Reviewer's report

Title: Variations in levels of care between nursing home patients in a public health care system

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Reviewer: Greg Arling

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This study addresses an important issue – facility and resident-level factors that influence the distribution of direct care provided to nursing home residents. The sample is reasonably large – it consists of 1204 nursing home residents in 35 facilities in a Norwegian municipality (Trondheim). Overall, the analysis was very competent and informative. The multilevel statistical model (patients nested within facilities) is well suited for this study. The researchers were able to estimate the within and between facility variation in care time, and the independent effects of predictor variables at each level when entered into the model simultaneously. They also explored interactions between ADL, IADL, and cognitive impairment as they relate to resident care time. The manuscript is relatively clear and well organized. Some findings were to be expected. Considerable variation in total resident care time remained between facilities even after controlling for facility structural characteristics. Because facility budgets were determined without regard to resident acuity, heavier case mix facilities had fewer resources at their disposal to care for their most ADL dependent residents when compared to lighter case mix facilities. Some of the most interesting findings were in patterning of care times (total, personal care, and eating assistance) by level of resident ADL and IADL dependency and cognitive impairment. Another interesting finding was the effect of informal caregiving, which apparently supplemented rather than substituted for formal care. The findings point to the need for a case-mix based budgeting model, which Trondheim adopted subsequent to the study.

Here are my concerns and suggestions for improvement.

Major Revisions/Issues to Addressed

1. The authors should be clearer in distinguishing between average or aggregate care time delivered by facilities and the care time received by individual residents. The Background paragraph in the abstract, for example, makes it appear as if the central research issue is variation in care time between facilities. The Results paragraph in the abstract is difficult to decipher without this distinction between facility and resident levels. What is “total individual care”? Does “ADL” refer to individual resident ADLs or average ADL dependency in the facility? Although I take these examples from the abstract, the confusion between levels of analysis and their interpretation is a problem throughout the manuscript.

2. The amount of care received by an individual resident depends on a series of
decisions: the facility’s global budget, allocation of budgeted resources between
direct care staffing and other areas such as administration, and distribution of
staff time among individual residents. The authors should describe global
budgeting in more detail. Is each facility given a uniform budget based only on
the number of residents it cares for, or do other considerations affect the global
budgets? It appears from the figure (poorly labeled and described) that facilities
differ substantially in their average hours of care per resident per week. What
accounts for this variation – global budgets or internal allocations to direct care or
other areas? Municipal budgeting processes and internal management decisions,
which are unmeasured variables, may help account for the unexplained
inter-facility variation in care time. Also, where does the resident’s private
payment fit into the global budgets? Do private payments represent additional
resources beyond the municipal budget? Unmeasured external factors should be
described and discussed in the manuscript.

3. Time studies in US nursing homes have found that very high direct care
resource use is associated with rehabilitation/therapies and specialized nursing
services often delivered to patients following an acute hospital stay. Only a small
% of care time (8%) in this study was for “medical care” and this pertained mainly
to passing of meds and cooperation with the doctor. Do Norwegian facilities
perform post-acute care or rehabilitation? If yes, were these resources left out of
the study? If not, then the authors should note the difference in the types of
residents and facilities in their samples.

4. The methods section and Table 1 should have more information about the
nursing homes. For example, what were the mean and median per resident care
times, minimum and maximum, and interquartile range? What about inter-facility
variation in number of direct care staff and skill mix?

5. Did the 2 staff members in each facility register (record) care time provide by
all staff on the shift or just for themselves? If only themselves then this would be
a study limitation with some (much?) time unaccounted for in the study.

6. The measurement of IADLs and ADLs in a NH setting can be problematic
because residents may not have the opportunity to perform these activities or
they may be done for all residents as a matter of facility policy even if a resident
could perform the activity on her own. The authors might address the issue of
capacity vs. opportunity to perform IADLs or ADLs.

Minor Revisions

7. Explain the difference between the traditional NH and extra sheltered housing
facilities. Do they differ mainly in payment mechanism or are they organized and
staffed differently?

8. Point out that the choice of a sample from one municipality may simplify the
study (page 5) but it also limits generalizability.

9. Consider using the terms ADL dependency and IADL dependency; the terms
ADL and IADL used alone are ambiguous.

10. Page 8, end of first paragraph “… score three (two?) or higher …”
11. Add to the discussion section. Did study results lead to new case-mix based budgeting system? Does the new system include IADLs and does it recognize interactions between resident ADL, IADL, and cognitive impairment?

Discretionary Revisions

12. The description of main and interaction effects on pages 12-13 is complicated. The higher-level interpretation of findings in the discussion section makes the interactions more understandable. Could some of that interpretation be woven into the presentation of findings?

Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests.