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# Patient Education for Long Term Adherence

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## ABSTRACT

The success of patients with chronic disorders in effective management is reflected in the poor adherence rates reported for various regimen components, including medication taking, exercise, dietary regimen, among others. A major function of nursing is the education of patients on care management. Research shows that this education primarily focuses on knowledge, with less attention given to the development of behaviors which would support continuation of treatments over time. Conceptualizing adherence to treatment as a habit building process has shown promise in supporting adherence. While there is the need for ongoing research, there is a body of evidence to support the development of adherence through habit building. Models of habit building exist to inform the nurse educator. It is recommended that the education of the nurse include the process of developing habits and habit strength to inform the education of patients on regimen management.

**Keywords:** Patient education; Adherence; Habit building; Nurse delivered patient education

## Introduction

The challenge of care management weighs heavily on the patient and/or the patient's caregiver. Whether the disorder is a brief infectious process or long -lasting chronic disease, once the clinician completes the diagnosis and prescription, the management of that prescription lies with the patient or their caregiver. While such management may pose difficulty for the person with one condition, much of the population is now burdened with multi-morbidities and the need to integrate care for several conditions into daily life. Indeed over 37% of the population is dealing with multi-morbidities with 51% of those over 60 years of age coping with more than one condition[1].

The success of patients on their own in this regard is reflected in the poor adherence rates seen across conditions and behaviors. Non-adherence to medication has been self-reported by over 50% of persons with chronic disease[2] while adherence measured by electronic bottle cap for young children on five to ten days of antibiotics showed that only 22% of the children received the full dose of their treatment[3] with self-reported adherence related to antibiotics among adults and children 32.1%[4]. The situation is no better with adherence to exercise regimens. In a multi-country meta-analysis of exercise adherence, it was found that just 19.7 % of adults and adolescents adhered to physical activity guidelines[5] and as many as 52% of patients with chronic disease discontinue exercise within the first year[6]. Similarly, continued dietary adherence in hypertension was self-reported to be just 19.4% accordant with the recommended diet[7] or reported managing their diet at all[8].

Who is there to help patients develop new habits, integrate care recommended by multiple providers, and monitor their progress? Studies examining nurse provided education show that is one strategy to assist patients and caregivers with management. For example, Arad et al [9] reported nurse provided education improved adherence and physiological measures among patients with End-Stage Renal Disease. The intervention consisted of a booklet on diet, medication, and fluid restriction followed by texts with education on the above topics. Similarly, nurse-led health education for patients with chronic conditions was successful in improving self-reported adherence to medication treatment although variability was found between intervention types and populations[10]. A meta-analysis of educational interventions and medication adherence in hypertension indicated the effectiveness of educational interventions was significant but small, with better results for oral education and frequent follow-up[11]. While the method of delivery and the general focus on self-management of medication were indicated, there was no further information provided on the nature of the education delivered. We have to ask whether we are focusing on the right targets in patient education and whether our education of nurses focuses on the appropriate patient education methodologies.

## Educating for Patient Adherence to Treatment

Typically, the education of patients consists of minimally the information of what the regimen is, what the consequences of not following it are, and how to address any side effects which may occur. The introduction of a new treatment, however, is best viewed as the need for a behavior change in the patient's life. Thus, the education of the nurse needs to include the most recent evidence on behavior change. In the terms of treatment regimen, whether it be medication taking, exercise, diet, or other prescription, the desire is for repeated adoption for anywhere from a week to life-long performance, especially in the case of chronic disease. In other words, the adoption of a new habit.

Studies on the use of and development of habits go back as far as the 1920s[12,13] and continue to the present, with recent studies showing strong associations between habit strength and adherence[14,15,16] Stroebele-Benschop et al[17] showed that habit strength was associated with eating in food groups and recommended that dietary education should consider habit strength. Similarly, Ma et al[18] reported in a meta-analysis that interventions that focus on habit formation are effective in developing physical activity habits. Badawy et al[14] showed a strong relationship between habit strength and medication adherence, recommending habit-based interventions to achieve higher adherence. The evidence is before us.

Habits take time to form. A meta-analysis using different behaviors suggested that on average it takes a median of 66 days for a health habit to form, that is for the behavior to become automatic, but may take up to 5 months or longer[19]. Thus, educating a patient once and expecting adherence is not realistic. A longer follow-up period to support habit *development* is likely to be required. This issue is rarely addressed in the education of nurses in patient education. Yet, it we are to achieve the goal of establishing long term adoption of treatment, it is critically important.

The development of habits requires an education in the science of habit formation. It is not simply the advice to take medication with the morning cup of coffee or to take a walk after dinner in the evening, that is, to pair the treatment behavior with an existing behavior, although this is important in the development of habit. There is a science behind its design for habit development to occur. This includes information behind cue formation, reinforcement, goal setting, self-monitoring, as well as other behavioral changes elements. Multiple models exist. Akash & Chowdhury[20], for example, provide a brief overview of relatively simple, implementable models. Gardner et al[21] provide a review of habit formation in the real world. And Ma et al [18] offer a review of the effectiveness of various habit-forming interventions. Even information on the hypothesized underlying biological mechanisms in habit development is available[22]. The science behind habit building is accessible for the education of nurses.

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## Patient Teaching as a Core Nursing Function

That patient education is effective in improving patient outcomes is well established[23]. This activity, patient education, is considered a key function of the nurse[24]. Numerous studies have shown the positive impact of the nurse's patient education on not just health outcomes, but also costs[25]. However, a review of the impact of pharmacist-nurse patient education in support of medication adherence, showed that only 25% of studies showed improvement in adherence associated with improved patient outcomes[26]. Alanazi et al[27], in a review of studies on health education and nursing, found a lack of focused education among the nurses as a barrier to effective education around adherence. Much of patient education in nursing centers on the delivery of information regarding the medical condition and the 'what and why' of the recommended treatments with less attention going to the 'how' of treatment implementation. A review of patient education and its effects on health behaviors among cardiac patients indicated that nursing education focused principally on medications, disease, and lifestyle/risk factors[28]. The interventions were based upon behavioral intention, social learning theory, and the health belief model. These are evidence-based models, which, however, do not focus on long term behavior change. Habit formation was not a component of the interventions taught. With the significant problem of patient adherence to treatment, particularly over time, the need for an evidence-based strategy that nurses can incorporate in their educational activities is needed. While research is still required on the elements of habit training that are effective[29], habit training seems to offer a strategy to address patient education for long term adherence.

## Conclusion

Adherence to multiple forms of treatment poses a problem in the long term care of chronic diseases. A promising strategy exists in the education of patients for the development of habits in medication taking, exercise, and dietary interventions, among others. Studies of the patient education provided by nurses suggests that education is primarily focused on knowledge without the component of development of habit. An opportunity for improving health care outcomes through improved adherence exists through the education of nurses in the delivery of habit based adherence interventions.

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## References


1. Chowdhury, S. R., Das, D. C., Sunna, T. C., Beyene, J., & Hossain, A. (2023). Global and regional prevalence of multimorbidity in the adult population in community settingts: A systematic review and meta-analysis. eClinical Medicine, 57:101860. Doi: 10.1016/j.eclinm.2023.101860
2. Cea-Calvo, L., Marin-Jimenez, I., de Toro, J., Fuster-RuizdeApodaca, M. J., Fernandez, G., Sanchex-Vega, N., & Orozco-Beltran, D. (2019). Current Medical Research and Opinion, 36(2):293-300. https://doi.org/10.1080/03007995.2019.1676539
3. Youngster, L., Gelernter, R., Klainer, H., Paz, H., Kozer, E., & Goldman, M. (2022). Electronically monitored adherence to short-term antibiotic therapy in children. Pediatrics, 150 (6): e2022058281. https://doi.org/10.1542/peds.2022-058281
4. Almomani, B. A., Hijazi, B. M., Awwad, O., & Khasawneh, R. A. (2022). Prevalence and predictors of non-adherence to short-term antibiotics: A population-based survey. PLOS One, https://doi.org/10.1371/journal.pone.0268285
5. Garcia-Hermoso, A., Lopez-Gil, J. F., Ramirez-Velex, R., Alonso-Martinez, A. M., Izquierdo, M., & Ezzatvar, Y. (2022). Adherence to aerobic and muscle-strengthening activities guidelines: a systematic review and meta-analysis of 3.3 million participants across 32 countries. British Journal of Sports Medicine. 57(4), https://doi.org/10.1136/bjsports-2022-106189
6. Saida, T. G. R. H., Sorensen, T. J., & Langberg, H. (2017). Long-term exercise adherence after public health training in at-risk adults. Annals of Physical Medicine and Rehabilitation, 60(4): 237-243. Doi: 10.1016/j.rehab.2017.02.006
7. Mellen, P. B., Gao, S. K., Vitolins, M. Z., & Goff, D. C. (2008). Deteriorating dietary habits among adults with hypertension: DASH dietary accordance, NHANES 1988-1994 and 1999-2004. Archives of Internal Medicine, 168(3): 308-314. https://Doi:10.1001/archinternmed.2007.119
8. 8.Shim, J. S., Heo, J. E., & Kim, H. C. (2020). Factors associated with dietary adherence to the guidelines for prevention and treatment of hypertension among Korean adults with and without hypertension. Clinical Hypertension. 26, 5 https://doi.org/10.1186/s40885-020-00138-y
9. 9.Arad, M., Goli, R., Parizad, N., Vahabzadeh, D., & Baghaei, R. (2021). Do the patient education program and nurse-led telephone follow-up improve treatment adherence in hemodialysis patients? A randomized controlled trial. BMC Nephrology. 22, 119 https://doi.org/10.1186/s12882-021-02319-9
10. 10.Albiladi, R. A. M., Ajlabri, K. A., Alrowatai, B. A., Alsuhimi, M. M., Alamri, A. S., Alharbi, R. A. A., Alharbi, S. S. A., & Aljabri, B. A. (2023). Nurse-led interventions to enhance adherence to chronic medication. International Journal for Scientific Research. 2(11), 312-325. https://doi.org/10.59992/IJSR.2023.v2n11p13
11. 11.Ampofo, A. G., Khan, E., & Ibitoye, M. B. (2020). Understanding the role of educational interventions on medication adherence in hypertension: A systematic review and meta-analysis. Heart & Lung. 49(5), 537-547, https://doi.org/10.1016/j.hrtlng.2020.02.039
12. Walter, W. G. (1925). Habit training for mental patients. Occupational Therapy & Rehabilitation, 4(4), 235-240.
13. Wilson, S. C. (1929). Habit training for mental cases. Occupational Therapy & Rehabilitation. 8(3), 189-109.
14. Badawy, S. M., Shah, R., Beg, U., & Heneghan, M. B. (2020). Habit strength, medication adherence, and habit-based mobile health interventions across chronic medical conditions: Systematic review. Journal of Medical Internet Research. 22(4):e17883 Doi: 10.2196/17883
15. Demirci, E., Tuzun, E., Un, A, F, asonmez, T. G., & Varol, O. (2025). From occasional to steady: Habit formation insights from a comprehensive fitness study. Computers and Society, arXiv:2501.01779
16. Pironet, A., Phillips, L. A., & Vrijens, B. (2025). Correlation between objective habit metrics and objective medication adherence: Retrospective study of 15,818 participants from clinical studies. Interactive Journal of Medical Research. 14:e63987, Doi: 10.2196/63987
17. Stroebele-Benschop, N., Dieze, A., & Hilsendegen, C. (2018). Students' adherence to dietary recommendations and their food consumption habaits. Nutrition and Health, 24(2), 75-81. https://doi.org/10.1177/0260106018772946
18. 18.Ma, H., Wang, A., Pei, R., & Piao, M. (2023). Effect of habit formation interventions on physical activity habit strength: Meta-analysis and meta-regression. International Journal of Behavioral Nutrition and Physical Activity. 20, 109. https://doi.org/10.1186/s12966-023-01493-3
19. 19.Singh, B., Murphy, A., Maher, C., & smith, A. E. (2024). Time to form a habit: A systematic review and meta-analysis of health beahviour habit formation and its determinants. Healthcare. 12(23), 2488. https://doi.org/10.3390/healthcare12232488
20. 20.Akash, M. S. & Chowdhury, S. (2025). Small changes, big impact: A mini review of habit formation and behavioral change principles. World Journal of Advanced Research and Reviews. 26(01), 3098-3106. Doi: https://doi.org/10.30574/wjarr.2025.26.1.1333
21. 21.Gardner, B., Rebar, A. L., & Lally, P. (2022). How does habit form? Guidelines for tracking real-world habit formation. Cogent Psychology. 9(1). https://doi.org/10.1080/23311908.2022.2041277
22. 22.Simonsmeier, B. A., Flaig, M., Simacek, T. & Schneider, M. (2020). What sixty years of research says about the effectiveness of patient education on health: a second order meta-analysis. Health Psychology Review. 16(3), 450-474. https://doi.org/10.1080/17437199.2021.1967184
23. 23.Murray, J. M. & Escola, G. S. (2020). Remembrance of things practiced with fast and slow leawrning in cortical and subcortical pathways. Nature Communications, 11, 6441. https://doi.org/10.1038/s41467-020-19788-5


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24. 24.Wang, S., Liu, K., Tang, S., Wang, G., Qi, Y., & Chen, Q. (2025). Interventions to improve patient health education competence among nursing personnel: A scoping review. Nurse Education in Practice. 83, 104258. https://doi.org/10.1016/j.nepr.2025.104258
25. 25.Rice, H., Say, R., & Betihavas, V. (2018). The effect of nurse-led education on hospitalization, readmission, quality of life and cost in adults with heart failure. A systematic. Patient Education and Counseling. 101(3), 363-374. https://doi.org/10.1016/j.pec.2017.10.002
26. 26.Celio, J., Ninane, F., Bugnon, O., & schneider, M. P. 2018). Pharmacist-nurse collaborations in medication adherence-enhancing interventions: A review. Patient Education and Counseling. 101(7), 1175-1192. https://doi.org/10.1016/j.pec.2018.01.022
27. 27.Alanzi, A. M., Al Guhani, M. F., Althobity, S. a., Alharthi, M. D. Alotaibi, S. D., & Al Ghamdi, F. A., (2024). The role of health education among nurses in promoting medication adherence: Strategies and outcomes. Journal of Healthcare Sciences. 4(12), JOHS2024001014. http://dx.doi.org/10.52533/JOHS.2024.41251
28. 28.Shi, W., Ghisi, G. l. M., Zhang, L., Hyun, K., Pakosh, M., & Gallagher, R. (2022). Systematic review, meta-analysis and meta-regression to determine the effects of patient education on health behaviour change in adults diagnosed with coronary heart disease. Journal of Clinical Nursing, 32(15-16), 5300-5327. https://doi.org/10.1111/jocn.16519
29. 29.Gardner, B., Aarden, M. A., Brown, D., Even, F. F., Green, J., Hamilton, K., Hankonen, N., Inauen, J., Keller, J., Kwasnicka, D., Labudek, S., Marien, H., Masaryk, R., McCleary, N., Mullan, B. A., Neter, E., Orbell, S., Potthoff, S., & Lally, P. (2021). Developing habit-based health behavior change interventions: twenty-one questions to guide future research. Psychology & Health, 38(4), 518-540. https://doi.org/10.1080/08870446.2021.2003362

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