

## Post Community Hospital Discharge Rehabilitation Attendance: Self-Perceived Barriers and Participation Over Time

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### Abstract

**Introduction:** This study aimed to examine the attendance rates of post-discharge supervised rehabilitation as recommended by the multidisciplinary team at discharge among subacutely disabled adults and the barriers preventing adherence. **Materials and Methods:** Patients were from a community hospital, aged 40 years or older. They had been assessed by a multidisciplinary team to benefit from rehabilitation after discharge, were mentally competent and communicative. We used a sequential qualitative-quantitative mixed methods study design. In the initial qualitative phase, we studied the patient-perceived barriers to adherence to rehabilitation using semi-structured interviews. Emerging themes were then analysed and used to develop a questionnaire to measure the extent of these barriers. In the subsequent quantitative phase, the questionnaire was used with telephone follow-up at 3, 6, 9 and 12 months after discharge. **Results:** Qualitative phase interviews (n = 41) revealed specific perceived financial, social, physical and health barriers. At the start of the quantitative phase (n = 70), 87.1% of the patients viewed rehabilitation as beneficial, but overall longitudinal attendance rate fell from 100% as inpatient to 20.3% at 3 months, 9.8% at 6 months, 6.3% at 9 months and 4.3% at 12 months. The prevalence of physical and social barriers were high initially but decreased with time. In contrast, the prevalence of financial and perceptual barriers increased with time. **Conclusion:** Attendance of post-hospitalisation rehabilitation in Singapore is low. Self-perceived barriers to post-discharge rehabilitation attendance were functional, social, financial and perceptual, and their prevalence varied with time.

Ann Acad Med Singapore 2014;43:136-44

**Key words:** Adult rehabilitation, Attendance, Barriers to rehabilitation, Mixed methods study

### Introduction

As Singapore faces a rapidly ageing population, the national burden of long-term disability is expected to correspondingly increase.<sup>1,2</sup> Post-discharge rehabilitation of the newly disabled adults, especially during the subacute phase after an acute disabling event where functional recovery is most likely, is an important strategy to reduce the prevalence of severe disability.<sup>3</sup> Besides maximising functional recovery, rehabilitation also improves their quality of life, reduces the costs associated with disability and years lost due to disability, translating into effective usage of limited resources.<sup>4-7</sup> Community hospitals in Singapore function as one of the primary sites facilitating adult rehabilitation.<sup>8</sup> Anecdotally, however, adherence

to supervised rehabilitation within the community, post-discharge, has been demonstrated to be low. Studies in the United States (US) and Australia have shown that the rates of rehabilitation service utilisation by stroke patients in the community is as low as 13% to 31%.<sup>9,10</sup> A local study by Koh et al on the adherence rates (at day rehabilitation centres) in stroke patients discharged from community hospitals have estimated the rate to be about 28% at 1 year.<sup>11</sup>

Studies have shown there are several factors which affect attendance for prescribed rehabilitation between different subgroups of patients. In one study in patients undergoing outpatient cardiac rehabilitation, common barriers to adherence to prescribed rehabilitation included

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financial cost and lack of motivation.<sup>12</sup> Another study done in a musculoskeletal outpatient clinic found that low adherence to rehabilitation was associated with low self-efficacy, depression, anxiety, helplessness, poor social support and greater perceived number of barriers.<sup>13</sup> Attendance at rehabilitation appears to be a result of a complex interplay of knowledge, social, financial and physical barriers. A Cochrane review on the effectiveness of interventions in cardiac rehabilitation programmes found that well planned interventions targeted at important barriers significantly improved adherence.<sup>14</sup> Articles regarding rehabilitation follow-up rates or analysing specific barriers in the context of rehabilitation in general were few, if any—demonstrating a definite knowledge gap in this aspect.

A mixed methods design was adopted to study the attendance rates at post-discharge supervised rehabilitation as recommended by the multidisciplinary team at discharge from a local community hospital among subacutely disabled adults and the barriers preventing adherence, with the aim to guide future development of interventions to improve adherence to rehabilitation.

## Materials and Methods

### *Study Design*

A sequential qualitative-quantitative mixed methods study was conducted in the 198-bedded Ang Mo Kio Thye Hwa Kwan Hospital (AMKH), one of the largest community hospitals in Singapore which are primary locations for continuation of care post-discharge from the acute hospitals. The study consisted of 2 phases: (i) an initial qualitative study involving semi-structured interviews of inpatients using a phenomenological approach to understand the self-perceived barriers to adherence to rehabilitation and to develop a quantitative questionnaire to measure the extent of self-perceived barriers to rehabilitation adherence, and (ii) a subsequent phase where the developed quantitative questionnaire was interviewer-administered on a new set of inpatients before discharge with repeated administration longitudinally via telephone interviews at 3, 6, 9 and 12 months after discharge to observe the trends in rehabilitation adherence and self-perceived barriers. The study was approved by the National University of Singapore Institutional Review Board.

### *Eligibility Criteria*

For both the qualitative and quantitative studies, recruited subjects satisfied the following eligibility criteria: The subject must (i) be aged 40 years or older, (ii) have been assessed by a multidisciplinary team (consisting of a physician, nurse, physiotherapist, occupational therapist and medical social worker) to benefit from rehabilitation

after discharge during the pre-discharge multidisciplinary patient care conference (PCC), (iii) not have a history of mental incapacity (e.g. severe dementia) and (iv) be communicative (i.e. no dysphasia).

### *Qualitative Phase*

For the first (qualitative) phase, available literature on the barriers to adherence to rehabilitation was reviewed and face-to-face discussions were conducted to develop a set of probing questions for the qualitative interview guide, as follows:

1. What do you understand by “rehabilitation”?
2. How do you feel about rehabilitation (e.g. good, not useful, etc.)?
3. Would you like to continue with rehabilitation after discharge? If yes/no, why?
4. If the hospital team recommends that you continue rehabilitation after discharge, would you do so? If yes/no, why?
5. Do you expect any barriers to rehabilitation after you go home? If yes/no, why?

Eligible subjects were identified at the PCCs within AMKH from June to July 2008. All eligible subjects were then interviewed with the above probing questions to explore their attitudes and beliefs towards post-discharge rehabilitation, with subsequent unstructured questions to clarify the context of their replies. As Singapore is a multiethnic population, multilingual interviewers (Abel W Chen, Yan Tong Koh, Sean WM Leong) conducted the interviews and translators were used when needed. To minimise inter-rater bias, all 3 interviewers were present during most of the interviews. At any given time, at least 2 interviewers were present. Subject interviews were audio-taped whenever possible and field notes were taken for those who refused audio-taping. Subjects who refused audio-taping were included in the study because this group formed nearly half of the surveyed population and excluding them would introduce significant bias. All audio-taped interviews were subsequently transcribed and translated into English where necessary. Thematic analysis using a phenomenological approach was then performed on the transcribed interviews and field notes.<sup>15</sup> Specific quotes were identified which elucidated certain themes about the patients' experience with inpatient rehabilitation and their barriers to outpatient rehabilitation adherence. The themes elicited individually were then discussed as a group to reach a consensus regarding the themes identified. The qualitative study stopped after the research team (Abel W Chen, Yan Tong Koh, Sean WM Leong, Gerald CH Koh) felt that saturation of themes had occurred.

*Quantitative Phase*

For the second (quantitative) phase, themes about barriers to rehabilitation adherence identified from the initial qualitative phase were used to develop a questionnaire to quantify the proportion of subjects who cited these barriers. The quantitative questionnaire also captured data on patient demographics, medical diagnosis, presence of caregiver support, intention to attend rehabilitation before discharge and actual adherence to rehabilitation post-discharge. This questionnaire was interviewer-administered prior to discharge and administered over the telephone at 3, 6, 9 and 12 months after discharge. Like with the qualitative phase, the interviewers attended all PCCs in AMKH to identify subjects who satisfied the eligibility criteria from September 2008 to June 2009. During the follow-up period, details on which patients subsequently passed away or dropped out from rehabilitation were noted. We stopped recruitment in the quantitative phase when we reached 70 subjects because the attendance rates for post-discharge rehabilitation was so low that additional subjects would not have significantly altered the final percentages.

For the quantitative study, univariate analysis was used to describe the sample population and chi-square tests were used to evaluate differences in the proportions. In the computation of the adherence rate, those who died, were discharged from rehabilitation or were lost to follow-up were excluded from the denominator at each time point (Fig. 1). We used linear by linear association to determine the *P* value for trend for self-perceived barriers to non-adherence to rehabilitation across time points. We used Statistical Package for the Social Sciences (SPSS) version 18.0 for statistical analysis and statistical significance was set at the conventional *P* < 0.05.

**Results**

*Qualitative Phase*

Forty-one subjects participated in the qualitative study. Twenty-four subjects allowed the interview to be audio-taped and field notes were taken for the remaining 17 subjects. The majority of subjects were aged above 60 years (36/41, 90.3%) with 14.6% aged 80 years or above. The mean age was 69.8 (standard deviation = 9.8) years and the median age was 70 years (interquartile range, 63.6 to 7.65 years). The female to male ratio was 19:22 and the majority were of Chinese ethnicity (33/41, 80.5%). Thematic analysis identified 5 recurring domains as barriers to adherence to post-discharge rehabilitation: functional, social, financial, medical and perceptual.

*Functional Factors*

Twenty-six subjects (63.4%) reported that either their physical disability or home environment (both internal and external) were barriers to attending rehabilitation after discharge. As most subjects requiring rehabilitation inherently have disability, they were particularly susceptible to physical barriers to mobility and transportation. As 90% of Singaporeans live in public high-rise apartments (flats) with the lifts in older buildings serving only on a few floors, many subjects had difficulty climbing stairs without assistance.

*“It’s very hard to get around... Upgrading works are in progress around my home at the moment. Now, I have to take a lift to the fifth floor before taking the stairs to the third storey where I live.”*

*[62-year-old Chinese female]*

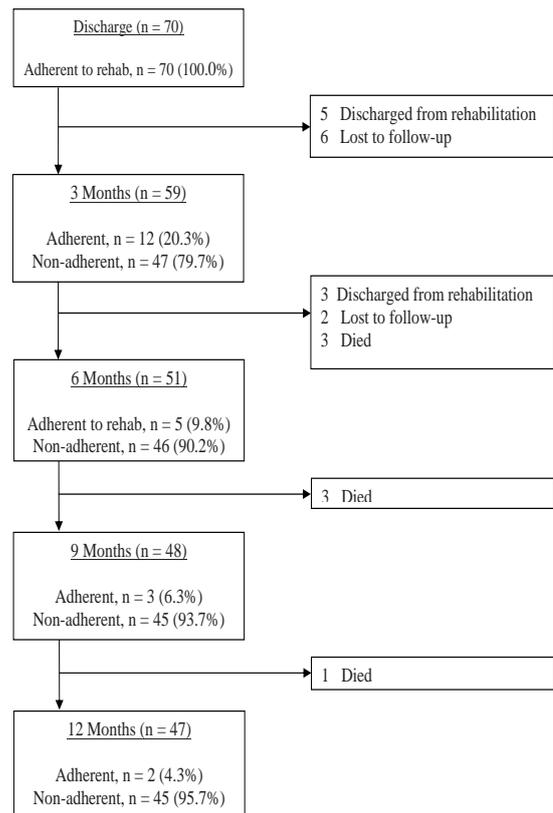


Fig. 1. Flowchart for quantitative study.

Even if subjects were able to reach the ground floor, they faced the challenge of being transported to the nearest day rehabilitation centre.

*“I think that the burden of transport is the main problem. After all, my husband is already 70 years old and I am not young either.”*

[64-year-old Chinese female]

*“Yes, (the biggest problem is transportation). This is because my children don’t have a car to bring me there.”*

[69-year-old Chinese male]

### Social Factors

Nineteen subjects (46.3%) mentioned unavailability of caregivers to transport and accompany them for rehabilitation which is important as disabled persons need physical assistance and are at risk of falls.

*“There is no one to bring me for my rehabilitation sessions if there will be any. However, I would like to continue rehabilitation if I am able to do so as I find it good and useful.”*

[74-year-old Chinese female]

Subjects were also reluctant to inconvenience their caregivers, especially if they were working.

*Interviewer: “The doctors have recommended that you continue day rehabilitation after your discharge. Would you go?”*

*Subject: “That depends on what my daughter feels about it.”*

*Interviewer: “Does your daughter have time to take you there?”*

*Subject: “She’s free once in a while, but not always. She has to work, you see.”*

*Interviewer: “So the main problem is just that there isn’t anyone to take you for physiotherapy, right?”*

*Subject: “Yes, I am afraid I might fall again if I go alone. However, I would like to continue rehabilitation if I am able to do so as I find it helpful.”*

[69-year-old Chinese male]

*“Although I am keen for rehabilitation, I do not want to burden my daughter.”*

[68-year-old Chinese male]

### Financial Factors

Eighteen subjects (43.9%) cited financial concerns as a barrier to attending rehabilitation centres. Subjects highlighted that rehabilitation could not be paid using their

medical savings account (Medisave) or national medical insurance (Medishield), and required personal out-of-pocket expenses.

*“Money is an important factor. I am concerned that I cannot use Medishield or Medisave (government insurance) for physiotherapy and transport. I currently have no income, thus I cannot pay.”*

[52-year-old Indian male]

Government subsidies for outpatient day rehabilitation are available for subjects who are eligible on means testing. However, subjects pointed out that although these subsidies helped to alleviate the cost of each therapy session, the cumulative cost of outpatient day rehabilitation was high. Subjects often needed 1 to 2 rehabilitation sessions per week over several months. Moreover, these costs did not include transportation and other medical costs.

*“I think (the cost of rehabilitation) will be okay for the first few weeks but will be a problem if it goes beyond that. After all, I already have to pay for my (other medical) bills.”*

[62-year-old Chinese female]

One subject was already so impoverished that he even felt rehabilitation was an extravagance and would be one of the first aspects of treatment he would dispense with.

*“I am more worried about my financial situation. (In that light) I feel rehabilitation is a luxury.”*

[73-year-old Malay male]

### Medical Factors

Patients needing rehabilitation often have multiple comorbidities which limit their ability to tolerate rehabilitation. For example, patients with stroke often have risk factors like diabetes mellitus which often causes concurrent illnesses such as renal failure, ischaemic heart disease, heart failure and postural hypotension which pose challenges to adherence to rehabilitation.

*“I can’t even walk now, how can I come? I’ll wait and see. Then again, I don’t think my condition permits me much exercise because of my long dialysis sessions. There was once I had to do physiotherapy after dialysis – I just couldn’t do it. Sometimes it’s not really fair to say that we patients don’t put our hearts into physiotherapy sessions. The fact remains that we are sick and are therefore (tire easily).”*

[65-year-old Chinese male]

### Perceptual Factors

Among patients who were not keen for rehabilitation, some felt their current functional status was already satisfactory, even when the multidisciplinary team advised them that they felt their functional status could improve with further rehabilitation.

*Interviewer: “Will you still come back for physiotherapy after your discharge?”*

*Subject: “No, I don’t think so. I feel I am fine and can walk now. I want to go home.”*

*Interviewer: “So the only reason why you don’t want to go for these sessions is because you don’t want to come back?”*

*Subject: “Yes. I am totally fine.”*

*Interviewer: “This is in spite that your doctors think you can improve further even after you’re discharged?”*

*Subject: “Yes.”*

*[74-year-old Chinese female]*

One patient felt that rehabilitation to improve functional status was less important than caregivers learning to care for them at their current level of functional status.

*“I feel that emphasis should be place on educating the caregiver instead on the patient going for day rehabilitation.”*

*[90-year-old Malay female]*

Another patient had an ‘ageist’ attitude towards functional independence: she felt she did not need rehabilitation as she was “supposed” to be functionally dependent because of her advanced age.

*“I am so old already – I don’t need to be functionally independent.”*

*[75-year-old Chinese female]*

Some patients were convinced that physiotherapy did not work, usually because of no self-perceived functional improvement during inpatient rehabilitation, preconceived notions, lack of understanding about rehabilitation or denial.

*Interviewer: “Do you think the exercises are useful? Do you think they help you?”*

*Subject: “No, it’s not useful. I cannot walk. It doesn’t help me move. They just sit me down on a chair and then make me stand up.”*

*Interviewer: “So you know that physiotherapy might take a long time. Do you think you will eventually start to improve?”*

*Subject: “No.”*

*[85-year-old Eurasian female]*

### Quantitative Phase

The socio-demographic profile of respondents in the quantitative phase is detailed in Table 1. The median time from onset of acute disabling condition to admission into AMKH in our study population was 16 days (interquartile range, 11 to 25 days).

The majority of the respondents felt inpatient rehabilitation was beneficial ( $n = 61/70$ , 87.1%) and only 5.7% ( $n = 4/70$ ) did not find rehabilitation beneficial, the rest being unsure. Although the majority of subjects acknowledged the benefit of inpatient rehabilitation, only 28 out of the 70 patients (40%) expressed an intention to continue with rehabilitation after discharge as recommended by the inpatient multidisciplinary team. Subjects who felt that inpatient rehabilitation was beneficial were not more likely to intend to continue with rehabilitation after discharge as recommended than those who did not [OR = 1.22 (95% CI, 0.54 to 2.78),  $P = 0.68$ ].

Figure 1 is a flowchart detailing subjects discharged from rehabilitation, lost to follow-up and who died, as well as rehabilitation attendance rates at each 3-month period over the year of the quantitative study. The loss to follow-up rate in our study was 11.4% (8/70) at 1 year. By 3 months post-discharge, only 20.3% of subjects were adherent to recommended rehabilitation. This proportion decreased to 9.8% at 6 months, 6.3% at 9 months and 4.3% by 1 year. There were no associations between caregiver support, means test category, self-perceived benefit from inpatient rehabilitation and intention to continue with rehabilitation after discharge with the attendance at rehabilitation at all 4 time points post-discharge.

Table 2 details the self-perceived barriers for non-attendance at rehabilitation at discharge, 3, 6, 9 and 12 months, categorised into the 5 domains. At discharge, the main barriers to rehabilitation attendance were from the functional [problems with getting from home to rehabilitation centre (61.9%)] and social [(inconvenience for patient (57.1%) and no caregiver to accompany subject (31.0%)] barrier domains. However, from 6 months onwards, the main barriers to rehabilitation attendance were from the perceptual [satisfaction with current functional state and no interest in participating in rehabilitation] and financial [problems with out-of-pocket payments and high cost per session] barrier domains. Three barriers declined over time: problems with ambulating from home to rehabilitation centre ( $P < 0.001$ ), inconvenience for subject ( $P < 0.001$ ) and inconvenience for caregiver ( $P = 0.105$ ) declined over time, although the last barrier was only borderline significant (Fig. 2). Two barriers increased over time: financial problems from long duration of rehabilitation ( $P = 0.005$ ) and no interest in participating in rehabilitation ( $P < 0.001$ ). Concurrent medical conditions were not perceived to be a major barrier to rehabilitation.

Table 1. Characteristics of Quantitative Study Population (n = 70)

Characteristics	n (%)*
<b>Age</b>	
Mean (standard deviation)	73.3 (13.1)
<b>Gender</b>	
Female	37 (75.7%)
Male	33 (24.3%)
<b>Ethnicity</b>	
Chinese	61 (87.1%)
Malay	2 (2.9%)
Indian	6 (8.6%)
Others	1 (1.4%)
<b>Marital status</b>	
Single	14 (20.0%)
Married	23 (32.8%)
Divorced/separated/widowed	33 (47.2%)
<b>Number of caregivers</b>	
0	21 (30.0%)
1	14 (20.0%)
2	17 (24.3%)
3	13 (18.6%)
4	5 (7.1%)
<b>Main caregiver</b>	
None	21 (30.0%)
Spouse	12 (17.1%)
Child	14 (20.0%)
Sibling	2 (2.9%)
Maid	17 (24.3%)
Others	4 (5.7%)

Table 1. Characteristics of Quantitative Study Population (n = 70)  
(Con't)

Characteristics	n (%)*
<b>Means test category†</b>	
0%	40 (58.0%)
25%	5 (7.2%)
50%	6 (8.7%)
75%	18 (26.1%)
<b>Primary diagnosis for admission</b>	
Stroke	8 (11.4%)
Fractures	22 (31.5%)
Amputations	1 (1.4%)
Others	39 (55.7%)
Infection	11 (15.7%)
Trauma from falls	7 (10.0%)
Non-specific de-conditioning	5 (7.1%)
Postoperative de-conditioning	7 (10.0%)
Acute myocardial infarction	3 (4.3%)
Cancer	3 (4.3%)
Spinal stenosis	2 (2.9%)
End stage renal failure	1 (1.4%)
<b>Barthel Index score on admission</b>	
Median (interquartile range)	53.0 (42.5 – 66.5)

\* Denominators vary slightly because of missing responses.

†Means testing is a policy introduced by Ministry of Health (Singapore) in 2001 to redistribute subsidies to different income groups through fixed parameters. After the test, the patients are allocated a percentage of subsidies, with the lower income group receiving more. At the time of study, the number of means testing categories was 4 but in 2010, the number increased to 9. More details can be found at <http://www.moh.gov.sg/mohcorp/hcfinancing.aspx?id=16072>.

Table 2. Self-Perceived Barriers to Non-Adherence to Rehabilitation at All Time Points

	n (%)					P value‡
	Discharge (n = 42)*	3 months (n = 47)†	6 months (n = 46)†	9 months (n = 45)†	1 year (n = 45)†	
<b>Functional barriers</b>						
Problems with ambulating from home to rehabilitation centre	26 (61.9) <sup>1</sup>	10 (21.3)	12 (26.1)	11 (24.4)	8 (17.8)	<0.001
Problems with ambulating within the home	9 (21.4)	11 (23.4)	8 (17.4)	8 (17.8)	5 (11.1)	0.596
<b>Social barriers</b>						
Inconvenient for subject	24 (57.1) <sup>2</sup>	11 (23.4)	6 (13.0)	6 (13.3)	8 (17.8)	<0.001
No caregiver available to accompany subject	13 (31.0) <sup>3</sup>	13 (27.7) <sup>3</sup>	11 (23.9)	11 (24.4)	8 (17.8)	0.687
Subject does not wish to burden caregiver	12 (28.6)	11 (23.4)	9 (19.6)	8 (17.8)	7 (15.6)	0.598
Inconvenient for caregiver	9 (21.4)	6 (12.8)	7 (15.2)	2 (4.4)	3 (6.7)	0.105
Caregiver is too busy	8 (19.0)	4 (8.5)	7 (15.2)	4 (8.9)	5 (11.1)	0.568
Subject is too busy	5 (11.9)	4 (8.5)	2 (4.3)	4 (8.9)	2 (4.4)	0.643
<b>Financial barriers</b>						
Financial problems from out-of-pocket payments	12 (28.6)	9 (19.1)	13 (28.3) <sup>3</sup>	15 (33.3) <sup>2</sup>	15 (33.3) <sup>3</sup>	0.549
Financial problems from high cost per session	9 (21.4)	14 (29.8) <sup>2</sup>	13 (28.3) <sup>3</sup>	14 (31.1) <sup>3</sup>	12 (26.7)	0.875
Financial problems from long duration of rehabilitation	2 (4.8)	6 (12.8)	14 (30.4)	13 (28.9)	14 (31.1)	0.005

Table 2. Self-Perceived Barriers to Non-Adherence to Rehabilitation at All Time Points (Con't)

	n (%)					P value‡
	Discharge	3 months	6 months	9 months	1 year	
	(n = 42)*	(n = 47)†	(n = 46)‡	(n = 45)‡	(n = 45)‡	
<b>Medical barriers</b>						
Effects from medical conditions limiting rehabilitation participation	6 (14.3)	3 (6.4)	6 (13.0)	6 (13.3)	7 (15.6)	0.706
<b>Perceptual barriers</b>						
Satisfied with current functional state	13 (31.0) <sup>3</sup>	15 (31.9) <sup>1</sup>	19 (41.3) <sup>1</sup>	16 (35.6) <sup>1</sup>	16 (35.6) <sup>2</sup>	0.859
Not interested to participate in rehabilitation	5 (11.9)	11 (23.4)	18 (39.1) <sup>2</sup>	18 (40.0)	21 (46.7) <sup>1</sup>	<0.001
Feels rehabilitation is not beneficial	7 (16.7)	9 (19.1)	5 (10.9)	8 (17.8)	7 (15.6)	0.849

Note: Superscript numbers represent the rank order of the top three barriers at the specified time point.

\*Based on subjects who did not intend to continue with rehabilitation after discharge.

†Based on subjects who were non-adherent to rehabilitation at the specified time point.

‡Linear by linear association test for trend.

## Discussion

In our study, only 40% of patients recommended for continuation of rehabilitation after discharge from an inpatient rehabilitation unit intended to adhere to the recommendation; by the third month after discharge, only 20% of patients were undergoing rehabilitation and this proportion decreased to less than 5% by 1 year. Our attendance rates at post-discharge rehabilitation are lower than data from the US and Australia studies which report that attendance at rehabilitation in the community is about 20% at 1 year.<sup>9,10</sup> A previous local study on stroke patients reported that 28% of subjects were still participating in rehabilitation one year after discharge from 2 community hospitals.<sup>11</sup> The follow-up phase of our study was conducted during the global financial crisis in 2009 and as Singapore was also affected, financial barriers may have been felt more acutely during this phase and contributed to the lower rate

of rehabilitation attendance in our study.

Although Singapore is an urbanised compact city, ambulating to the nearby public transport (i.e. bus stop or subway) is still a physical challenge. Moreover, most local buses require passengers to climb stairs to board and alight, contributing another barrier for subjects. An alternative form of transport is to use a taxi but it is expensive for the majority of patients. For the severely disabled, especially the bedbound who cannot assume a sitting position, subjects pointed out that taxis were unsuitable and a non-emergency ambulance would be required. However, the cost of an ambulance for a one-way journey could cost 4 to 8 times the cost of a taxi fare. Another alternative would be to use a car but car ownership in Singapore is tightly regulated and is very expensive, and hence is not a viable option for most subjects.

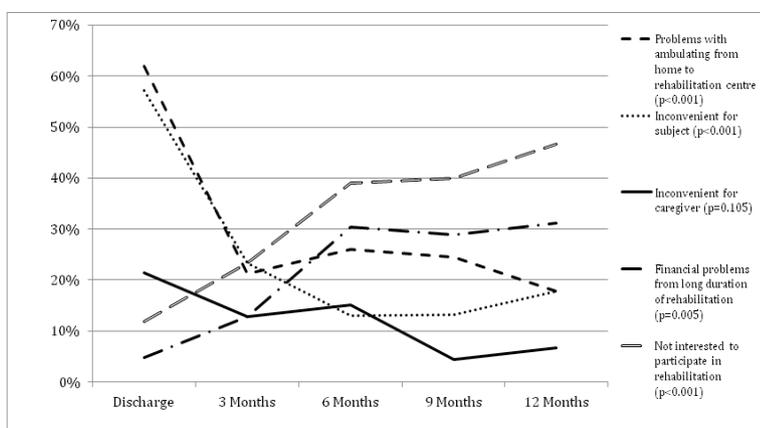


Fig. 2. Trends in self-perceived barriers which changed significantly with time.

A possible solution to environmental barriers, especially for the severely disabled, is home rehabilitation whereby therapists would visit the subject's home instead. However, home rehabilitation is currently not subsidised or eligible for use under Singapore's mandated medical savings account (Medisave) or medical insurance (Medishield), and is 3 to 5 times more expensive than day rehabilitation for 1 session. Hence, home rehabilitation is expensive and unaffordable for most subjects.

Singapore is a multicultural Asian society, and Asian values probably have an effect on the perceptions of the population on rehabilitation. In stark contrast to Anglo-American societies, the elderly in Chinese cultures gain social approval and social status from being dependent on their offspring, a phenomenon termed as 'generational dependency' by Hong and Liu, resulting in Chinese elderly being willing and even eager to become dependent on their offspring.<sup>16</sup> This inclination to dependence could make these elderly less likely to be interested in rehabilitation and view it as an unnecessary chore. Their offspring would likewise be more inclined to look after them or employ domestic workers as an expression of filial piety, rather than encourage them to participate in rehabilitation to regain their functional independence, contributing to the increasing disinterest in rehabilitation with time.

Ageism is a societal phenomenon that has been observed all over the world, with the negative consequences of ageing being unconditionally unaccepted by both the elderly themselves and the people around them.<sup>17</sup> As alluded to in the results of the qualitative phase, ageist attitudes towards health shown by the patients themselves were noted. These included a view that disability should be expected in old age and need not be alleviated even if interventions to do so exist. The ageism exhibited could again be influenced by misconceptions and a lack of information about healthcare and the benefits of rehabilitation.

Applying the conceptual framework of the Health Belief Model<sup>18</sup> to structure our findings within a conceptual framework, newly disabled persons may not perceive continued dependency or failure to improve one's functional status as a consequence of non-adherence to rehabilitation (i.e. they do not consider themselves as susceptible to functional dependency because they viewed their disabling condition like stroke as a final endpoint). Yet, almost 90% of our study population acknowledged that inpatient rehabilitation was beneficial. Perhaps the issue is that although our subjects were convinced of the benefits of inpatient rehabilitation, they were less so with continuation of rehabilitation after discharge. There should also be greater public, patient and family education on the value and importance of subacute rehabilitation to maximise functional recovery, and the undesirable outcome of

unnecessary and irreversible disability with non-adherence with rehabilitation. Such education should also be coupled with peer group influence such as sharing of positive experiences by patients who benefited from post-discharge rehabilitation. Cues to action such as reminders to attend such as telephone reminders to subjects and caregivers may also aid in the promotion of rehabilitation adherence. Lastly, our study's focus on the barriers to rehabilitation adherence provides a rich contextualised understanding on the factors that facilitate or discourage adoption of post-discharge rehabilitation. The Housing Development Board (HDB) is already reconfiguring lifts in 5300 blocks built before 1990 to open on every level with blocks with higher proportions of elderly and disabled residents receiving priority.<sup>19</sup> However, about 200 blocks will not qualify for the lift upgrading programme because of the high cost. The Land Transport Authority of Singapore has recently retrofitted all 4500 bus stops in Singapore to be wheelchair-accessible by replacing steps with ramps, removing potential obstacles and creating more space for wheelchairs to manoeuvre.<sup>20</sup> The government is also funding the capital cost of replacing steps in all buses with ramps by 2020. In the light of Singapore's low reproductive ratio, rising old dependency ratio, rising rates of singlehood and shrinking family sizes, social barriers are expected to escalate, and the need for social support services will correspondingly increase. Financial barriers such as transportation and day rehabilitation centre fees also need to be addressed to offset the cumulative cost of weekly rehabilitation sessions over months which can contribute to a significant amount in monthly out-of-pocket expenses. Subsidies for home rehabilitation, especially for the severely disabled and homebound, should also be considered.

Our study has several limitations, foremost being the relatively small sample size which probably accounted for the lack of statistically significant associations between caregiver support, means test category, perceived benefit from inpatient rehabilitation and intention to continue with rehabilitation after discharge. About half of our patients refused audio-taping and some data may have been lost from using field notes alone. Our study was limited to one community hospital and may not be generalisable to patients from other hospitals or other settings. Nevertheless, the qualitative themes identified and quantitative results are still useful for clinicians and policymakers. Also, the barriers identified were patient perceived and may not reflect true circumstances. Nevertheless, self-perceived barriers are important as they closely correlate with patient health-seeking behaviour. Lastly, in Figure 1, it should be noted that although we excluded patients who were lost to follow-up from the denominator when calculating attendance rates, these patients could have attended rehabilitation (but we could not contact them to verify whether they did).

## Conclusion

In conclusion, only two-fifths of newly disabled older adult patients recommended for continuation of rehabilitation after discharge from an inpatient rehabilitation unit intended to adhere to the recommendation, one fifth were actually undergoing rehabilitation at 3 months, and this proportion decreased to less than 5% by 1 year. The barriers to post-discharge rehabilitation attendance were functional, social, financial and perceptual. Functional and social barriers were more frequently cited during the early post-discharge period but financial and perceptual barriers were more frequently cited during the late post-discharge period. These barriers must be addressed if we wish to improve attendance rates of post-discharge rehabilitation when recommended by healthcare professionals.

## Acknowledgements

*The authors would like to thank the patients and staff of Ang Mo Kio Thye Hwa Kwan Hospital for their participation and support in the study. This study was supported by National University of Singapore (NUS) Start-Up Grant, NUS Provost Matching Grant and NUS Academic Research Fund. Dr Koh is supported by a Singapore National Medical Research Council (NMRC) Research Fellowship.*

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