

# Barriers to Medication Adherence in Chronic Heart Failure Patients during Home Visits

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## ABSTRACT

**Aim:** To identify barriers to medication adherence in chronic heart failure patients during home visits; and to find solutions to address medication non-adherence.

**Method:** This was an observational study of home visits by the chronic heart failure pharmacist that was made after referral from a multidisciplinary chronic heart failure service. The reasons for medication non-adherence and solutions to overcome them were recorded in 66 consecutive chronic heart failure patients. Barriers to medication adherence and subsequent interventions (education, counselling, motivational interviews), hospital readmissions, length of stay, mortality and cause of death were analysed 3 months after the first home visit.

**Results:** Main reasons for medication non-adherence were poor and/or complex medication instructions (71%), running out of medications (33%) and adverse drug reactions (20%). Interventions included education and counselling (100%), reducing dosing frequency (64%) and introducing dose administration aids (32%). 10 complex chronic heart failure patients (15%) required multiple home visits, motivational interviews and telephone coaching. Hospital readmissions, average length of stay for readmissions and deaths due to chronic heart failure 3 months after the first home visit were 4.5%, 6.3 days and 3%, respectively.

**Conclusion:** Multiple strategies were necessary to overcome barriers to medication adherence in chronic heart failure patients. Home visits by the pharmacist optimised medication adherence, thus potentially minimising unplanned hospital admissions.

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## INTRODUCTION

Chronic heart failure a progressive syndrome that marks the end-stage of diseases of the heart has a high mortality rate and significant cost burden.<sup>1,2</sup> Chronic heart failure is a disease of the elderly with prevalence estimates in the US to exceed 10% in people aged over 65 years.<sup>3</sup> An Australian study reported chronic heart failure prevalence of over 20% in those aged 60 to 80 years.<sup>4</sup> Heart failure was the primary diagnosis for 41 703 hospitalisations in Australia during 1999 to 2000 and most patients were aged 70 years and older.<sup>5</sup> Chronic heart failure affects 300 000 Australians and around 30 000 new cases are diagnosed each year.<sup>6</sup> The mortality rate attributed to chronic heart failure is high (2% of all

hospital deaths), with 50% mortality within three to four years of diagnosis.<sup>5</sup>

The last few months or years of life of chronic heart failure patients are punctuated with episodes of exacerbations of heart failure symptoms. These episodes result in attendance at emergency departments and the utilisation of scarce health resources. Unplanned hospital readmissions (within one month post-discharge) in Victorian public hospitals can be as high as 20%.<sup>5</sup> The 2006/07 average cost of a hospital admission in Victoria for simple heart failure (diagnostic-related group 62B) and complex heart failure (diagnostic-related group 62A) was \$3440 and \$7260, respectively.

Cardiac decompensation, attendance at emergency departments and hospital readmissions in chronic heart failure are often precipitated by preventable events. To decrease health expenditure and improve patient outcomes, since 2003, the Victorian Department of Human Services has funded ambulatory multidisciplinary teams to address the needs of chronic heart failure patients.<sup>5</sup> These multidisciplinary teams have improved clinical outcomes in these patients, by reducing hospital readmissions, reducing length of stay, improving care and quality of life.<sup>2,5,7</sup> Some authors have reported that multidisciplinary teams significantly reduce chronic heart failure mortality.<sup>1,2,8</sup>

At Dandenong Hospital, the chronic heart failure service consists of a multidisciplinary team comprising cardiologists, specialist nurses, a pharmacist, a physiotherapist and a clinical psychologist. Chronic heart failure patients are provided with a comprehensive education with an emphasis on self-management strategies, such as attention to medications, exercise, diet, fluid restriction and daily weight measurements. Pharmacotherapy, especially chronic heart failure medicines were optimised at the chronic heart failure outpatient clinic. Medication non-adherence is high among old patients, those from culturally and linguistically diverse backgrounds, low socioeconomic backgrounds and low educational status. Medication adherence is essential to attain maximal therapeutic benefits.<sup>9</sup> Medication adherence in patients with chronic diseases has been reported to average 50%.<sup>9</sup> Non-adherence significantly contributes to morbidity and mortality and wastes scarce health resources.<sup>10</sup>

There are two types of medication non-adherent behaviours. Unintentional non-adherence occurs when patients forget or are unable to follow directions because of poor understanding, medication regimen complexity or physical disability.<sup>9,10</sup> Intentional non-adherence results when patients decide not to take medications because of adverse drug reactions and/or have self-perceptions about the risk of harm and benefit of a medication.<sup>9,10</sup> Personal health beliefs and experiences contribute to intentional non-adherence in patients with chronic diseases.

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Home visits by pharmacists can provide an opportunity to identify the nature of poor medication adherence and affords an opportunity to improve adherence. Conventional interventions available for improving medication adherence include medication counselling and education, telephone follow-up, simplifying and improving medication regimens and organising dose administration aids.<sup>9</sup> Another technique is motivational interviewing, which involves directed, patient-centered counselling to elicit behaviour change by helping patients explore and resolve their ambivalence.<sup>11</sup>

This study aimed to identify barriers to medication adherence in chronic heart failure patients during home visits; and to find solutions to address medication non-adherence.

## METHOD

This was an observational study by the chronic heart failure pharmacist eliciting clinical information during home visits to chronic heart failure patients. Patients were referred to the chronic heart failure pharmacist for home visits if issues with medication adherence were identified by nurses during home visits or by cardiologists and pharmacists during outpatient clinics. The patients were visited as soon as practicable after referral. This was a quality assurance audit and ethics approval was not obtained.

Sixty-six consecutive chronic heart failure patients who were visited at home by the chronic heart failure pharmacist from March 2005 to November 2007 were included in the study. Data collected included: patients' demographic data, non-pharmacological issues related to chronic heart failure management, barriers to medication non-adherence and solutions used during home visits, as well as the number of patients needing multiple home visits. Patients were provided with simplified medication lists in English, i.e. purpose, adverse effects, dosing.

Three months after the first home visit, readmissions to the emergency department and hospital readmissions, mortality and cause of death from cardiac and non-cardiac events were analysed for each patient. These data were retrieved by the pharmacist working with Health Information Services using electronic records and manual case note reviews.

## RESULTS

Over the first three years of the chronic heart failure service, 66 patients were referred to the pharmacist for home visits (Table 1). The patients were typically old,

**Table 1. Characteristics of chronic heart failure patients who received a home visit by a pharmacist**

Characteristics	No. of patients (n = 66)
Mean age (years)	68.4 ± 13.2
Gender (male)	46 (70%)
Culturally and linguistically diverse background	45 (68%)
Mean number of comorbidities	6.4 ± 2.4
Mean number of prescription medicines	10.6 ± 3.4
Mean number of pharmacist home visits	1.3 ± 0.8
Time from referral to first visit (days)	7.5 ± 7

**Table 2. Reasons given by patients for medication non-adherence**

Reasons for non-adherence	No. of patients
Poor ± complex medication regimen instructions	47 (71%)
Run out of medications ± prescriptions	22 (33%)
Adverse drug reactions	13 (20%)
Poor memory	12 (18%)
Financial hardship	6 (9%)

male, of culturally and linguistically diverse backgrounds, with multiple comorbidities including chronic heart failure as a primary diagnosis, and were taking multiple medications (Table 1). Patients were seen by the pharmacist within one week of referral and ten patients required more than a single home visit.

The major reason for medication non-adherence was the inability to manage multiple medications and associated complex medication regimen (Table 2). Medication instructions were inadequate and too complex for 71% of chronic heart failure patients. Running out of medications and prescriptions for ongoing medications (33%) and adverse drug reactions (20%) were other reasons for medication non-adherence. Some patients reported poor memory (18%) or financial hardship (9%) as contributing factors (Table 2).

Fifty-three per cent of patients were unintentionally non-adherent and 27% were intentionally non-adherent to their medications. Only 18% of chronic heart failure patients were adherent and were provided with education only.

The strategies used by the pharmacist to increase medication adherence included a combination of education and counselling, simplifying dosing regimens, facilitating dose administration aids, motivational interviews and multiple home visits. Only 15% of chronic heart failure patients required more than one home visit: five patients had two visits, three patients had three visits, and one patient each had four and five visits (Table 3).

**Table 3. Interventions by pharmacist to promote medication adherence**

Interventions	No. of patients
Education and counselling	66 (100%)
Alter dosing frequency and supply medication list	42 (64%)
Dose administration aids	21 (32%)
Motivational interviews	13 (20%)
Multiple home visits	10 (15%)

As well as addressing chronic heart failure medication non-adherence, the pharmacist also counselled patients on their other medications. Patients also received education on non-pharmacological issues such as sodium restriction (32%), fluid restriction (29%) and daily weight measurements (27%). The pharmacist also discussed diet (27%), alcohol restriction (8%) and smoking cessation (8%). Twenty-seven per cent of patients who previously had minimal contact with their general practitioner were encouraged to have regular follow-up.

Three months after the first home visit, two patients were admitted to the emergency department on one occasion each while two patients had four hospital readmissions. Overall, three patients had six episodes of admission to emergency and hospital wards. The overall admission rate for this cohort of 66 chronic heart failure patients was 4.5% with an average ward length of stay of  $6.3 \pm 1.3$  days. Three months after referral, four patients had died (two from heart failure).

## DISCUSSION

Non-adherence to chronic heart failure medications among the elderly with multiple comorbidities, especially those with impaired memory, is a major challenge. The average elderly patient (65 to 74 years) who takes six or more medications is at the greatest risk of medication-related problems.<sup>12</sup> The catchment area for the Dandenong Hospital is culturally diverse and socially, economically and educationally disadvantaged.<sup>13</sup> The most common cause of non-adherent behaviour reported by chronic heart failure patients in this study was poor and complex medication instructions received at the time of hospital discharge. Late notification about a patient's impending discharge from hospital has been identified as a contributing factor.<sup>5</sup> If the importance of continuing medications long-term is not impressed on patients at the time of discharge, patients may cease medications when a supply runs out or fail to obtain further prescriptions for ongoing pharmacotherapy. Experiencing adverse effects may also cause patients to cease or reduce doses of medications without informing their general practitioner. Financial hardship was also identified as a contributing factor for medication non-adherence.

To overcome barriers to medication non-adherence, the pharmacist supplied fact sheets on medications, educated patients on the purpose of each medication, discussed possible adverse effects, reinforced the lifelong need for chronic heart failure medications and the need to inform their general practitioner of adverse effects. The pharmacist assisted patients in decreasing dosage frequency and supplied a medication list showing administration times to enhance convenience and maximise adherence. To further enhance medication adherence, cognitively appropriate patients were supplied dose administration aids. For patients with cognitive impairment, the local community pharmacy was contacted to supply dose administration aids. The chronic heart failure service at Dandenong Hospital has a small budget for patients in financial stress to allow an extended supply of medications for a few months. Some patients with infrequent contact with their general practitioner were taken by the pharmacist to visit their general practitioner for prescriptions and clinical review. Telephone follow-up by the chronic heart failure pharmacist with the local community pharmacy and patients was maintained for a minimum of one month. These measures were employed for patients with unintentional medication non-adherence.

Employing these interventions for patients with intentional medication non-adherence is unlikely to be effective.<sup>10</sup> Hence, motivational interviews, which aim to correct personal misbeliefs by involving the patient in goal setting and decision making, together with multiple home visits and telephone coaching were used.

The multi-layered intervention described in this study is similar to a study that identified pharmacists as essential health professionals in medication adherence.<sup>14</sup> An Australian study on pharmacist home visits in a chronic disease management unit ( $n = 24$ ) used education (88%), simplified dosing times (42%) and dose administration aids (29%) to address medication non-adherence.<sup>15</sup> In comparison, 100% of patients in this study were counselled about their medications and 64% required rationalisation of their dosage frequency. This observation may be attributed to the higher proportion of culturally and linguistically diverse patients in the present study. Unlike Stell et al.,<sup>15</sup> 15% of chronic heart failure patients in this study also required multiple home visits and telephone contact to maximise medication adherence.

The chronic heart failure pharmacist also engaged in additional interventions such as reinforcing self-management strategies for sodium and fluid restrictions and daily weight measurements that were introduced by chronic heart failure nurses. A review has attributed poor adherence to lifelong lifestyle changes and restrictions that the self-management strategies usually require.<sup>16</sup> This review found a non-adherent rate for diet to be 13 to 76% and adherence dropped with time. van der Waal et al.<sup>17</sup> also reported similar results and identified that major barriers to adherence to sodium restriction, fluid restriction, daily weights, and exercise were taste of food, thirst, daily motivation and physical symptoms compounded by lethargy, respectively. It is not surprising that around 30% of patients in the present study needed reinforcing about sodium and fluid restrictions and daily weight measurements despite prior education by the chronic heart failure nurses. Non-adherence to sodium and fluid restrictions and medication greatly increases the risk of decompensated heart failure, leading to hospital readmissions. The tools suggested by van der Waal et al. include increasing patient knowledge and changing their belief by education and counselling.<sup>17</sup>

The multidisciplinary approach with an outreach capability presented in this study was compared to a cohort of chronic heart failure patients in the US who were under cardiologist care at discharge from hospital with no formal follow-up post-discharge.<sup>18</sup> Hospital readmissions and the death rate three months from the first home visit was indirectly compared with the readmission rate at four months and the mortality rate at six months. Of the 419 patients in the US study, the readmission rate was higher (17%) at four months compared to 4.5% at three months after the first home visit.<sup>18</sup> The all-cause mortality at six months was higher (18%) compared to 6% at three months after the first home visit. While it is not possible to directly compare these data (due to the small sample size of this study), the average length of hospital stay was similar –  $6.3 \pm 1.3$  days in our study versus  $6.1 \pm 6.5$  days.<sup>18</sup> The length of hospital stay is also favourable when compared with the 2006/07 Victorian average of 9.2 days for complex chronic heart failure and 4.5 days for simple chronic heart failure. The present results suggest that the average length of ward admission approximates reported benchmarks.

Although the sample size in this study was small, it compares well with a similar Australian study of 24 patients in a chronic diseases management clinic.<sup>15</sup>

Another limitation of this study was the analysis of hospital readmission and deaths was undertaken at three months after the first home visit rather than 12 months. However, this was an observational study and not a hypothesis-derived research study. The next phase will be to prospectively compare patients receiving the chronic heart failure pharmacist intervention with a control group, which would allow a rigorous evaluation of the effectiveness of pharmacist interventions.

The reasons for medication non-adherence are complex and require that pharmacists use a combination of interventions to overcome these barriers. In a recent review, Riegel et al.<sup>19</sup> comprehensively detailed barriers to medication adherence, sodium and fluid restrictions, exercise, engaging in preventive behaviours and monitoring for signs and symptoms of heart failure.

A systematic review of 2026 chronic heart failure patients has suggested that a pharmacist is most effective in a multidisciplinary team and not in a pharmacist-led team.<sup>9</sup> The inclusion of a pharmacist in a multidisciplinary team was associated with significant reductions in the rate of heart failure hospitalisations.<sup>9</sup> This finding is mirrored by our multidisciplinary team, which has a medical lead and a pharmacist as a team member.

In conclusion, multiple strategies are necessary to overcome barriers to medication adherence in chronic heart failure patients. Home visits by the pharmacist optimised medication adherence.

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#### References

1. Hargraves T, Bennett AA, Brien JE. Developing an outpatient heart failure pharmacy service. *J Pharm Pract Res* 2008; 38: 103-6.
2. Davis RC, Davies MK, Lip GY. *ABC of heart failure*. 2nd ed. Oxford: Blackwell Publishing; 2006.
3. Koda-Kimble MA, Young LY, Kradjan WA, Guglielmo BJ, Alldredge BK. *Applied therapeutics: the clinical use of drugs*. 9th ed. Philadelphia: Lippincott Williams & Wilkins; 2009. p. 18.2.
4. Krum H, Tonkin AM, Currie R, Djundjek R, Johnston CI. Chronic heart failure in Australian general practice. The Cardiac Awareness Survey and Evaluation (CASE) Study. *Med J Aust* 2001; 174: 439-44.
5. Davies J, Anderson J, Birdsey G, Bradley R, Brand C, Bunker S, et al. Hospital admission risk program (HARP). Chronic heart failure working party report. Melbourne: Victorian Government Department of Health Services; 2003. Available from <www.health.vic.gov.au/archive/archive2005/harp/chf.pdf>.
6. Australian Institute of Health and Welfare. Heart, stroke and vascular diseases. Australian facts 2008. Canberra: Australian Institute of Health and Welfare; 2008. p. 187. Available from <www.aihw.gov.au/publications/index.cfm/title/10585>.
7. Koshman SL, Charrois TL, Simpson SH, McAlister FA, Tsuyuki RT. Pharmacist care of patients with heart failure. A systematic review of randomized trials. *Arch Intern Med* 2008; 168: 687-94.
8. Rodgers JE, Stough WG. Underutilization of evidence-based therapies in heart failure: the pharmacist's role. *Pharmacotherapy* 2007; 27: 18S-28S.
9. Rigby D. Adherence assessment tools: drugs don't work when they are not taken. *Aust J Pharm* 2007; 88: 32-3.
10. George J, Vuong T, Bailey MJ, Kong DC, Marriott JL, Stewart K. Medication regimen complexity and adherence in patients at risk of medication misadventure. *J Pharm Pract Res* 2006; 36: 99-102.
11. Rigby D. Motivational interviewing. *Aust J Pharm* 2008; 89: 28-9.
12. National Prescribing Service. Medicines and older people: an accident waiting to happen? NPS News 2004; 34. Available from <www.nps.org.au/\_data/assets/pdf\_file/0018/15822/news34.pdf>.
13. Australian Bureau of Statistics. Census of population and housing: Socio-Economic Indexes for Areas, Australia – data only. Available from <www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/2033.0.55.001Med ia%20Release22006?opendocument&tabname=Summary& prodno=2033.0.55.001&issue=2006&num=&view>. Accessed 30 March 2009.
14. Lee JK, Grace KA, Taylor AJ. Effect of a pharmacy care program on medication adherence and persistence, blood pressure, and low-density lipoprotein cholesterol. *JAMA* 2006; 296: 2563-71.

15. Stell R, Bonollo M, Fiddes K, Dooley MJ. Successful Integration of a clinical pharmacist into a disease management unit. *J Pharm Pract Res* 2008; 38: 132-6.
16. Evangelista LS, Dracup K. A closer look at compliance research in heart failure patients in the last decade. *Prog Cardiovasc Nurs* 2000; 15: 97-103.
17. van der Waal MH, Jaarsma T, Moser DK, Veeger NJ, van Gilst WH, van Veldhuisen DJ. Compliance in heart failure patients: the importance of knowledge and beliefs. *Eur Heart J* 2006; 27: 434-40.
18. Philban EF, Weil HF, Erb TA, Jenkins PL. Cardiology or primary care for heart failure in the community setting: process of care and clinical outcomes. *Chest* 1999; 116: 346-54.
19. Riegel B, Moser DK, Anker SD, Appel LJ, Dunbar SB, Grady KL, et al. State of the science: promoting self-care in persons with heart failure: a scientific statement from the American Heart Association. *Circulation* 2009; 120: 1141-63.

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