physical well-being and help maintain their independence. Assessing patients with geriatric-specific tools may provide more reliable and accurate assessment data that better accounts for aging dynamics. In addition, comorbidities must be managed appropriately.

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References

Optimal Wheelchair Service Provision for Children with Disabilities


Study Overview

Objective. To conduct a systematic review on the effectiveness, service user perspectives, policy intentions, and cost-effectiveness of wheelchairs for disabled children (< 18 years) for the purposes of developing a conceptual framework to inform future research and development.

Design. EPPI-Centre (eppi.ioe.ac.uk/cms/) mixed-method systematic review with narrative summary and thematic and narrative synthesis.

Data. A search for relevant studies available in English and published in the last 15 years was performed. All identified study titles were assessed for relevance against the inclusion/exclusion criteria, and a second screening process was used to assess relevance of studies by their abstract. Studies deemed relevant were then obtained in full and underwent an additional review by a second researcher to reduce bias and reach consensus regarding inclusion. After data extraction, evidence was divided into 4 streams according to methodology and topic to enable separate syntheses by evidence type: (1) intervention evidence; (2) opinion evidence; (3) policy and not-for-profit organization (NFPO) literature; and (4) economic evidence. Intervention and economic streams were not synthesised due to vast differences in studies and lack of statistical evidence within each stream, thus narrative summary was conducted.

Main outcome. The primary outcome was to create a conceptual framework to inform future research and wheelchair service development in the UK, with international implications. To inform the searching, management, and interpretation of evidence, the review focused on the following 4 objectives regarding wheelchair interventions for disabled children and young people:

- to determine the effectiveness and cost-effectiveness of wheelchairs for said population;
- to better understand service users, parents, and professional perspectives regarding wheelchairs;
- to explore current UK policy, NFPO publication and clinical guideline recommendations and intentions regarding wheelchair provision; and
- to determine if disabled children’s desired outcomes match with existing policy aspirations and effectiveness evidence.

Main results. Synthesis of the integrated dataset elicited the following findings: (1) higher quality wheelchair services take into account the needs of the whole family; (2) disabled children benefit when psychosocial needs are considered along with health needs; (3) disabled children could benefit if policy recommendations focused on services meeting individual needs rather than following strict eligibility criteria; (4) without appropriate outcome measures the holistic benefits of powered wheelchair interventions cannot be evaluated; (5) disabled children may benefit more when physical outcomes of powered wheelchairs are seen as facilitators to wider holistic benefits, but lack of transition of evidence into practice hinders progress; and (6) disabled children would benefit from public buildings and spaces that promote inclusion of disabled people.

A key finding of this study is that wheelchairs offer disabled children independence and social integration and participation in age-appropriate activities. Secondary findings pertain to policy, specifically, the lack of effective translation of policy and evidence into practice, barriers to service delivery, lack of organization, and absence of knowledge application of what children desire from their wheelchairs. The resulting framework of this review lays out the interconnectedness of the problem areas, required actions, and overall development stages, which can lead to future cost-effective wheelchair services and interventions.

Conclusion. Wheelchairs offer children a variety of benefits, particularly with respect to health, development, and social inclusion. Given the barriers surrounding
NHS wheelchair services in the UK, this review provides a solid research foundation for further research and has implications for wheelchair services globally. In particular, the lack of economic evidence found in the review process has implications for the need of appropriate methods to measure cost-effectiveness of interventions in order to promote more efficient service provision.

Commentary
Wheelchair access has compelling implications for improving children’s health, development, and social inclusion. It is this final benefit in particular that makes wheelchair interventions stand out from the rest due to the fact that the wheelchair goes beyond being a medical assistive device to being a gateway to societal participation.

Also related to social inclusion, an additional relevant observation made in this study is the lack of wheelchair access in public spaces. Such barriers can deem a wheelchair irrelevant if it cannot be used in the spaces where the subject needs to travel, such as schools, restaurants, parks, or government offices. Though this study was based in the UK, such barriers to inclusion remain all too common for persons with disability around the world [1], thus positioning the results of study as a starting framework for further global research.

That being said, the authors’ recommendations of resolving public space barriers with the simple addition of wheelchair access is an outdated approach towards inclusion that has been widely challenged by the community of persons with disabilities over the last decade. The promotion of “inclusive design” or “human-centered design” [2] to properly address the challenges of persons with disability is a growing trend, particularly in the United States, and takes into account the highest possible degree of permutation in the local demographics. A recommendation limited to mere wheelchair access stands to shut out other significant portions of the disabled community and exacerbates a “patchwork” approach toward resolving access that is not truly holistic.

Another observation pertains to the financial burden imposed on the family to modify the home when a child in the household has to use a wheelchair. While this is discussed in the article, it is treated separately as it occurs in the private sphere. However, construction regulations, permits, and other aspects pertaining to home-building reside on the government and policy side, even if a private independent entity does the home-building. Hence, policy changes towards inclusive design have implications for both public as well as private spaces.

With respect to the benefits of wheelchair interventions, the authors contend that appropriate interventions stand to “reduce disability discrimination and promote equality.” Concepts such as “discrimination” and “equality” cannot be discussed without political and cultural considerations [3]. The linkage between access and equality is a correlation worthy of discussion; however, the study was not designed to gather data to support such correlation.

Finally, while the overall findings of this study are relevant, it would be useful to know more about wheelchair service provision and the elderly, as it is they who comprise the majority of the disabled population [1,4]. The elderly disabled also need caretakers, need to make home modifications and travel to and from public spaces, and experience barriers and service delays Future research on wheelchair interventions would benefit from a comparative intra-population analysis.

Applications for Clinical Practice
This study outlines critical challenges and problems in the process of obtaining a wheelchair, such as poor evaluation methods for matching a wheelchair to patient needs, bureaucratic delays even after the order has been approved, physical accommodations that need to take place once the wheelchair has been acquired, and financial burdens assumed by the family and/or caretakers. Consideration needs to be given to addressing these problems given the importance of adequate wheelchairs for many disabled people.

—Molly A. Martínez, PhD, World Enabled, Berkeley, CA

References