# Outcome of Elderly Patients Enrolled in Home Health Care Program Affiliated to Al-Hada and Al-Tayef Military Hospitals Program in KSA

Mohamed M Makhlouf *

**Abstract:** Home health care is a rapidly growing health care sector. An increasing older population and the desire to reduce acute health care costs have contributed to its growth. Moreover, older persons and their family members do prefer home care. A prospective cohort study was implemented to determine the outcome of elderly patients enrolled in the Home Health Care program affiliated to Al-Hada and Al-Tayef Military Hospitals program, KSA and investigate some factors associated with the outcome of those patients. A total of 131 elderly enrolled in the program were included. Sociodemographic and medical history were obtained, medical records were reviewed and full clinical assessment was conducted. The study extended for 19 months. All elderly were followed-up until discharge from services, readmission to hospital, death, or end of the study. Results revealed that by the end of the study, 65.5% of the elderly were still in the service, 6.9% died, and 17.6% were readmitted to the hospital and didn't' return back. The factors significantly associated with death or readmission to the hospital were the principal diagnosis, higher number of comorbidities, presence of chronic obstructive pulmonary disease (COPD), atrial fibrillation (AF), presence of associated problems, and higher number and earlier timing for emergency visits to hospitals. The independent predictors for death and readmission to hospitals were altered consciousness on admission, presence of AF, COPD, and higher number of emergency visits to hospitals. Further studies including control groups receiving different modalities of care are required to assess the effectiveness of the program. Cost effective analysis of the service is recommended. Better selection of the patients for the service and assuring their stabilization before admission may improve the outcome of these patients and enhance the quality of care.

## INTRODUCTION

An overall goal of good geriatric medical practice is to maintain older persons in the familiarity, comfort, and dignity of their own home setting for as long as possible. If attempts to reduce the functional impact of illness in old age are to be successful, it is vital that all health care professionals understand the significance of providing care in the patient's own home.[1]

Home health care (HHC) is a rapidly growing health care sector.[2] An

*Department of Family Medicine, Al-Hada Armed Forces Hospital, Tayef, KSA

increasing older population and the desire to reduce acute health care costs have contributed to its growth. Moreover, older persons and their family members do prefer home care, independent of the financial savings.[3]

The health care delivery system has undergone dramatic shifts in care settings during the past decade. More patients are receiving professional home care following discharge from hospitals, skilled-care facilities and rehabilitation centres.[4]

Several studies[5,6] have shown that home based interventions for patients with chronic illness following acute hospital stays can result in fewer unplanned readmissions, lower fatality, fewer emergency department encounters, and lower cost of care.

Despite the huge benefits of HHC, hospitalization and visits to the emergency department among seniors receiving homecare services is still high.[7] Several factors were found to be significantly associated with readmission to hospitals. Among these are disease severity, functional disability level, comorbidity, and previous hospital admission.[8,9]

The increased use of home care services, and the provision of more sophisticated care to acutely ill patients, has prompted concern about quality assurance in home settings.[10] Reduction in rehospitalization is one of the outcome measures used to evaluate home care services. However, practitioners and managers must carefully analyze the reasons for patients' return to the hospital.[11]

Despite the rapid growth in home health services in industrial world, HHC programs in our Arab countries are newly

established. Data on outcomes of elderly patients receiving homecare services are sparse.

### Aims of this study are

1- To determine  the outcome of elderly patients enrolled in the Home Health Care program affiliated to a Military Hospitals program, KSA.

2- To investigate some factors associated with the outcome of those patients.

### MATERIAL AND METHODS

### HHC program at Al-Hada and Al-Tayef Military Hospitals program

HHC is a newly developed and expanding service offered to the patients working in the military service and their relatives. Patients are referred to HHC from the 4 hospitals affiliated to Al-Hada and Al-Tayef Military Hospitals program and also from the community. HHC team receives requests for admission, assesses patients, puts the care plan, and follows the patients at their homes through scheduled visits. The team includes physician, rehabilitation specialist, nurses, physiotherapists, and drivers. For enrolled, patients should have 24-hour available caregiver, and his medical condition should be stable. Care givers were given health education about the case, emergency situations, and general care for the elderly.  In case of emergency situations, patients are transferred to the hospital.

### Study design

A prospective cohort study.

### Target population

Elderly patients (60 years or more) enrolled in the HHC of Al-Hada and Al-Tayef Military Hospitals program.

### Sampling

All elderly enrolled in the  HHC program during the study period (From 11/2004 till 6/ 2006) were included in the study.

**Methods**

1- All elderly patients or their caregivers were interviewed to collect socio-demographic data as age and sex, and history of the past, and present medical condition.

2- Complete physical examination. All patients had complete assessment on admission to the HHC program.

3- Medical records of the patients referred from the hospitals including the discharge summary and patient's record in the HHC program were reviewed.

4- Follow up of the patients during the whole period of the study. The following data were collected:

 - Final diagnosis for the patient' condition for which he/she was enrolled in the HHC   program.

- Associated number and type of comorbidities as hypertension, Diabetes Mellitus (DM), ischemic heart disease (IHD), atrial fibrillation (AF) and chronic obstructive pulmonary disease (COPD).

- Problem list on enrollment including the state of consciousness, presence or absence of bedsores, pattern of feeding; oral, nasogastric tube feeding (NGT), or Gastrostomy  tube feeding (PEG tube). It

includes also whether the patient utilizes room or external oxygen, and if he has incontinence or joint contracture.

- Frequency of visits of the HHC team to the patient.

- Frequency of emergency visits of the patient to the hospital and the duration from the admission to HHC to the first emergency visit.

- Length of stay of the patient in the HHC program was calculated by subtracting  the final outcome date

from date of enrollment to HHC service. The final outcome of the patients was determined as follows:

A- Favourable outcome:

- Patient is still receiving the service (active) by the end of the study.

- Patient was discharged from the service due to improvement or to transfer other place or on caregiver request.

B- Unfavourable outcome:

- Patient was readmitted to the hospital and didn't return back to the HHC service.

- Patient died.

All elderly or their caregiver included were informed about the study and their consent was taken to participate.

**Statistical analysis**[12,13]

Analyses were performed using the Statistical Package for Social Sciences (SPSS, version 11.0.

- The differences between categorical variables were tested by Chi–Squared test; Fisher's Exact Test (FET) and Mont-Carlo Exact test (MCE) were used in case of small frequencies.

- Student t test was used for comparison of mean length of stay for two independent groups.

- Multivariate associations were evaluated in a logistic regression model, including only significant variables in univariate analysis.

**Dependent variable**

Patient outcome was divided into two categories only: Favourable (Active/ Discharged) and Unfavourable (readmitted/died). Although it was much Better to investigate the factors associated with death and re-enrollment separately. However, due to small number of patients who died (9 patients) and those who were readmitted (23

patients), and as many of those who were readmitted and didn't return back may be died at hospital, these 2 outcome were combined under unfavourable outcome.

**Independent variables**

Reference categories were chosen according to literature review and results of the univariate analysis. For all variables, the reference category is mentioned first, and the predictor category was contrasted with the reference category. The variables included in the model were: principal diagnosis (miscellaneous vs. CVA, dementia), number of comorbidities (< 3 vs. ≥ 3), level of conscious on admission (intact vs. impaired), feeding (oral vs. PEG, NGT feeding), respiration (room vs. external oxygen) and number of emergency visits (< 2 vs. ≥ 2), and for AF, COPD, bedsore, joint contracture,

incontinence (negative vs. positive). Time from enrollment to 1st emergency visits to hospital was not included due to small number of those who had visits.

**RESULTS**

The present study is a follow-up one. It included 131 elderly patients enrolled in the HHC program. Their age ranged from 60 to 100 years, with a mean of 75±10.25 years. More than half of the sample was males (53.4%). The most common cause for enrollment was cerebrovascular accidents (CVA) in 72.52% of patients followed by dementia (5.34%). Other causes included traumatic brain injuries, cancers, spinal cord injuries, and others. The minimum length of stay was one week; the maximum was 19 months, with a mean of 5.74 ± 4.71 months.

Figure (1) shows distribution of the patients according to their outcome. The figure reveals that a round two-thirds of

the patients (65.6%) were active by the end of the study, while around one quarter were either reenrolled to the hospital (17.6%), or died (6.9%).

Figure (2) shows the mean length of stay of the elderly in the HHC program. It reveals that those with favourable outcome had significantly higher mean length of stay in the HHC (6.77± 4.9 months) compared to those with unfavourable outcome (2.55 ± 2.1), t= 4.76, P<0.01.

Table (1) demonstrates distribution of the patients by sociodemographic variables, principal diagnosis, comorbidities, and outcome. The table reveals that no significant differences in the outcome of patients according to their age or sex. It also shows that the highest rate of unfavourable outcome (readmission or death) was found among dementia patients (71.4%) compared to

patients with other diagnosis (25.3% for those with CVA , and 10.3% for the miscellaneous group) and the difference was found to be statistically significant (MCE: P < 0.01). The table also portrayed that patients with higher number of comorbidities had significantly higher percentage of unfavourable outcome than those with lower number (39.4% vs. 19.4%, respectively; $\chi^2$ = 5.35, p <0.05). The table also revealed that association of DM, hypertension or IHD with the principal diagnosis didn't significantly affect the outcome of the patients. On the other hand, patients with AF and COPD had higher incidence of unfavourable outcome (66.7%, 57.1%, respectively) compared to those without (16.4%, 15.5%, respectively) and the differences were found to be statistically significant ($\chi^2$ =24.17, $\chi^2$ =20.65 respectively, p< 0.01).

Table (2) shows distribution of the patients by associated problems and outcome. The table demonstrates that patients with impaired level of consciousness on enrollment had higher significant percentage of unfavourable outcome compared to those with intact consciousness (72.7% vs 14.7%, $\chi^2$ = 33.4, p< 0.01). It also reveals that patients with bedsores, joint contracture, incontinence, and patients on external oxygen had higher rate of unfavourable outcome (46.5%, 43.6%, 34.4%, and 54.5% respectively) compared to those without such problems (13.6%, 16.3%, 2.4% and 18.3%, respectively) and the differences were found to be statistically significant ($\chi^2$=16.91, $\chi^2$=11.05, FET: P< 0.01 and $\chi^2$ =12.99, respectively, P< 0.01). Moreover, patients with NGT and PEG tube feeding had higher level of unfavourable outcome (51.3%, 36.8%,

respectively) compared to those with those with oral feeding (6.8%) and the difference was found to be statistically significant ($\chi^2$ =29.04, P< 0.01).

Table (3) shows distribution of the elderly patients according to sources of referral of the elderly to HHC, frequency of HHC team visits, emergency visits to hospitals, and outcome. The table portrayed that patients referred from the hospital to HHC had higher level of unfavourable outcome (30.9%) compared to those referred from the community (17.5%), however, the difference was not statistically significant. Also the difference regarding the frequency of HHC team visits to the patients was not statistically significant. On the other hand, patients who had two or more emergency visits to the hospitals had higher level of unfavourable outcome (63.6%) compared to those who had one or no emergency

visits. (36.4%, 11.5%, respectively) and the difference was found to be statistically significant ($\chi^2$ =27.9, P<0.01). Also those with earlier emergency visits to hospitals (<2 months) had statistically significant higher level of unfavourable outcome (77.8%) than those with later visits (5.9%), FET P< 0.01.

Table (4) reveals results of the stepwise logistic regression analysis of the factors associated with unfavourable outcome of patients, The table demonstrates that the independent predictors of unfavourable outcome were having impaired level of consciousness on admission ( OR= 7.15, 95% CI = 1.93-26.48), having associated comorbidities as COPD ( OR= 5.87, 95% CI = 1.78-19.38), AF( OR = 10.9, 95% CI = 2.85-41.76), and having two or more times emergency visits to the hospital (OR= 6.69, 95% CI = 1.67-26.82).
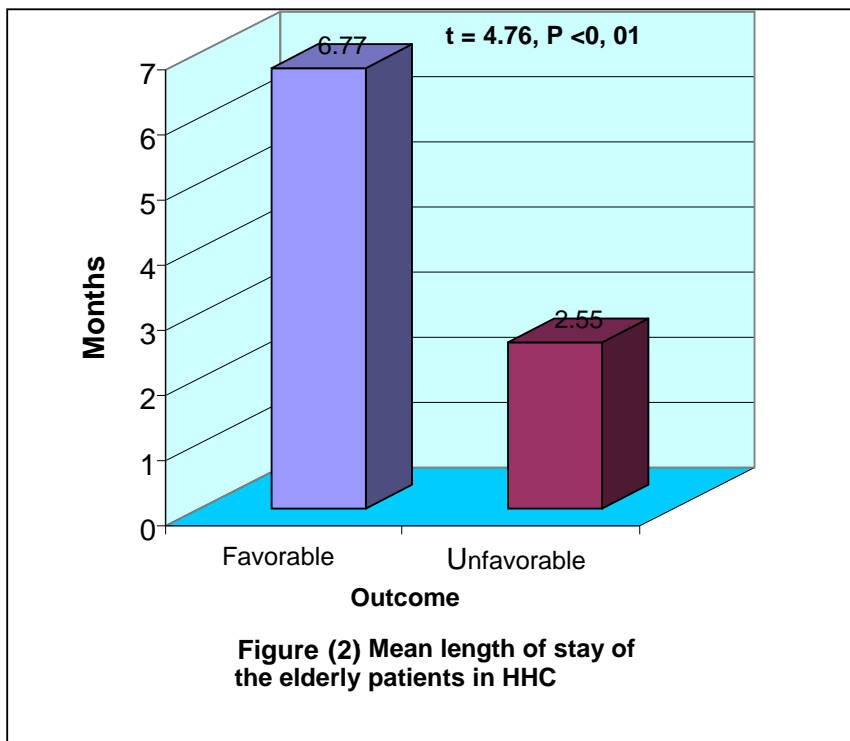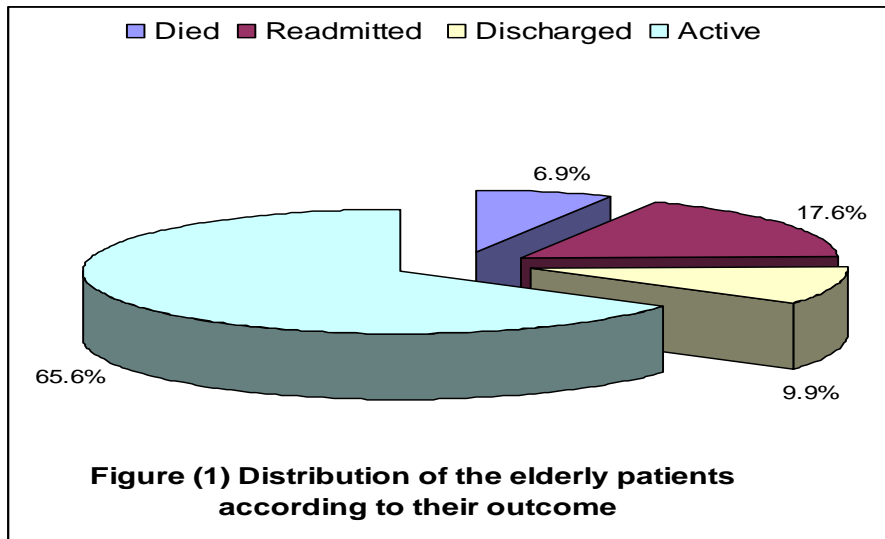
**Figure (1) Distribution of the elderly patients according to their outcome**



**Figure (2) Mean length of stay of the elderly patients in HHC**

**Table (1) Distribution of patients in HHC program by socio-demographic variables, principal diagnosis, comorbodities, and outcome.**

| Sociodemographic variables, principal diagnosis & comorbidities | Patient outcome | | | | Total (n= 131) | | Significance test |
|---|---|---|---|---|---|---|---|
| | Favourable⁰ ( n= 99) | | Unfavourable# (n= 32) | | | | |
| | No. | % | No. | % | No. | % | |
| **Sex** | | | | | | | |
| Male | 52 | 74.3 | 18 | 25.7 | 70 | 100 | $\chi^2 = 0.135$ |
| Female | 47 | 77.0 | 14 | 23.0 | 61 | 100 | |
| **Age** | | | | | | | |
| 60-74 | | | | | | | $\chi^2 = 0.003$ |
| 75 + | 47 | 75.8 | 15 | 24.2 | 62 | 100 | |
| Mean = 75± 10.25 | 52 | 75.4 | 17 | 24.6 | 69 | 100 | |
| **Principal diagnosis** | | | | | | | MCE: P< 0.01 |
| CVA | 71 | 74.7 | 24 | 25.3 | 95 | 100 | |
| Dementia | 2 | 28.6 | 5 | 71.4 | 7 | 100 | |
| Miscellaneous | 26 | 10.3 | 3 | 10.3 | 29 | 100 | |
| **No. of comorbidities** | | | | | | | $\chi^2 = 5.35*$ |
| < 3 | 79 | 80.6 | 19 | 19.4 | 98 | 100 | |
| ≥ 3 | 20 | 60.6 | 13 | 39.4 | 33 | 100 | |
| **Type of comorbidity** | | | | | | | |
| **DM** | | | | | | | |
| Negative | 43 | 68.3 | 20 | 31.7 | 63 | 100 | $\chi^2 = 3.52$ |
| Positive | 56 | 12.0 | 12 | 17.6 | 68 | 100 | |
| **Hypertension** | | | | | | | |
| Negative | 50 | 75.8 | 16 | 24.2 | 66 | 100 | $\chi^2 = 0.00$ |
| Positive | 49 | 75.4 | 16 | 24.6 | 65 | 100 | |
| **IHD** | | | | | | | |
| Negative | 80 | 75.5 | 26 | 24.5 | 106 | 100 | $\chi^2 = 0.00$ |
| Positive | 19 | 76.0 | 6 | 24.0 | 25 | 100 | |
| **AF** | | | | | | | |
| Negative | 92 | 83.6 | 18 | 16.4 | 110 | 100 | |
| Positive | 7 | 33.3 | 14 | 66.7 | 21 | 100 | $\chi^2 =24.17**$ |
| **COPD** | | | | | | | |
| Negative | 87 | 84.5 | 16 | 15.5 | 103 | 100 | |
| Positive | 12 | 42.9 | 16 | 57.1 | 28 | 100 | $\chi^2 =20.65**$ |

⁰ Favourable = Active/discharge
\# Unfavourable = Death/Readmission
\* P < 0.05
\*\* P < 0.01

**Table (2) Distribution of patients in HHC by associated problems and outcome.**

| Associated problems | Patient outcome | | | | Total | | Significance Test |
|---|---|---|---|---|---|---|---|
| | Favourable[o] (n= 99) | | Unfavourable# (n= 32) | | (n= 131) | | |
| | No. | % | No. | % | No. | % | |
| **Level of consciousness on enrollment** | | | | | | | |
| Intact | 93 | 85.3 | 16 | 14.7 | 109 | 100 | $\chi^2 = 33.4$** |
| Impaired | 6 | 27.3 | 16 | 72.7 | 22 | 100 | |
| **Presence of bedsore** | | | | | | | |
| Negative | 76 | 86.4 | 12 | 13.6 | 88 | 100 | $\chi^2 = 16.91$** |
| Positive | 23 | 53.5 | 20 | 46.5 | 43 | 100 | |
| **Presence of contracture** | | | | | | | $\chi^2 = 11.05$** |
| Negative | 77 | 83.7 | 15 | 16.3 | 92 | 100 | |
| Positive | 22 | 56.4 | 17 | 43.6 | 39 | 100 | |
| **Feeding** | | | | | | | |
| Oral | 68 | 93.2 | 5 | 6.8 | 73 | 100 | $\chi^3 = 29.04$** |
| NGT | 19 | 48.7 | 20 | 51.3 | 21 | 100 | |
| PEG | 12 | 63.2 | 7 | 36.8 | 19 | 100 | |
| **Incontinence** | | | | | | | |
| Negative | 40 | 97.6 | 1 | 2.4 | 41 | 100 | FET: P< 0.01 |
| Positive | 59 | 56.6 | 31 | 34.4 | 90 | 100 | |
| **Respiration** | | | | | | | |
| Room air | 89 | 81.7 | 20 | 18.3 | 109 | 100 | $\chi^2 = 12.99$** |
| External Oxygen | 10 | 45.5 | 12 | 54.5 | 22 | 100 | |

[o] Favourable = Active/discharge

\# Unfavourable = Death/Readmission

** $P < 0.01$

**Table (3) Distribution of patients in HHC by source of referral to HHC, frequency of HHC team visits, referral to hospital, and outcome.**

| Source of referral to HHC , team and emergency visits | Patient outcome | | | | Total (n= 131) | | Significance test |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | Favourable[o] ( n= 99) | | Unfavourable # (n= 32) | | | | |
| | No. | % | No. | % | No. | % | |
| **Source of referral to HHC** Hospital Community | 47 52 | 69.1 82.5 | 21 11 | 30.9 17.5 | 68 63 | 100 100 | $\chi^2$ =3.19 |
| **Frequency of visits of HHC team to the patient** Two times/ week Three times/ week | 68 31 | 74.7 77.5 | 23 9 | 25.3 22.5 | 91 40 | 100 100 | $\chi^2$ =0.12 |
| **No. of emergency visits to hospital** 1 2 + | 77 14 8 | 88.5 63.6 36.4 | 10 8 14 | 11.5 36.4 63.6 | 87 22 22 | 100 100 100 | $\chi^2$ =27.9** |
| **Time from admission to 1st emergency visits to hospital** ◊ (n=44) < 2Months ≥ 2 Months | 6 16 | 22.2 94.1 | 21 1 | 77.8 5.9 | 27 17 | 100 100 | FET :P <0.01 |

[o] Favourable = Active/discharge
# Unfavourable = Death/Readmission
◊ For those who had emergency visits to the hospital
*   P < 0.05
** P < 0.01

**Table (4) Results of the stepwise logistic regression analysis of the factors associated   With patient's outcome in HHC**

| Independent variable | B | S.E | P | OR | 95% C.I. |
|---|---|---|---|---|---|
| **Consciousness on enrollment** | | | | | |
|    Impaired | 1.967 | 0.668 | 0.003 | 7.15 | 1.93- 26.48 |
| **COPD** | | | | | |
|    Positive | 1.770 | 0.609 | 0.004 | 5.87 | 1.78 - 19.38 |
| **No. of emergency visits to hospitals** | | | | | |
|    Two or more | 1.901 | 0.708 | 0.007 | 6.69 | 1.67 - 26.82 |
| **AF** | | | | | |
|    Positive | 2.389 | 0.685 | 0.000 | 10.90 | 2.85- 41.76 |
| **Constant** | -3.073 | 0.486 | 0.000 | 0.05 | |

## DISCUSSION

The rapid growth of medical capabilities as well as economically driven changes in the medical systems in the industrialized world have sparked significant innovations in models of HHC delivery, types of care able to be delivered at home, and quality measures in HHC.[14] These wide modalities of delivered care, variation in the selection criteria of patients in different programs, and   variation  in the follow-up period make it difficult to  compare the results of the present study with others.

Also, many measures were used to assess the quality of the services supplied to home health care patients. One of these measures is to assess patient's outcome.   This   outcome included fatalities, hospital readmissions, acute care hospital visits, and days of hospital stays. The present study is a pilot one to explore the outcome of

elderly patients enrolled in a newly developed home health care program in KSA. The results revealed in-home fatality of 6.9% during the study period. This figure is very close to that found in Australia[15] where mortality of 6% was found among elderly receiving services of a Post-Acute Care (PAC) at one-month follow-up. A systematic review and meta-analysis study[16] concluded that home visits to older people can reduce mortality and enrollment to long term institutional care. Another study in USA,[17] found a high level of home death (21%) in a cohort of long-term home care patients within 1 year of enrollment to the service. It also showed that factors associated with dying at home rather than in a hospital included female gender, severely dependent functional and cognitive status; and dying of cancer, chronic lung disease or coronary artery disease. The present study also revealed that the

independent predictors of home death or re-enrollment to the hospital were level of consciousness on admission, presence of COPD and AF (table4). Atrial fibrillation may be associated with mortality and readmission to hospital as it was found that further stroke within 6 months of the first one is more common in patients with continuous AF[18]. Also patients with COPD had an increased risk of mortality and hospital admissions as found in different studies.[17,19] Hospital readmission was the other unfavourable outcome encountered for the patients in the present study; where 17.6% were readmitted and didn't return back to the service. In a study done in USA[6] it was found that elderly patients with advanced practice nurse-centered discharge planning and home follow-up intervention had a rate of hospital readmission of 20.3%; compared to 37.1% for those with routine care at a 6

month following index hospital discharge. Other studies showed a variable rate of hospital readmissions for home health care elderly patients (from 18.3% up to 40.1%)[5,8,9]

Different risk factors for hospital readmission were found among different studies. Among these are comorbidity and previous hospital admission[9], development of a new problem[11], or deterioration in health status related to the primary or to a secondary medical diagnosis,[4] functional disability level, skin or wound problems and diabetes.[8] Elderly patients in the present study had a lot of comorbidities and associated problems (tables 1 and 2). The factors which appeared as independent predictors of combined mortality and hospital readmissions in the present study were level of consciousness, associated comorbidity, and higher number of emergency visits to the

hospital. High rate of emergency visits of home health care patients to the hospitals was found in different studies.[5,7,20] The present study also showed that 44 patients (33.6%) had at least one emergency visit to the hospital during the study period, (table3). It also revealed that those who had an emergency visit to the hospital earlier than 2 months from enrollment in HHC program had significantly higher rate of unfavourable outcome than those who visited it later (table 3). This was also found in other studies.[4,20] The crucial time period for hospital readmission during home care is the first 2-3 weeks following hospital discharge.[4] This may be explained by the fact that patient condition may be less stable in the early period following discharge from the hospital. Individuals are increasingly discharged "sicker" and "quicker" in response to economic pressure to reduce

acute hospital costs.[21] Proper targeting or selecting patients for home care is essential if quality and cost-effective outcomes are to be obtained. The most important selection factor is the determination of clinical stability.[1] This may also appear from the results of the present study, as those who have longer mean length of stay in the HHC program had significantly higher rate of favourable outcome (figure 2). Also, the frequency of visits of the HHC team to the elderly patients didn't significantly affect the outcome of patients. This may be partially explained by the fact that with stabilization of the patients, lower frequency of visits may have the same impact on patient care as the higher frequency.

## CONCLUSION AND RECOMMENDATIONS

This study is a pilot study to explore the outcome of patients enrolled in the newly developed home health care program affiliated to a military hospitals program in KSA. The study revealed a favourable outcome in around two-thirds of patients. Unfavourable outcome was significantly associated with higher number of comorbidities, associated problems on admission and instability of the condition of the patients as manifested by higher number and earlier emergency visits. The independent predictors for mortality and hospital readmissions are impaired consciousness on admission, presence of atrial fibrillation, chronic obstructive pulmonary disease, and higher number of emergency visit to the hospitals. Further studies including control groups receiving different modalities of care are required to assess the effectiveness of the program. Also cost-effective analysis of the service is recommended. Better selection of the patients for the service

and assuring their stabilization before admission may improve the outcome of

these patients and enhance the quality of care.

## REFERENCES

1. Keenan JM, Kenneth WH. Home care. In : Ham JR, Sloane PD;eds. Primary Care Geriatrics: A case-based approach. 3rd edition. St. Louis, London, Madrid: Mosby;. P.193-213.
2. Coyte PC, McKeever P. Home care in Canada: Passing the buck. Can J Nurs Res. 2001; 33:11–25
3. American Association of Retired \Persons, The Villers Foundation: The American public views long term care, Princeton NJ: 1987.
4. Anderson MA, Hanson KS, DeVilder NW, Helms LB. Hospital readmissions during home care: a pilot study J Community Health Nurs. 1996; 13(1):1-12.
5. Stewart S, Pearson S, Luke CG, Horowitz JD. Effects of home-based intervention on unplanned readmissions and out-of-hospital deaths. J Am Geriatr Soc. 1998; 46(2):174-80.
6. Naylor MD, Brooten D, Campbell R, Jacobsen BS, Mezey MD, Pauly MV, et al. Comprehensive discharge planning and home follow-up of hospitalized elders: a randomized clinical trial. JAMA. 1999 17; 281(7):613-20.
7. Smith AA, Carusone SB, Willison K, Babineau TJ, Smith SD, Abernathy T, et al. Hospitalization and emergency department visits among seniors receiving homecare: a pilot study. BMC Geriatr. 2005 Jul 13; 5:9.
8. Fortinsky RH, Madigan EA, Sheehan TJ, Tullai-McGuinness S, Fenster JR. Risk factors for hospitalization among

Medicare home care patients. West J Nurs Res. 2006 Dec; 28(8):902-17.
9. Landi F, Onder G, Cesari M, Barillaro C, Lattanzio F, Carbonin PU, et al. Comorbidity and social factors predicted hospitalization in frail elderly patients. J Clin Epidemiol 2004 Aug; 57(8):832-6.
10. Kramer AM, Shaughnessy PW, Bauman MK, Crisler KS. Assessing and assuring the quality of home health care: a conceptual framework. Milbank Q. 1990; 68(3):413-43.
11. Madigan EA, Schott D, Matthews CR. Rehospitalization among home healthcare patients: results of a prospective study. Home Healthc Nurse. 2001; 19(5):298-305.
12. Jekel JF, Katz DL, Elmore JG. Epidemiology, Biostatistics, and Preventive Medicine. 2ed edition. Philadelphia: WB Saunders Company; 2001.
13. Feinstein AR. Principles of Medical Statistics. Boca Raton: Chapman & Hall /CRC.A CRS Press Company; 2002.
14. Leff B, Steel K. Home care: issues and innovations. In: Evans JG, Williams TF, beattie BL, Michel JP, Wilcock GK, eds. Oxford Textbook of Geriatric Medicine. New York, Paris, Madrid: Oxford University Press; 2000. P. 1101.
15. Lim WK, Lambert SF, Gray LC. 3-Effectiveness of case management and post- acute services in older people after hospital discharge. MJA. 2003 178 (6): 262- 6.
16. Elkan R, Kendrick D, Dewey M, Hewitt

M, Robinson J, Blair M, *et al*. Effectiveness of home based support for older people: systematic review and meta-analysis. BMJ. 2001 29; 323(7315):719-25.

17. Fried TR, Pollack DM, Drickamer MA, Tinetti ME. Who dies at home? Determinants of site of death for community-based long-term care patients. JA Geriatr Soc. 1999 Jan; 47(1):25-9.

18. Orr WB, Bashir Y. Cardiac arrhythmia. In: Evans JG, Williams TF, Beattie BL, Michel JP, Wilcock
GK, eds. Oxford Textbook of Geriatric Medicine. New York, Paris, Madrid: Oxford University Press; 2000.  P. 382.

19. Shepperd S, Iliffe S.  Hospital at home versus in-patient hospital care.Cochrane Database Syst Rev. 2005 20 ;(3):CD000356.

20. Caplan GA, Williams AJ, Daly B, Abraham K.  A randomized, controlled trial of comprehensive geriatric assessment and multidisciplinary intervention after discharge of elderly from the emergency department--the DEED II study. J Am Geriatr Soc. 2004 Sep; 52(9):1417-23.

21. Shaughnessy PW, Kramer AM. The increased needs of patients in nursing homes and patients receiving home health care. NEJM. 1990; 322: 21-7.