Improvements in the quality of co-ordination of nursing care following implementation of the Resident Assessment Instrument in Dutch nursing homes

Wilco P. Achterberg MD
Nursing Home Physician, Cascade Zorgcentrum Rosendael, Utrecht and Department of Nursing Home Medicine and EMGO Institute, Vrije Universiteit Medical Centre, Amsterdam, The Netherlands

Chantal C. M. Holtkamp MSc RN
Research Fellow, Netherlands Institute of Primary Health Care, Department of Nursing and Caring Research, Utrecht, The Netherlands

Ada Kerkstra PhD
Head of the Department, Department of Nursing and Caring Research, Netherlands Institute of Primary Health Care, Utrecht, The Netherlands

Anne Margriet Pot PhD
Department of Nursing Home Medicine, Vrije Universiteit Medical Centre, Amsterdam, The Netherlands

Marcel E. Ooms MD PhD
EMGO Institute, Vrije Universiteit Medical Centre, Amsterdam, The Netherlands

and Miel W. Ribbe MD PhD
Department of Nursing Home Medicine and EMGO Institute, Vrije Universiteit Medical Centre, Amsterdam, The Netherlands

Correspondence:
Wilco Achterberg,
Cascade Zorgcentrum Rosendael,
Indusdreef 5,
3564 GV Utrecht,
The Netherlands.
E-mail: wp.achterberg.gpnh@med.vu.nl

ACHTERBERG W.P., HOLTKAMP C.C.M., KERKSTRA A., POT A.M., OOMS M.E. & RIBBE M.W. (2001) *Journal of Advanced Nursing* **35**(2), 268–275

Improvements in the quality of co-ordination of nursing care following implementation of the Resident Assessment Instrument in Dutch nursing homes

Aim. To study the effect of implementation of the Resident Assessment Instrument (RAI) on the quality of co-ordination of nursing care in Dutch nursing homes.

Background. The Resident Assessment Instrument (RAI) was designed to improve the quality of care and quality of life in nursing homes. Until now, only noncontrolled studies on the effects of implementation of the RAI have been carried out.

Design/methods. Quasi-experimental; intervention wards with RAI compared with wards with no intervention. We used the *co-ordination of nursing care instrument*, which includes measures for case history, care plan, end of shift report, communication, patient allocation and patient report. The scores on these scales represent the quality of nursing procedures on a ward. The measurements were done 1 month before and 8 months after RAI-implementation in 18 wards in 10 nursing homes in the Netherlands.

Results. Out of 348 somatic patients on the participating wards who met the inclusion criteria and signed an informed consent, 278 could be measured at the first and 218 at the second data collection. 175 residents could participate twice. We used a meta-analysis technique to study the mean differences between eight couples of RAI/control wards before and after the intervention. The mean difference scores showed significant positive improvement in the RAI group for case history, there were minor (not statistically significant) improvements for all other scores and the total score. These results are encouraging especially in light of the fact that RAI-implementation in all the experimental wards did not proceed according to plan, owing to staffing and software problems.

Conclusions. We conclude that the RAI has the potential to improve the quality of co-ordination of care in nursing homes.

Keywords: quality of care, co-ordination of nursing care, Resident Assessment Instrument, Minimum Data Set, nursing home, meta-analysis

Introduction and background

Nursing homes deliver care to frail, mostly elderly residents. The care needed for these residents is often complex and multidimensional. This includes improving, maintaining or slowing decline in health conditions, physical, cognitive, communicative and psychosocial functioning as well as creating a pleasant living environment. Nurses play a crucial role in the process of achieving these goals, because of the central role they play in the care process. Quality of care encompasses several dimensions. When evaluating this quality, it is useful to divide it into structural aspects (staffing and budget), process aspects (case history, making a care plan) and outcome measures (health and well-being of a resident) (Donabedian 1985).

Co-ordination of care is an aspect of process quality that aims to improve the quality of care by providing tailor-made care (van Achterberg *et al.* 1996). To bring about this tailor-made care, thorough assessment is essential. Taking a case history is an important part of this assessment. But co-ordination of care also includes a qualitative good care plan, good communication between care givers, an efficient patient allocation, patient report and transfer of information from one nursing shift to another (end of shift report).

The Resident Assessment Instrument (RAI) has been developed as an answer to concerns about poor quality of care in nursing homes in the United States of America (USA). The goals of RAI are improving the quality of care and quality of life in nursing homes (Morris *et al.* 1990). The RAI provides a structured, standardized approach for facility staff to gather information on a resident's strengths and needs and in the problem identification process. It is an aid in developing individualized care plans. It helps staff to look at residents holistically. One of the starting points of the RAI is that everything must be done to ensure that residents achieve the highest level of functioning possible, and maintain their sense of individuality (Morris *et al.* 1995). Although the RAI is primarily designed for nurses, it can be used in an interdisciplinary way. The RAI consists of a structured screening questionnaire [the Minimum Data Set (MDS)], an algorithm that links the information from the MDS to certain important problem areas, and protocols for these problem areas.

A nurse fills the MDS out for the majority of items. The MDS has over 300 items concerning many domains of physical, mental and social functions. The MDS schedule requires observations, interviews and clinical assessment. The full MDS is conducted at admission and yearly thereafter. Between these full assessments a quarterly review is completed, which is a condensed version of the full MDS. When a resident has an important change in health status however, a full MDS assessment has to be done. Completion of the MDS assessment by an experienced nurse takes about 30 minutes.

Certain scores in the MDS trigger specific protocols, the Resident Assessment Protocols (RAPs). There are 18 RAPs, which give directives for further analysis and handling of major problem areas in nursing home care. The RAI therefore links structured, individual assessment information to care planning of that resident, which should lead to 'tailor-made' care.

Definitions of MDS-items, guidelines to fill out the MDS, the RAPs and practical guidelines for taking a case history, observations and communication between care givers and the making of a care plan are described in the RAI Manual (Morris *et al.* 1991, 1995).

The effects of implementation of the RAI in nursing home care in the USA have been evaluated in a large longitudinal, quasi-experimental (noncontrolled) cohort design. Changes in the care process have been found after implementation, especially improvements in the accuracy and comprehensiveness of care plans and resident documentation (Hawes *et al.* 1997a). Besides the number of RAPs that were triggered (comprehensiveness of care plans), a set of 23 MDS-items was used to study the accuracy of the information in the documentation of the resident. This approach showed that the RAI improved an important aspect of quality of care. However, the evaluation of the accuracy of information in the documentation was derived from MDS-items and number of RAPs triggered. Therefore the evaluation standard was derived from the intervention. Also, this study lacked control groups (Achterberg *et al.* 1999). Did these findings really prove a better care process, or just compliance with the mandated implementation?

In Japan, there have also been changes in the care process after RAI implementation: some problem areas are more frequently, others less frequently, addressed in the care plan, and there has been an improvement in the quality of the content of the care plan (Ikegami *et al.* 1998). Again, this study had no control group, and the selected group of participating Japanese facilities makes interpretation of these results unclear. Following the implementation of the RAI in the USA, nursing homes in other countries (Japan, Canada and several European countries) have decided to use the RAI (Hawes *et al.* 1997b). In Sweden, implementation of the RAI has also led to increased nursing documentation: more residents having care plans, and more daily notes on important resident situations, again in a noncontrolled design (Hansebo *et al.* 1999). In the Netherlands, there are 325 nursing homes with 53 800 beds (26 per 1000 elderly people) (Ribbe *et al.* 1997). Fourteen nursing homes have recently started implementation of the RAI.

To gain more insight into the effects of the RAI on the care process, we conducted a controlled trial, with the following research question: Does the implementation of the RAI method improve the quality of the co-ordination of care in Dutch nursing homes? An instrument for measuring quality of nursing care in Dutch nursing homes has been developed and validated which focuses on three aspects: co-ordination of care, instrumental/technical aspects, and environmental/living aspects (van Lingen *et al.* 1990). Co-ordination of care is here divided into six main quality aspects: taking case history at admission, content of the care plan, end of shift report, communication (between nurses and other caregivers and patient), patient allocation and content of patient report. These aspects are strongly related to procedures at ward or facility level, and therefore these scores are an indication of the quality of co-ordination of care at the ward/facility level.

Considering these quality aspects and the procedures described in the RAI method, we expect to see improvements after RAI-implementation in the quality of taking a case history, the care plan, patient report and communication. The RAI gives no directions for the end of shift report and patient allocation and we therefore expect no influence on these items.

The study

Methods

Ethical considerations
The study was approved by the ethical committee of the hospital of the Vrije Universiteit Amsterdam, the Netherlands.

The study employed a nonrandomized, controlled trial. Nursing homes that planned to implement the RAI were asked to participate. Nursing home staff negotiated informed consent with the residents. They explained the goal and content of the study. If residents were interested they were asked to sign the informed consent form. After the informed consent was given, the researchers approached the residents.

Sample
Data were collected through site visits in nine somatic wards in seven nursing homes, which planned to implement the RAI. Control wards were recruited from the same nursing home (in four nursing homes, where RAI-implementation was planned to be phased in) or comparable other 'matched' nursing homes; two nursing homes could only include experimental wards and were matched with four nursing homes. For this matching, a questionnaire was used which contained 40 items about facility characteristics, organization and care services.

Inclusion criteria for residents
• Admitted for long-term care at a somatic ward with an expected remaining duration of stay longer than 9 months.
• Able to understand simple questions and to answer 'yes' or 'no' verbally by pointing at the intended answer.
• Able to give informed consent according to the judgement of the investigator.

Exclusion criteria
Psychogeriatric residents, residents with terminal illness and residents who were admitted for rehabilitation, were therefore excluded.

Data collection

Specially trained research staff conducted structured interviews with residents (who had signed an informed consent) and studied these residents' care documentation. When residents could not participate in the interview because of fatigue or cognitive disorders, their family members were asked to complete a questionnaire. On each ward, several nurses were asked to complete a structured questionnaire.

Data collection took place 1 month before and 8 months after RAI-implementation. In total there were 348 residents included. Interviews with the resident could be held in 278 cases in the first data collection round, and with 218 residents in the second round. A total of 175 residents, 61 men and 114 women participated in both the pre- and postmeasurements. The average age was 78·6 years. There were 27 residents who could not participate although they had given informed consent (see Table 1 for reasons).

In the participating 18 wards, wastage after the first measurement ranged between 0 and 63·6% (Table 2). The reasons for this attrition and nonresponse are described in Table 1. A relatively large number of participants died during the study ($n = 62$). Others were unable to answer the questions in the second interview because of serious health problems ($n = 11$). Other reasons for attrition in the postmeasurement phase were: refusals ($n = 12$), nonresponse by family members ($n = 10$), transfer to another ward ($n = 4$), discharge ($n = 2$) and other reasons ($n = 5$) (see Table 1).

Table 1 Reasons, nonresponse and longitudinal attrition after inclusion for data collection

Reasons	Nonresponse (attrition)
No data collection	27 (death 5, serious health problems 4, refusal 7, nonresponse from family 6)
Pretest data collection done, but no post-test data collection	103 (death 62, serious health problems 11, refusal 12, nonresponse from family 10, others 8)
Total residents who participated in pre- and post-test data collection	175
Newly included in postmeasurements	43
Included	348
Eligible for analysis	321

Intervention

A nursing home that planned to implement the RAI started with a workshop and formed a project group that was trained in the RAI method. Training consisted of a 4-day course, and was identical for all participating nursing homes. The trained project group was responsible for the further training of caregivers and implementation of the RAI in the nursing home. Some nursing homes chose to carry out the implementation in phases, while others implemented RAI in a single effort.

Measuring instruments

Dependent variables

The process quality was assessed by means of the subscale 'co-ordination of care', a part of the 'Quality of Nursing Care in Nursing Homes instrument' (van Lingen *et al.* 1990). This instrument has been developed by a Delphi-method using nursing care experts in Dutch nursing homes. The theoretical frame-work is based on the quality of care theory by Donabedian (1985). Donabedian's model is divided in structural aspects (staffing or budget), process aspects (the way care-givers provide care, for example case-history) and outcome aspects (health and wellbeing of a resident).

Van Lingen's instrument to assess the quality of co-ordination of nursing care is based on the process aspects. The instrument consists of quality standards and accompanying criteria, which are discrete items of practice, and are observable and measurable. Examples of quality standards concerning all six aspects of co-ordination of care are shown in Table 3. It measures the judgement of residents and nurses on the process of co-ordination of care, including the care plan, and contains several structured questions for residents (interviews) and nurses (questionnaires) and information found in the residents' care documentation on the following aspects (subsets): case history, the care plan, patient report, end of shift report, communication and allocation of nurses to residents.

In the total score all aspects are equally weighted. All scores were recalculated to create a scale from 0 (the worst possible score) to 100 (the best possible score). Acceptable content validity has been shown by van Lingen *et al.* (1990), interrater reliability for co-ordination of care was 0·73 (Cohen's κ). This instrument was chosen because it was developed for Dutch nursing home care, measures the quality of nursing care, includes information found in documentation as well as information from nurses and residents, and has no relation to the intervention method (RAI).

Table 2 Differences in distribution of participants (*n*) and longitudinal attrition in experimental (RAI) wards (E1–E8) and control wards (C1–C8)

RAI ward	*n* pretest	*n* post-test	*n* pretest and post-test	Attrition after premeasurement (%)	Control ward	*n* pretest	*n* post-test	*n* pretest and post-test	Attrition after premeasurement (%)
E1	22	19	15	31·8	C1	11	8	7	36·4
E2	17	22	17	0	C2	32	27	23	28·1
E3	36	23	18	50	C3	21	14	14	33·3
E4	11	11	11	0	C4	6	8	6	0
E5	8	5	5	37·5	C5	11	6	4	63·6
E6	15	11	8	46·7	C6	11	11	6	45·5
E7	7	7	5	28·6	C7	8	3	3	62·5
E8	27	17	13	51·9	C8	10	7	7	30
					C9*	25	19	13	48
Total	143	115	92	35·7		135	103	83	38·5

*This nursing home was supposed to have an experimental and control ward, but it did not implement the RAI and was therefore not included in the analysis.

Table 3 The instrument by van Lingen *et al.* to measure quality of co-ordination of care: standards and criteria

Aspect of the co-ordination of care instrument	No. standards	No. criteria	Maximum points	Example of a quality standard
1. Taking case history	4	6	12	Case history has to be done within 24 hours after admission in nursing home, together with resident and family
2. Care plan	7	15	30	In the care plan the level and kind of self care activities of the resident has to be recorded
3. End of shift report	4	4	8	The end of shift report has to be in writing and explained verbally by the nurse
4. Communication	6	11	22	At least once a week a number of nurses have to discuss and evaluate if the nursing care takes place according to the care plan
5. Patient allocation	2	2	4	No more than two nurses should be responsible for the different aspects of care of a resident during a shift
6. Patient report	5	6	12	Residents health status has to be recorded according to the instructions

Procedure

Data collection took place in a fixed order. First, residents were interviewed individually and face-to-face (the resident part of the co-ordination of care scale). Second, the primary nurses of the participants were asked to complete a questionnaire with the nurse's part of the scale. Finally, the research-assistants analysed the care records of the participating residents.

Data analysis

Co-ordination of nursing care is a nursing home and ward specific measure, not a resident specific measure. It provides information on aspects of procedures, which are custom in that nursing home or ward. Approaching the data on resident level with ANOVA would exclude those who died or were too

ill after the first data collection, and those who were newly admitted. It could also bias the results, because the number of residents on the separate wards was very different.

Multilevel analysis can be used to look at individual as well as ward level, but it also uses paired samples and would exclude those who only participated in one data collection round.

Therefore we decided to analyse primarily at ward level, and to approach the data of the experimental/control couples as if they were Randomised Clinical Trials pooled in a meta-analysis (Whitehead & Whitehead 1991). Mean scores (and SD) were calculated for all residents on a ward. Mean differences (mean score postintervention – mean score preintervention) of the experimental and control wards were used to make eight couples (experimental vs. control) of mean differences. These eight standardized mean differences then were pooled to create the standardized mean difference

(SMD) of intervention vs. control wards with 95% confidence interval. This SMD is the difference in the changes (of the pre- and postintervention measurement) between the intervention- and control-wards.

In this analysis, participants who completed at least one data collection could be analysed. In the results, the mean differences express changes between the intervention and control wards and not the differences between individual residents.

Results

The overall mean score on co-ordination of care in the pre-RAI cohort was 53·9 (%), with the lowest mean score on the care plan (47·1), and the highest on 'end of shift report' (72·6). The mean scores for the participating nursing homes for the total co-ordination of care ranged from 46·7 to 63·5, for the participating wards from 45·45 to 64·98. Mean baseline scores for the experimental and control residents did not differ significantly for care plan, communication and patient allocation, but they were significantly higher in the control group for taking case history, end of shift report and the total co-ordination of care score; patient report score was significantly higher in the intervention group (Table 4). At ward level, there were only minor differences.

One of the intervention wards did not implement the RAI because of staffing problems, and was not included in our analysis. The eight intervention wards with the eight matched controls had 253 residents in the first data collection, in the second data collection 199 residents.

All pooled mean differences showed heterogeneity of the mean differences, therefore we decided to use a random effect approach. Pooled mean differences for case history showed a significant positive effect for the wards that implemented the RAI compared with their control wards ($U = 6·11$; $Q = 59·89$; $P = 0·035$). The (random) effect-size was 6·5 (95% CI: 1·35, 11·73). For all other subscales a positive, but not significant effect was found: random effect for care plan was 0·8 (−2·49, 4·06), for end of shift report 0·1 (95% CI: −1·27, 1·5), for communication 4·2 (95% CI: −8·56, 16·94), for patient allocation 6·0 (95% CI: −6·98, 18·93) and for patient report 1·3 (95% CI: −3·17, 5·74). For the total co-ordination the random effect was 2·8 (95% CI: −0·28, 5·82) (Table 5).

RAI posttest co-ordination of care scores increased for all aspects except patient allocation and patient report; in the control group all scores except care plan decreased (Table 6).

At the end of the data collection, a semi-open interview with the nurse in charge of the ward was held to identify whether there had been any kind of problems with the intervention (i.e. the implementation of the RAI). In these interviews it appeared one nursing home had not yet implemented the RAI at all in the ward that was designated (and where the pretest data collection had already taken place) because of staffing problems. In all intervention wards problems with staffing (caused by sickness and mutation of staff) or availability of a satisfactory software package

Table 5 Pooled mean differences (pre- and postintervention measurement) of eight intervention/control couples of nursing home wards on items of the co-ordination of care scale

	Mean difference*	95% Confidence interval	Significance of mean difference (P)
Case history	6·5	1·35, 11·73	0·035
Care plan	0·8	−2·49, 4·06	NS
End of shift report	0·1	−1·27, 1·5	NS
Communication	4·2	−8·56, 16·94	NS
Patient allocation	6·0	−6·98, 18·93	NS
Patient report	1·3	−3·17, 5·74	NS
Total co-ordination	2·8	−0·28, 5·82	NS

*Positive mean difference means better for intervention ward than for control ward. NS = not significant.

Table 4 Baseline scores on co-ordination of nursing care in the control and intervention group

	Intervention group (n = 143) Mean (SD)	Control group (n = 135) Mean (SD)	Significance of difference (P)
Taking case history	49·1 (15·7)	60·1 (17·0)	<0·001
Care plan	47·1 (10·6)	46·4 (12·5)	NS
End of shift report	70·2 (19·2)	77·8 (19·6)	<0·005
Communication	53·7 (21·1)	57·1 (19·6)	NS
Patient allocation	82·6 (23·9)	86·3 (22·4)	NS
Patient report	71·2 (8·2)	67·9 (9·0)	<0·005
Co-ordination total	52·8 (8·7)	55·5 (9·4)	<0·05

NS = Not significant.

	Intervention		Control		
	Pretest $n = 143$ Mean (SD)	Post-test $n = 115$ Mean (SD)	Pretest $n = 135$ Mean (SD)	Post-test $n = 103$ Mean (SD)	Table 6 Scores on co-ordination of nursing care (pretest and post-test) in the control and intervention group for all participants
Case history	49·1 (15·7)	56·2 (16·6)	60·1 (17·0)	57·4 (14·1)	
Care plan	47·1 (10·6)	53·6 (12·7)	46·4 (12·5)	48·2 (12·9)	
End of shift report	70·2 (19·2)	70·3 (18·2)	77·8 (19·6)	74·7 (16·5)	
Communication	53·7 (21·1)	54·0 (20·6)	57·1 (19·6)	55·1 (19·9)	
Patient allocation	82·6 (23·9)	81·1 (24·4)	86·3 (22·4)	78·0 (25·0)	
Patient report	71·2 (8·2)	67·8 (7·6)	67·9 (9·0)	64·9 (9·0)	
Co-ordination total	52·8 (8·7)	54·7 (9·8)	55·4 (9·6)	53·5 (9·6)	

resulted in a delayed or adapted (less complete) implementation effort. This meant that fewer MDS-forms were filled out, and that the analysis of the identified RAPs hardly ever occurred. In the control group all wards also faced staffing problems.

Discussion

Dutch nursing home wards show large differences in the quality of co-ordination of nursing care, an important aspect of quality of care. In this study, we found improvements in this co-ordination of care following the implementation of the Resident Assessment Instrument in nursing home wards. In this nonrandomized controlled trial, the most positive improvement was found on the subscale case history: 6·5 points mean difference (95% CI: 1·35, 11·73). Improvements in the RAI group were also found for care plan and all the other aspects of co-ordination of care, when compared with non-RAI wards, although these differences were smaller and not statistically significant.

The effects were partly because of a decrease in the quality of co-ordination of care in the control wards. Important items (total co-ordination of care, care plan and case history) however, also showed improvement without comparison with the non-RAI group.

Our findings confirm the positive changes in quality of care, especially the quality of documentation, which were reported in the USA, Sweden and Japan after implementation of the RAI (Hawes *et al.* 1997a, Ikegami *et al.* 1998, Hansebo *et al.* 1999). The international consistency of these positive changes strengthens the evidence that the RAI is a good instrument for improving quality of nursing home care. The strength of this study is that we used an instrument that is not derived from the RAI/MDS itself and that we included a control group. Randomization and an alternative intervention for the control group was not possible in our context, but would have improved the power of the design.

The selection of control wards was based on comparable facility characteristics. Nevertheless, there was a significant difference in co-ordination of care base-line scores between the intervention and control residents. The positive results are however, not likely to be influenced by this because on the level of analysis (the wards) there were only minor differences.

The outcome, quality of co-ordination of care, was measured with an instrument that has been developed for Dutch nursing homes, but has not been through a meticulous validation compared with other instruments or measures. It is sensitive to poor quality and to change, but has insufficient items to give a comprehensive picture or a threshold of the quality of co-ordination of care. It may, therefore, have been too restricted to identify other changes as a result of the RAI-implementation.

The improvement in the quality of the case history following RAI implementation was expected. The quality of the care plan also improved in the RAI group, but this was not statistically significant. The lack of definitive effects on care plan, communication and patient report is puzzling, as RAI provides several tools to improve these aspects. One of the statistical explanations is the relative small number of wards examined, and the major differences (heterogeneity) in base-line quality scores and mean difference scores, which forced us to use a random effect model, instead of a fixed effect model. In a fixed effect model, confidence intervals are usually smaller.

We believe that another explanatory factor is that the time frame used in this study was short (8 months follow-up). In this period, 2 or 3 MDS-assessments for each resident should have been made within an untroubled implementation scheme. But the RAI implementation in Dutch nursing homes has until so far not been without its problems, and in the wards we studied, frequently did not proceed according to the implementation plan. Simply filling in an MDS-form cannot improve quality of care. Further assessment of the identified problems (or risk of developing that problem) by using the RAPs is an essential part of the RAI. This study has

also shown that our participating RAI nursing homes wards find this a difficult task. Further, feedback to the wards about the care they are giving, based on outcomes, health, and well-being of the residents, is an essential incentive for quality enhancement. Software and database procedures to supply this feedback were however, not yet operational during the time of our study.

Difficulties in obtaining (good) staff (a problem facing the care industry as a whole) and operational RAI-software have caused delayed and adjusted implementation in the nursing homes that were included in the study. Delivering better care also depends on availability and quality of staff and resources. At the moment, it is difficult for most Dutch nursing homes to employ sufficient and qualitatively good staff, and this shortage is expected to last for several years. This could explain the decrease in quality of co-ordination of care (for all aspects but the care plan) in the control wards. Implementation of the RAI may somehow protect a nursing home from the implications of the staffing problems on the quality of care because of its structure and guidance in the nursing care process.

Conclusion

The results of this study demonstrate that the Resident Assessment Instrument may be capable of improving the quality of care in nursing homes. Will individual residents benefit from this improvement? We found that the RAI has led to better case history and better care plans, which could mean the resident needs are better assessed. Having a better care plan does however, not necessarily mean the resident is better off (for example in aspects of quality of life, well-being and health outcomes) (Schnelle 1997). Nevertheless, without a comprehensive and good quality care plan these three aspects are unlikely to improve. Making use of the positive effects of the RAI on process quality to improve these aspects will be the next challenge for the nursing homes that have implemented the RAI. Attention should be paid to the use of the RAPs and to using feedback mechanisms for quality indicators and case-mix, in order to strive for a better quality of care in nursing homes.

Acknowledgements

References

van Achterberg T., Stevens F.C.J., Crebolder H.F.J.M., de Witte L.P. & Philipsen H. (1996) Co-ordination of care: effects on the continuity and quality of care. *International Journal of Nursing Studies* **33**, 638–650.

Achterberg W.P., van Campen C., Pot A.M., Kerkstra A. & Ribbe M.W. (1999) Effects of the Resident Assessment Instrument on care process and health outcomes in nursing homes. *Scandinavian Journal of on Rehabilitation Medicine* **31**, 131–137.

Donabedian A. (1985) *Explorations in Quality Assessment and Monitoring, Vol. 3. The Methods and Findings of Quality Assessment and Monitoring: An Illustrated Analysis.* Health Administration Press, Ann Arbor, MI.

Hansebo G., Kihlgren M. & Ljunggren G. (1999) Review of nursing documentation in nursing home wards-changes after intervention for individualised care. *Journal of Advanced Nursing* **29**, 1462–1473.

Hawes C., Mor V., Phillips C., Fries B.E., Morris J.N., Fogel B., Hirdis J., Spore D., Steele-Friedlob E. & Nennstiel M. (1997a) The OBRA-87 nursing home regulations and implementation of the resident assessment instrument: effects on process quality. *Journal of the American Geriatric Society* **45**, 977–985.

Hawes C., Morris J.N., Phillips C.D., Fries B.E., Murphy K. & Mor V. (1997b) Development of the nursing home resident assessment instrument (RAI) in the US. *Age and Ageing* **26-S2**, 19–26.

Ikegami N., Igarashi C., Takagi Y., Kato T. & Mor V. (1998) The impact of the MDS and RAI on quality of Care plans in Japan. *Canadian Journal of Quality in Healthcare* **14**, 23–28.

van Lingen B., Hollands L., Bergen van B., Lemmen T. & Visser G. (1990) *Kwaliteit van verpleegkundige zorg in verpleeghuizen- een meetinstrument.* de Tijdstroom, Lochem, The Netherlands.

Morris J.N., Hawes C. & Fries B.E. (1990) Designing the national resident assessment instrument for nursing homes. *Gerontologist* **30**, 293–307.

Morris J.N., Hawes C. & Murphy K. (1991) *Resident Assessment Instrument: Training Manual and Resource Guide.* Elliot Press, Natick, MA.

Morris J.N., Murphy K. & Nonemaker S. (1995) *Long Term Care Facility Resident Assessment Instrument (RAI) User's Manual*, Version 2.0. HCFA, Baltimore.

Ribbe M.W., Ljunggren G., Steel K., Topinkova E., Hawes C., Ikegami N., Henrard J.C. & Jonnson P.V. (1997) Nursing homes in 10 nations: a comparison between countries and settings. *Age and Ageing* **26-S2**, 3–12.

Schnelle J.F. (1997) Can nursing homes use the MDS to improve quality? *Journal of the American Geriatric Society* **45**, 1027–1028.

Whitehead A. & Whitehead J. (1991) A general parametric approach to the meta-analysis of randomized clinical trials. *Statistics in Medicine* **10**, 1665–1677.