Title	Residential Assessment Instrument 2.0 in care planning for residents in nursing homes
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Residential Assessment Instrument 2.0 in care planning for residents in nursing homes

Key Messages

1. This randomised controlled trial examined the effects of a Minimum Data Set Residential Assessment Instrument (MDS-RAI) evaluated by a multidisciplinary care planning team, with a view to enhancing the health status of elderly residents in long-term care settings.
2. After 12 months, the experimental group fared significantly worse in terms of cognitive performance and urinary incontinence, but significantly better in terms of psychosocial outcome measures when compared with the control group. After 18 months, no significant difference was observed between the two groups.
3. The adoption of MDS-RAI to fulfil the needs of residents in long-term care settings could be useful. However, direct application of the measures in local residential care facilities should be cautious since far more 'unknowns' play potential roles in results than this study has been able to examine.

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Introduction

Longer life expectancy coupled with a decline in fertility has resulted in ageing populations. In Hong Kong, the need for formal long-term care services among elderly population will increase in the coming decades, owing to epidemiological transitions and a decreasing capacity for provision of informal support. Therefore, it is important to understand how to improve the general well-being of institutionalised elderly people, and how to enhance their quality of care. Comprehensive and sensitive assessment of residential care facilities is crucial to maximising residents' physical functioning and quality of life. The Residential Assessment Instrument 2.0 (RAI 2.0) is a comprehensive and standardised tool validated for use in elderly people in residential facilities.[1,2]

In Hong Kong, the RAI 2.0 has been proved to be a reliable and valid assessment tool for elderly residents in nursing homes.[3] It has been adopted as a tool in service matching for the gate-keeping mechanisms for various community and residential aged care services.

We examined a function of the RAI 2.0 in long-term care services, namely care planning. The RAI 2.0 permits service providers in residential care facilities to identify and appropriately respond to 18 physical and psychological problems of the elderly residents. These include delirium, cognitive loss/dementia, visual function, communication, activities of daily living (ADL) functional/rehabilitative potential, urinary incontinence and indwelling catheter, psychosocial well-being, mood state, behaviour problems, activities, falls, nutritional status, feeding tubes, dehydration/fluid maintenance, dental care, pressure ulcers, psychotropic drugs, and physical restraints. For each problem, a Resident Assessment Protocol (RAP) is triggered if one or more of these items for a particular RAP are positive. This indicates that a typical problem exists, that a client is at risk of developing a problem, or that the client's strengths must be monitored and nurtured. Each RAP also contains guidelines that provide information for evaluating factors that may cause, contribute to, or exacerbate the triggered area, and in turn assists the service providers in determining if the problem can be eliminated or reversed, or if special care must be taken to maintain a resident at his/her current level of functioning. The RAI 2.0 measurement is by no means a substitute for clinical diagnoses but aims to facilitate better practice in care planning. Besides the 18 RAPs, a set of nine continuous outcome measures have been developed to act as indicators of physical and psychosocial well-being among elderly residents.

Aims and objectives

The study objective was to evaluate the effectiveness of the RAI 2.0 and its care planning function of RAP in improving the health status of Hong Kong Chinese nursing home residents.

Methods

From December 2002 to December 2005, a prospective 18-month randomised clinical trial was conducted among residents of 10 residential care facilities

operated by for-profit agencies and non-government organisations. Using cluster randomisation, five of the facilities were assigned as the experimental and the remaining five as the controls; their respective numbers of subjects were 571 and 519. They were assessed at baseline, 12 months and 18 months. Respondents in the experimental group were assessed by a multidisciplinary team and were treated by their respective clinicians and practitioners with their RAP profiles generated by RAI 2.0.

Instruments and variables measured

Socio-demographic variables including age, gender, education and marital status were measured, as were outcome variables including:

1. Function index of ADL: this was constructed from self-performance scores on six ADLs: transfer, locomotion, dressing, eating, toileting, and bathing. For each item, respondents were rated on a 5-point scale as independent (0), needing supervision (1), limited assistance (2), extensive assistance (3), and totally dependent (4).
2. Measurement of cognitive performance: this was based on Minimum Data Set cognition scale (MDS-COGS), which is an 11-point scale rating from cognitively intact (0) to very severe impairment (10).
3. Urinary incontinence: this was assessed by one MDS item related to urinary incontinence in the past 14 days, using a 5-point scale rating from no incontinence (0) to completely incontinent (4).
4. Bowel incontinence: this was assessed by another MDS item related to bowel incontinence in the past 14 days, also using a 5-point scale rating from no incontinence (0) to completely incontinent (4).
5. Making oneself understood: this was assessed by an MDS item related to the ability of making oneself understood, using on a 4-point scale rating from understood (0) to rarely or never understood (3).
6. Understanding others: this was measured by another MDS item related to the ability to understand others, using a 4-point scale rating from understand (0) to rarely or never understand (3).
7. The social engagement scale: this consisted of six questions. Greater total scores indicated higher levels of social engagement.
8. Mood and behaviour patterns: these were measured by 16 mood disturbance items in reference to the past 30 days, and were rated as not felt at all (0), felt a few days per week (1), or felt almost every day (2). Greater total scores indicated higher levels of mood disturbance.
9. Problem behaviour: this was assessed by four questions rated on a 4-point scale from not exhibited in past 7 days (0) to occurred daily (3).

Data processing and statistical analysis

The primary analytic model utilised MANCOVA, in which the dependent variables were measured at two follow-up assessments. Experimental status was the prime independent variable. All dependent measures assessing the physical and psychological well-being of residents were included in the analyses based on MDS-RAI items. Nine continuous outcome measures were obtained (Table 1). These categories were chosen because they were important functional areas, well captured by the MDS-RAI, and had profound effects on quality of life. Demographic variables (including age, gender, martial status, and educational level) were also included as co-variates in the MANOVA models.

Hierarchical MANCOVA models were applied to study differences between experimental and control groups. In the first step, socio-demographic variables (including the facility type, gender, age, marital status, and educational levels) were considered. In the second step, outcome measure baselines were considered, and in the last step the group effects of these were studied. MANCOVA was repeated using the changes at the 18-month follow-up as the dependent variable. Some dropout cases failed to attend the follow-up. Per-protocol (PP) and intention-to-treat (ITT) analysis were considered. In PP analysis only cases that attended all follow-ups were considered. In ITT analysis the last-observation-carry-forward method was used.

Results

At baseline, 1090 residents were assessed, whereas at 12- and 18-month follow-ups, 794 were assessed. Thus, the dropout rate was approximately 27.1%. Dropouts and survivors were contrasted by t-tests with Bonferroni adjustments. Using Bonferroni procedure to adjust for multiple simultaneous comparisons, significant differences emerged between dropouts and follow-up participants in ADL, urinary incontinence, bowel incontinence, understood by others, understanding others, and social engagement ($P<0.001$). These indicated that systematic bias due to attrition was substantial.

Table 1 shows the distribution of the characteristics of control and experimental groups in both PP and ITT analyses. In PP and ITT analyses respectively, the mean subjects ages were 82.5 and 83.9 years; 68.6% and 65.9% of subjects were female; 70% and 71% of the subjects were widowed, 17.4% and 17.9% were married, 10.2% and 8.8% were never married and 2.4% and 2.1% were separated or divorced.

In the PP analysis, residents in the experimental group reported significantly higher educational levels and levels of social engagement, but an ADL level requiring only limited assistance, a higher level of understanding others, and a lower level of mood disturbance and problem behaviour

Table 1. Socio-demographic variables and outcome measures at baseline

Variable	Per-protocol analysis		Intention-to-treat analysis	
	Experimental (n=437)	Controls (n=357)	Experimental (n=571)	Controls (n=519)
Mean (SD) age (years)	82.9 (8.0)	82.1 (7.8)	83.1 (8.0)	82.8 (8.0)
Female (%)	64.8‡	73.4	63.0†	69.0
Marital status (%)	*		†	
Married	20.4	13.7	21.4	14.1
Widow	68.4	72.0	68.7	74.0
Single	9.4	11.2	8.4	9.2
Divorced/separated	1.9	3.1	1.6	2.7
Facility (%)	‡		†	
For-profit organisation	46.5	35.3	45.5	38.0
Care and attention home	39.8	46.8	38.5	43.5
Nursing home	13.7	17.9	15.9	18.5
Mean (SD) education score	1.85 (1.30)†	1.66 (1.21)	1.85 (1.30)†	1.69 (1.21)
Mean (SD) activities of daily living score	9.08 (8.77)*	10.33 (9.30)	10.08 (8.90)‡	11.90 (9.57)
Mean (SD) cognition score	4.39 (1.02)	4.47 (1.09)	4.42 (1.04)†	4.58 (1.09)
Mean (SD) urinary incontinence score	1.63 (1.91)	1.80 (1.92)	1.81 (1.95)*	2.04 (1.95)
Mean (SD) bowel incontinence score	1.23 (1.82)	1.42 (1.89)	1.37 (1.87)‡	1.73 (1.96)
Mean (SD) understood by others score	0.48 (0.79)	0.53 (0.82)	0.51 (0.83)†	0.63 (0.89)
Mean (SD) understanding others score	0.49 (0.79)‡	0.69 (0.81)	0.51 (0.80)‡	0.78 (0.85)
Mean (SD) social engagement score	1.36 (0.89)‡	1.18 (0.89)	1.33 (0.91)‡	1.08 (0.88)
Mean (SD) mood disturbance score	2.14 (1.58)‡	2.75 (1.58)	2.16 (1.61)‡	2.76 (1.55)
Mean (SD) problem behaviour score	0.11 (0.58)‡	0.29 (1.11)	0.11 (0.57)‡	0.26 (1.00)

* P<0.1
† P<0.05
‡ P<0.001

when compared with the controls. Moreover, they included a lower proportion of females, a higher proportion of married respondents, and persons living in for-profit homes. In the ITT analysis, similar results were obtained for the socio-demographic variables at baseline. In addition, a slight higher level of cognitive performance, a lower level of urinary and bowel incontinence, better understood by others and understanding others, a higher level of social engagement, a lower level of mood disturbance, and problem behaviour were noted in the experimental group.

To examine group effects on the nine outcome measures, hierarchical MANCOVA models were performed using changes of outcome measures at 12- and 18-month follow-ups. Analyses were adjusted for facility, gender, age, education, marital status, and all baselines. Based on the hierarchical MANCOVA models in the final step using both PP and ITT analyses, the group effect was significant for changes from the baseline to the 12-month follow-up (P<0.001), but not to the 18-month follow-up (P=0.416 and P=0.651 in PP and ITT analyses, respectively).

Table 2 shows the regression coefficients (beta) of the group variable pertaining to the nine changes under the MANCOVA model III. The beta values refer to the expected difference between the nine changes in the experimental and control groups. A negative value means that experimental group respondents improved more than controls for all outcome measures. In both PP and ITT analyses, group effects were significant in cognitive performance, urinary incontinence, and social engagement for the changes from baseline to the 12-month follow-up.

Experimental group respondents showed significantly poorer cognitive capability and urinary incontinence between baseline and 12-month follow-up, compared with the control group. Favourable effects of experimental intervention were found for social engagement and mood disturbance, indicating that intervention significantly improved social engagement and alleviated mood disturbance during the 12-month period. However, results no longer differed significantly in the 18-month follow-up.

Discussion

Using a randomised clinical trial design, the present study explored the function of RAI 2.0 in the local context. Its objective was to assess whether elderly residents' health status improved if the results of RAI 2.0 assessment by a multidisciplinary team had been used in care planning. Based on the findings, they were not able to provide direct observations of RAI 2.0 effects on elderly resident care in Hong Kong's residential care settings.

At baseline, using the PP analysis, there were no significant differences between the experimental and control groups for physical outcome measures. However, the former appeared to have higher scores for psychosocial measures (ie understanding others, social engagement, mood disturbance, and problem behaviour). In the same assessment using the ITT analysis, significant differences between the two groups were found for all nine outcome measures (Table 1). Apparently randomisation could not efface differences between them. However, even though the respondents were in principle randomly selected by the research team, we had no control over who would be assigned to the team for interview.

Based on the PP analysis, at the 12-month follow-up the experimental group showed significantly worse cognitive

Table 2. Regression coefficients (beta) and P values of the group effect under MANOCOVA model III

Variable	12-Month follow-up		18-Month follow-up	
	Beta	P value	Beta	P value
Per-protocol analysis				
Activities of daily living	0.027	0.931	-0.092	0.810
Cognition scale	0.151	0.025	0.004	0.949
Urinary incontinence	0.240	0.008	0.014	0.886
Bowel incontinence	0.064	0.471	0.069	0.489
Understood by others	0.019	0.663	-0.017	0.717
Understanding others	0.009	0.827	-0.071	0.106
Social engagement	-0.319	0.002	0.130	0.165
Mood disturbance	-0.598	0.007	-0.029	0.913
Problem behaviour	-0.062	0.212	-0.011	0.811
Intention-to-treat analysis				
Activities of daily living	-0.062	0.808	-0.052	0.864
Cognition scale	0.097	0.086	0.001	0.987
Urinary incontinence	0.162	0.024	0.026	0.750
Bowel incontinence	0.036	0.616	0.046	0.572
Understood by others	0.014	0.706	-0.013	0.745
Understanding others	-0.014	0.661	-0.063	0.079
Social engagement	-0.352	<0.001	-0.002	0.981
Mood disturbance	0.340	0.073	-0.193	0.397
Problem behaviour	-0.038	0.318	-0.015	0.678

performance and higher rates of urinary incontinence, but performed better in social engagement and mood disturbance, as compared to the controls (Table 2). Although there appeared to be no differences in health quality between the two at baseline, it was possible that health conditions changed immediately following implementation of the study. Alternatively, staff-resident contacts with particular residents might have increased immediately after giving the RAPs to staff members and delineating care plans. At the time the study was implemented, staff members might well have become more aware of the resident's physical and psychosocial status, and residents might have been more willing to share their problems. Based on our observation, in the experimental group, some facilities offered more activities and entailed more time talking with those who were recognised to be psychosocially at risk. Such 'intervention' might trigger better outcomes in those areas. Meanwhile it might have taken some time to address perceptible physical needs. At the 12-month follow-up, these residents may not have responded to the intervention. The 18-month follow-up showed no difference between the two groups for all nine outcome measures. Staff members naturally paid more attention to such impaired residents and their problems, and over the longer term they might have declined less rapidly in functional status, with respect to aspects recognised at the 12-month assessment point. Thus, the two groups would have shown no significant differences. Concerning the improved psychosocial items in experimental group residents, the reason that no significant difference was found between the two groups may be due to a statistical ceiling effect or the fact that improved functioning may be less marked over a longer period of time. It could be argued that overall effects achieved a stability in which fewer residents declined and thus fewer improved.

This study had several limitations. First, systematic bias resulted from attrition. Significant differences between dropouts and follow-up participants were noted. Thus, caution is indicated in the interpretation of these findings. Second, we recognised difficulties in monitoring the integrity and adherence issues of staff members at these participant facilities. As no immediate benefit accrued to participating facilities and their staff members from adoption of the MDS-RAI in care planning for the residents, a certain measure of resistance was only to be expected. For example, its adoption might have created an additional workload for staff members. In response they might tend to subliminally select more cooperative and thus less burdensome residents who might be more physically and mentally fit. Staff resistance to implementing such a tool and its resultant care planning was predictable. Although we had provided staff members with training, different practitioners might treat the residents with a particular triggered RAP differently, especially as no current protocol existed on what to do if the RAP was triggered. Again, being undoubtedly constrained by the limited resources provided, some staff members might even have ignored information provided by the MDS-RAI.

The present study used a randomised controlled trial design to examine the effects of care planning assessed by a multidisciplinary team by means of MDS-RAI on the general health of residents in nursing homes and related facilities. Although studies done elsewhere suggested that their effects on assessing such residents' needs appeared promising, in our study these effects were based on uncontrolled experimental designs, usually involving before and after designs. Despite the methodological problems (such as a significant drop-out rate, differences in background information, integrity and adherence issues among formal care workers), there were some positive effects of implementing the MDS-RAI in care planning on the health of these residents. Nevertheless, far more

'unknowns' play potential roles in results than this study has been able to examine. Thus, the present study could shed light on future studies and be treated as a reflective exercise.

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