Original Article

Functional Independence and Improved Performance among Older Ambulatory Patients following Multidisciplinary Interventions

Dey A B*, Batra A*, Gupta S*, Kumar N*, Gumber S*, Roy B*, Singh U**

Abstract

Background: Functional deterioration as a result of the intrinsic living process, extrinsic factors, and age associated diseases is a major health and health care issue in geriatric practice. The impact of a multidisciplinary intervention protocol on functionality of a group of ambulatory older subjects was assessed in the present study.

Methodology: In a prospective longitudinal study, 155 older subjects attending a dedicated geriatric out-patient facility were recruited for a comprehensive package of interventions over six month period. Apart from clinical evaluation, Functional Independence Measurement and Instrumental Activities of Daily Living were used as the tools for assessing functional capacity in pre and post intervention period.

Results: Eighty four subjects completed the protocol in all respect. The base line FIM and IADL scores were high. After intervention there was significant improvement (p= 0.0001) in FIM and IADL scores in both the genders as well as in the total group.

Conclusions: The comprehensive multidisciplinary interventions improve functionality among ambulatory older subjects significantly. The tools used in the assessment that is Functional Independence Measurement Score and Instrumental Activities of Daily Living were detected to be competent tools for the group comparison. However, for use as a tool in day-to-day clinical practice, an indigenous instrument needs to be developed.

(Journal of The Indian Academy of Geriatrics, 2006; 3:93-97)

INTRODUCTION

The functional deterioration which begins after post-maturational and post-reproductive period determines the impact of the associated morbidity on the health status of the older individual.[1] The rate of functional decay of ageing being extremely variable, older individuals of age, gender and socio-cultural back ground may be extremely heterogenous in their presentation of various disease states. Functional assessment thus becomes one of the important steps in assessment of older individuals in clinical practice. Similarly the impact of the therapeutic interventions can be determined by functional assessment. Several functional assessment scales have been developed for clinical and epidemiological use. Functional Independence Measurement Score (FIMS)[2] and Instrumental Activities of Daily Living (IADL)[3] are two such assessment instruments which have been used extensively in geriatric practice as well as other specialities in out-patient as well as in-patient settings for evaluation of various interventions.[2-11]

The role of a dedicated outpatient facility for older subjects for establishment of a database for health care programme development has been earlier reported.[12] The impact of multi-disciplinary intervention in this setting was evaluated in a prospective longitudinal study. In the present publication the impact of such interventions is reported with primary focus on functional independence and ability to pursue activities of daily living. The value of these two scales will also be discussed.

Material and Methods

In a prospective longitudinal study, 155 subjects who attended the Geriatric Clinic of All India Institute of Medical Sciences, New Delhi between February 2002

*Department of Medicine, **Department of Physical Medicine and Rehabilitation, All India Institute of Medical Sciences, New Delhi

Address for Correspondence:
Dr A B Dey, Professor, Chief of Geriatric Services, Department of Medicine, All India Institute of Medical Sciences, New Delhi-110029.
Email: abdey@aiims.ac.in

and May 2004 were evaluated for the impact of an intensive multi-disciplinary intervention strategy. Inclusion criteria for recruitment included age above 60 years, ambulatory status and residence in the National Capital Region of Delhi. Presence of cognitive impairment, major psychiatric disorder and severe locomotor disability were used as exclusion criteria. After collection of basic demographic data and clinical evaluation, the subjects were subjected to assessment of functional independence and ability to pursue activities of daily living.

For assessment of functional independence, Functional Independence Measure Score (FIMS) was used.[2] Over the years it has emerged as one of the most widely used methods of assessing the basic quality of daily living activities in people with disability. The FIMS consist of 18 items. Scores for each item range from 1 to 7 with 1 (total assistance) being the worst possible score and 7 (complete independence) being the best possible score; the possible total score ranges being 18-126. The FIM score is applied to various aspects of functional independence. The FIM score is also used for psychological areas such as comprehension, expression, social interaction, problem solving, and memory. It is an indicator of severity of the disability. The utility of this instrument lies in its ability to track changes in disability and analyze outcomes of rehabilitation intervention. Instrumental Activities of Daily Living is an instrument to evaluate functional ability of older persons to take care of themselves and perform more sophisticated tasks of daily living.[3] It consists of 8 items, scores for each ranging from 0 (inability to do it) to 2 (ability to do it with complete independence); possible score range being 0 to 16.

Table 1: Demographic details of the study subjects (n=155)

Variable	Number	Percentage
Males	85	54.8%
Females	70	46.8%6
Age distribution		
60-69 years	90	58.1%
70-79 years	60	38.7%
80 years and above	5	3.2%
Living arrangement		
With spouse	36	23.2%
With spouse and children	74	47.7%
With children	34	21.9%
Alone	9	5.8%
Senior citizen accommodation	2	1.3%
Economic independence		
Dependent	62	40%
Partially dependent on others	24	15.5%
Independent	67	43.2%
Others dependent on him/her	2	1.3%

After obtaining the baseline, FIM and IADL scores, the patients were subjected to a pre-determined battery of interventions as per requirement. The subjects were provided a comprehensive package of interventions, which included drug therapy, surgery, physiotherapy, occupational therapy, behavior therapy and advice on appliances and prosthesis (within their paying capacity) over a period of six months. The physical therapy included a three pronged approach in the form of therapeutic exercise, electrotherapy and postural awareness training. The exercises prescribed included any combination of four types of therapeutic exercises vis-à-vis endurance exercises, which included walking, cycling and swimming; muscle strengthening exercises with gradually increasing resistance; balance training including coordination exercises and transfer training; and range of motion/flexibility exercises which were of three types including active, active-assistive and passive. Electrotherapy was performed with physical agents including mechanical traction or electric current and with thermal agents including moist heat, cold packs, short wave diathermy and ultrasonic therapy. The common psychological issues observed in the patients during the study were of stress, encountered on account of bereavement, lifestyle changes due to disease, fear of invalidation, loneliness, frailty of spouse, dissatisfaction with children, pain and poor memory. The participants were offered supportive, cognitive and behavior therapy with recreational counseling and catharsis. The patients were counseled for proper dietary intake and physical activity along with management of pain and relaxation exercises. They were also offered spiritual and marital counseling. While continuing with their interventions, they were allowed to seek treatment and advice as and when required. The patients were subjected to a reassessment at the end of six months.

Data obtained was managed by SPSS version 10.0.1, standard version of the SPSS Inc. For comparison of pre and post intervention FIM and IADL two-way analysis of variance (ANOVA) was employed.

Table 2. Functional health status of the study population

Gender	Functional Independence Measurement Scores (Maximum score 126)	Instrumental Activities of Daily Living scores (Maximum score 16)
Males	122.13 ± 2.66	14.51 ± 2.2
Females	120.46 ± 5.65	14.3 ± 1.99
Total	121.37 ± 4.34	14.41 ± 2.10

Figures are mean scores ± standard deviations

Table 3. Functional Independence Measure (FIM) scores at the pre, 3 and 6 months post intervention assessments. (Maximum Score=126)

	Initial Assessment		3 months Assessment		6 months Assessment		p-value
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Males (n=41)	122.02	2.80	123.27	2.05	124.12	1.62	
Females (n=43)	121.37	1.96	122.79	1.58	123.79	1.42	
Total (n=84)	121.69	2.41	123.02	1.83	123.95	1.52	.0001

Results

Between February 2002 and May 2005, 225 cases were recruited for the study as per the inclusion criteria. After initial screening for compliance and exclusion criteria, 155 cases were included in the study for assessment and various stages of intervention. Demographic details of 155 cases included in the study are provided in table 1. The study subjects comprised of a near equal mix of males and females and mostly (60%) in the age group of 60 to 69 years. The mean age was 69.9 years for males and 65.5 years for females. The proportion of subjects declines sharply in very old category which is beyond 80 years of age. The subjects mostly lived in nuclear or extended families fully or partially independent economically.

The functional health status as indicated by functional independence measurement scores and instrumental activities of daily living scores of the study population is presented in table 2. After initial assessment, the subjects were provided the interventions mentioned above. Seventy one patients could not complete the entire protocol and were considered as dropouts. The causes of drop out were: dislocation, increase in cost of travel to hospital, progressive disease and disability, death, non elderly friendly nature of the hospital and non compliance. Eight four subjects (41 males and 43 females) completed the entire protocol of intervention and 3 months and 6 months assessment. Their functional health status is presented in tables 3-6. Despite high base line scores there was significant improvement in FIM and IADL scores post intervention.

Discussion

The functionality of an individual depends on his/her state of health which encompasses physical, emotional, social and spiritual state. There are several determinants of health and fitness in old age, namely, genetic endowment, environmental influences and lifestyle during adulthood. The major feature of ageing is the difference in the physiological processes in older people as compared to younger individuals. The functional deterioration has an important role to play in determining the associated increase in morbidity and mortality. Deterioration of organ systems begins early in young age after the reproductive phase in all species, including human beings. The damages that occur in individual organs in the post maturation phase are not adequately repaired by the repair mechanisms, resulting in accumulation of defects that ultimately affect the functioning of the entire system. The extent and rate of functional inadequacy of ageing varies from individual to individual among the same species and even within the organs of the same individual. The causes of age-associated deterioration are: damages resulting from the intrinsic living process, damages caused by

Table 4: Pair wise comparison between pre and post intervention scores of FIM

FIM (I)	FIM (J)	Mean difference (I-J)	Standard error	Significance	95% Confidence Interval for difference	
					Lower Bound	Upper Bound
1*	2	-1.333	.115	.000	-1.563	-1.104
	3	-2.262	.173	.000	-2.606	-1.918
2*	1	1.333	.115	.000	1.104	1.563
	3	-0.929	.097	.000	-1.121	-0.736
3*	1	2.262	.173	.000	1.918	2.606
	2	0.929	.097	.000	0.736	1.121

* 1, 2, 3 represent initial, 3 month and 6 month follow-up.

Table 5: Instrumental Activities of Daily Living (IADL) scores at the pre, 3 and 6 months post intervention assessments (Maximum Score=16)

	Initial Assessment		3 months Assessment		6 months Assessment		p-value
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Males (n=41)	15.00	1.47	15.34	1.17	15.59	0.84	
Females (n=43)	14.21	1.95	14.86	1.49	15.14	1.30	
Total (n=84)	14.60	1.76	15.10	1.36	15.36	1.12	.0001

extrinsic factors, and the damage resulting from age-associated diseases.[1]

In geritric practice, functionality is of great clinical importance. It determines the outcome from ill health. Often it is a major confounder for therapeutic interventions. Several clinical tools to measure the functionality has been devised and used in practice. Combination of Functinal Independence Measurement Score with Instrumental Activities of Daily Living provides a comprehnsive assessment tool for determination of functionality.[2,3] The Functinal Independence Measurement deals with self care, sphincter control, transfer, locomotion, communication and social cognition while Instrumental Activities of Daily Living encompasses using telephone, getting to places beyond walking distance, grocery shoping, preparing meals, doing house work, doing laundry, taking medications and managing money. Thus together they provide a complete status of the subject's functionality in indoors as well as outdoor activity.

In the present study, by focusing on evaluation of the functional status the impact of multidisciplinary interventions on health and well being of the subjects was assessed. The tools used were Functional Independence Measurement and Instrumental Activities of Daily Living. Eighty four of the 155 subjects recruited for the comprehensive multidisciplinary interventions at the dedicated geriatric out patient facility of a tertiary care hospital completed the protocol. The baseline FIM and IADL scores were very high, close to the maximum possible on those scales which reflected that though most of the people were suffering from various diseases and disabilities and complained of musculoskeletal pain; they were functionally independent. This could be attributed to the fact that the study included only ambulatory subjects who are expected to be independent in their basic activities of daily living. Also most of the subjects belong to the young-old age group (60-70 years) with very little information available on the functional status of those beyond 70 or 80 years old (old-old age group). Reservations on the part of the elderly to discuss their functional inadequacies with health care provider in presence of their accompanying caregiver could also contribute to the high initial scores.

It seemed high baseline scores would provide little scope for improvement from the patient's perspective as well as from a statistical point of view. On the contrary, mean FIM and IADL scores obtained at

Table 6: Pair wise comparison between pre and post intervention scores of IADL

		Mean difference (I-J)	Standard Error	Significance	95% Confidence Interval for difference	
IADL(I)	IADL(J)				Lower Bound	Upper Bound
1*	2	-0.500	0.069	.000	-0.637	-0.363
	3	-0.762	0.100	.000	-0.960	-0.564
2*	1	0.500	0.069	.000	0.363	0.637
	3	-0.262	0.054	.000	-0.369	-0.155
3*	1	0.762	0.100	.000	0.564	0.960
	2	0.262	0.054	.000	0.155	0.369

* 1, 2, 3 represent initial, 3 months and 6 months follow up.

3months and 6months post intervention assessments were significantly higher (p=0.0001) than at baseline in males and females as well as the whole group. Thus, the tools were found useful for statistical comparison of the functional assessment before and after interventions. However, in view of very high scores their utility for comparison in clinical practice for individual patient remains debatable. These tools for assessment in the present study has been extensively used in disease states such as stroke, dementia and depressive symptoms due to chronic musculoskeletal pain.[4,5,7,8,10,11] In addition these tools have been used for assessing the utility of rehabilitation services in geriatric practice.[6,9]

Both the tools used are derived from life style of European and North American societies. We did encounter cultural difficulties in administering them. These cultural incompatibilities coupled with high scores in assessment indicate that there is a need for developing indigenous tools for functional assessment of older Indians. The methodological difficulties not withstanding, the impact of the multidisciplinary interventions in improving functionality in geriatric practice is obvious from this study. The outpatient geriatric care model in India should thus focus on functionality in addition to usual diagnosis treatment model of health care.

Funding support: Indian Council of Medical Research

References

1. Khetarpal K. Only functionality matters. In: Ageing in India: a situation analysis and planning for the future. Dey AB (Ed): 2003:79-82.
2. Dodds TA, Martin DP, Stolov WC, et al. A validation of the functional independence measurement and its performance among rehabilitation inpatients. *Arch Phys Med Rehabil* 1993; 74:531-536.
3. Rubenstein LZ, Schairer C, Wieland GD, et al. Systematic biases in functional status assessment of elderly adults: effects of different data sources. *J Gerontol* 1984; 39:686-691.
4. Hershkovitz A, Gotilieb D, Beloosesky Y, et al. Assessing the potential for functional improvement of stroke patients attending a geriatric day hospital. *Arch Gerontol Geriatr* 2006; 43: 243-248.
5. Kurz X, Scuvee-Moreau J, Rure B, et al. A new approach to the qualitative evaluation of functional disability in dementia. *Int J Geriatr Psychiatry* 2003; 18: 1050 - 1055.
6. Valach L, Selz B, Signer S. Length of stay in rehabilitation center, the admission functional independence measure and the functional independence measure gain. *Int J Rehabil Res* 2004; 27: 135-143.
7. Bode RK, Heinemann AW, Semik P, et al. Relative importance of rehabilitation therapy characteristics on functional outcome of persons with stroke. *Stroke* 2004; 35: 2537-2542.
8. Mathuranath PS, George A, Cherian PJ, et al. Instrumental activities of daily living for dementia screening in the elderly people. *In J Psychogeriatr* 2005; 17: 461-474.
9. Yu F, Richmond T. Factors affecting outpatient rehabilitation outcomes in elderly. *J Nurs Scholarsh* 2005; 37: 229-236.
10. Nickel MK, Nickel C, Lahmann C, et al. Changes in instrumental activities of daily living after treatment of depressive symptoms in elderly women with chronic musculoskeletal pain: a double blind, placebo controlled trial. *Aging Clin Exp Res* 2005; 17: 293-296.
11. Bottemiller KL, Bieber PL, Basford JR, et al. FIM score, FIM efficiency and discharge disposition following inpatient, stroke rehabilitation. *Rehabil Nurs.* 2006; 31:22-25.
12. Dey AB, Soneja S, Nagarkar KM, et al. Evaluation of the health and functional status of older Indians as a prelude to the development of a health program. *National Medical Journal*