Sequential audits of geriatric care: measuring change in structure and process and the contribution of clinical audit

ABSTRACT – Background: Sequential audits of care in geriatric practice can demonstrate improvement in its content and quality, and identify its strengths and weaknesses. However, there are problems in such sequential audit, particularly if it depends on data entry by lay staff rather than trained researchers. These include: changes in staff and patients from one audit to the next; having to take into account instances where the desired standards are already in place and therefore no further improvement can be shown, or where initial standards are so low that only improvement can take place.

Objectives: To demonstrate methods of analysis of sequential audits in long-term care for elderly people and in geriatric day hospital practice designed to overcome these difficulties.

Design: Audit packages for long-term care and for care provided by geriatric day hospitals have been evaluated in each case by analysing two audit cycles carried out at eight and six month intervals respectively.

Methods: The Royal College of Physicians CARE scheme for audit of long-term care was carried out in 17 locations (nursing homes and geriatric long-stay wards) in two cycles at an interval of eight months. The Royal College of Physicians audit scheme for geriatric day hospitals was carried out in 27 day hospitals in two cycles at an interval of six months. A different method of analysis and presentation of results was devised for each of the two projects.

Results and conclusion: The two methods of analysis and presentation of data used to evaluate the effect of sequential audits reveal the ups and downs in the standards of care provided by the different institutions for the care of the elderly, and in the standards of care experienced by individuals resident in the same long-term institutions. Overall, sequential audits show that improvement outweighs deterioration in all domains of geriatric care, and suggest that audit contributes to this improvement.

The purpose of clinical audit is to improve practice. Sequential audits show whether practice is improving. If there is improvement, it is probable that audit caused or contributed to it, but the possible contribution of coincidental changes in organisation, staff, technology etc must also be acknowledged.

Many audits are of outcome, eg survival after major surgery, but there are areas of medicine in which outcome is not so easily defined and audit of the structure and process of health care is used as a surrogate. Such audits present problems of their own, well exemplified by the audit of long-term care for older people and of the work of geriatric day hospitals – two areas of particular interest to the Research Unit of the Royal College of Physicians. Evaluation of such care must take account of changes in staff and clientele between audits and of the instances in which standards have already reached the desired level (so they can get worse but not better) or are at rock bottom to start with (and can therefore get better but not worse). We describe our endeavour to overcome these problems in analysis of sequential audits.

Method

The two audit tools considered in this report are the RCP’s CARE scheme (continuous assessment review and evaluation) and Clinical audit scheme for geriatric day hospitals. The former derives from the report High quality long-term care for elderly people which contains guidelines derived from the literature and from two multidisciplinary workshops of experts in the field. The latter derives from Geriatric day hospitals: their role and guidelines for good practice. Evaluation projects were set up in 17 long-term care facilities, each undertaking two audit cycles at an interval of eight months, and in 27 geriatric day hospitals undertaking two audit cycles at an interval of six months. Different methods of analysis and presentation of results were used for each of the two audits, and are described below; they are offered as two ways in which the effectiveness of such audits may be assessed.

Results

Long-term care audit

In the long-term care audit, the 17 participating facilities (four long-stay hospital wards and 13 nursing homes) each assessed one domain of care every two weeks. The effectiveness of the audit is illustrated by analysis of the changes between the first and second audits in questions regarding the structure of care in the facility (Table 1) and questions about the processes of care for individual residents (Table 2). In analysing the results of the two audit cycles, allowances have to be made under a number of heads. First, since the audit was carried out by staff members and not by trained researchers, there were inevitable gaps – questions unanswered or, in a few cases, incompatible answers that had to be disregarded. Using data adjusted to allow for these inaccuracies therefore yielded different numbers of pairs of answers for the first and second audits.

Second, in considering what changes might have taken
Table 1. Changes between first and second facility audits (questions relating to structures of care) in long-term care.

| Domains of care                                      | No. of pairs of audit questions* | Better Base† n | % †† | Worse Base** n | % †† |
|------------------------------------------------------|----------------------------------|----------------|------|----------------|------|
| Preserving autonomy                                  | 119                              | 35 12 34       | 84 16 19 |
| Promoting urinary continence                         | 59                               | 8 4 50         | 51 6 12  |
| Promoting faecal continence                          | 74                               | 16 7 43        | 58 5 9  |
| Optimising drug use                                  | 27                               | 5 3 60         | 22 1 5  |
| Managing falls and accidents                         | 122                              | 26 8 31        | 96 5 5  |
| Preventing pressure sores                            | 73                               | 36 17 47       | 37 2 5  |
| Aids and adaptations                                 | 50                               | 14 3 21        | 36 6 17 |
| The medical role in long-term care                   | 92                               | 22 13 59       | 70 16 23 |
| Staff training – all domains                         | 149                              | 65 23 35       | 84 9 11 |
| Total:                                               | 765                              | 227 90 40      | 538 66 12 |

* Variation in these figures is due to variation in the number of questions available for comparison in the audits of various domains
† No. with potential to improve
** No. with potential to deteriorate
†† Percentage of the base

place between the two audits, floor and ceiling effects had to be taken into account. Where the desired standard had already been achieved at the time of the first audit, the respondents’ care could not improve but could deteriorate, and when it was poor at the time of the first audit, it could not get worse, but might be improved. The assessment of any change was therefore based on potential to improve and to deteriorate, and a percentage improvement and deterioration was calculated based on the numbers of answers in each category.

Third, when auditing the residents, since the second audit was carried out eight months after the first, there were inevitable changes in their numbers and identities. To allow for differences in the number of residents, we disregarded the findings for any audit carried out in a home where the total number of residents participating in the two audits differed by three or more. To allow for differences in the residents’ identity, a change in quality of care between the two audits was arbitrarily defined as having occurred when the difference between the pairs of answers from these two audits involved three or more residents. Thus, if a change was noted in any audit from an individual home involving only one or two residents, this was not accepted as a change in the quality of care.

In the residents’ audit, as in the facility audit, the percentage of change (better or worse) was calculated from the numbers of those whose care could be improved (ie all except those at the ceiling) and those whose care could get worse (ie all except those at the floor).

In the second audit cycle, the number of comparable answers was better than the first in 40% and worse in 12% (Table 1). Similarly, Table 2 shows improvement in 41% and deterioration in 16%. Sequential audits of facility show that the largest difference between improvement and deterioration results from better medication, but applies only to a few answers (Table 1). The most obvious differences revealed by structure (facility) audit lie in preventing pressure sores, in the medical role and in staff training. Sequential audits concerning process (residents) show that the most striking change can be achieved by promoting urinary continence and preventing pressure sores (Table 2).

Statistical treatment of data of this nature is difficult. The most appropriate test is probably the McNemar test which examines the cases with different values for two dichotomous variables, and this has been applied to the data in Tables 1 and 2. The McNemar test, however, shows only one significant result in Table 1 (staff training ($\chi^2=7.5000; p=0.0062$)) and two in Table 2 (preserving autonomy ($\chi^2=7.7794; p=0.0053$) and promoting urinary continence ($\chi^2=17.3333; p<0.0001$)), while a third approaches significance (optimising drug use ($\chi^2=3.7037; p=0.0543$)).

**Day hospital audit**

In the day hospital audit, each of the 27 participating geriatric day hospitals completed the four questionnaires on structure and four concerning process and outcome (Table 3). Each centre was also asked to complete a questionnaire for eight consecutive patients in three domains – new
admissions, current attenders and discharges (Table 4). If fewer than eight were completed, that centre was not involved in the analysis of that domain. One questionnaire was completed every two weeks and the whole process repeated six months later.

An analysis of results was sent to each day hospital on completion of the first cycle. This indicated the extent to which the centre had achieved the desired standards. Each day hospital was identified by a number known only to that day hospital and to the authors of this article, and were ranked in the order of their achievement of standards (see Appendix A). This format made it possible to see general areas of strength and weakness (standards where overall achievement was excellent, good or fair), each centre's relative strength or weakness (see bottom row), and specific areas of weakness or strength of individual centres (eg centre 10 = weak on identification of key worker and patients agreeing objectives). A similar analysis, carried out on results from the second audit cycle, made it easy for each day hospital to note any change in its overall ranking (percentage of standards achieved) between audits.

Table 4. Number of day hospitals completing audit for eight patients in the domains of new admissions, current attenders and discharges.

| Domain            | 1st questionnaire | Both questionnaires |
|-------------------|-------------------|--------------------|
| Admissions        | 22                | 16                 |
| Current attenders | 24                | 20                 |
| Discharges        | 20                | 14                 |

To assess the overall effectiveness of the audits, a comparison analysis of the same format as those for the first and second audits was produced. Colour coding was also used to illustrate change between the first and second audits for individual questions and individual day hospitals and for the overall achievements: yellow for improvement, red for deterioration and blue for no change.

Table 5 provides an example of the average scores in the first and second audits (questions relating to current attenders). The highest score of 8 indicates that the care of all eight patients in each of the day hospitals concerned had achieved that particular standard. The column headed '2nd audit' indicates that the average score had improved in twelve questions and deteriorated in two, with a mean overall improvement of 11% in this domain. Table 6 demonstrates the overall effect of the audit. At least part of both audit cycles was completed by 23 hospitals, who answered a total of 180 questions in all domains; they showed

Table 6. Total number of questions answered in audit of each domain of day hospital care and change (if any) between the first and second audits. Results from 23 day hospitals completing at least part of both audit cycles.

| Domain                | Total no. of questions | Improved (a) | No change | Deteriorated (b) | a-b No. (%) |
|-----------------------|------------------------|--------------|-----------|------------------|-------------|
| Facilities            | 45                     | 21           | 12        | 12               | 9 (20)      |
| Staff and policy      | 13                     | 11           | 2         | 0                | 11 (89)     |
| Activities            | 32                     | 27           | 3         | 2                | 25 (78)     |
| Communication and quality | 37                | 28           | 5         | 4                | 24 (65)     |
| Admissions            | 19                     | 15           | 2         | 2                | 13 (68)     |
| Current attenders     | 14                     | 12           | 0         | 2                | 10 (71)     |
| Discharges            | 20                     | 14           | 0         | 6                | 8 (40)      |
| **Total:**            | **180**                | **128**      | **24**    | **28**           | **100 (56)**|

* % overall improvement based on total number of questions
improvement in 128 questions (71%), no change in 24 (13%), and deterioration in 28 (16%).

Conclusion

The league table of the day hospital audit allowed individual day hospitals to compare their ranking in each audit and in both cycles with the other participating hospitals. Although the identity of individual day hospitals in the table was known only to themselves and to the authors of this report, such ranking could be a spur to improvement – some day hospitals with low standards at the time of the initial audit had raised them at the next audit.

The attempt to apply a statistical approach in long-term care audit is limited by the fact that these are not purposive samples; the questionnaires are completed by those caring for the patients, and the project has not been set up as a controlled research exercise but rather one to facilitate staff review of their own practice – an educational exercise. Statistical treatment cannot compensate for such limitations of the data, and its results must be interpreted with due caution. The methods described provide two approaches to assessing and demonstrating the effectiveness of clinical audit of structures and processes of patient care. In both of the audits described, while there was some deterioration in certain standards, this was far outweighed by improvement in others. Although we cannot exclude the possibility that coincidental factors contributed to the improvement we believe that it was largely the result of increased attention to quality resulting from the first audit. Both audit packages are recommended for use in geriatric practice.

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The second edition of The CARE scheme will shortly be available.

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Appendix A. Example of analysis sent to participating day hospitals. Based on 20 centres which included 8 currently attending patients in the second audit. Only questions answered in both first and second audits are included in this analysis. (Adapted from Ref 7.)

| Overall audit question | 20 | 2 | 18 | 27 | 10 | 11 | 12 | 22 | 3 | 17 | 19 | 14 | 15 | 26 | 7 | 9 | 16 | 24 | 5 | 23 | Overall achievement* |
|------------------------|----|---|----|----|----|----|----|----|---|----|----|----|----|----|----|---|----|----|----|----|---------------------|
| Excellent              | 4  | 7 | 8  | 8  | 8  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 7.8                 |
| 5ai                   |    | 8 | 8  | 2  | 8  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 7.7                 |
| 5bi                   |    | 0 | 6  | 8  | 8  | 8  | 8  | 6  | 0 | 8  | 8  | 8  | 8  | 7  | 8  | 8 | 8  | 8  | 8  | 8  | 7.0                 |
| 5ci                   |    | 8 | 8  | 8  | 8  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 8.0                 |
| 5di                   |    | 8 | 8  | 8  | 8  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 8.0                 |
| 6a                   |    | 8 | 8  | 8  | 8  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 8.0                 |
| 6ei                   |    | 8 | 8  | 4  | 8  | 8  | 8  | 8  | 8 | 7  | 8  | 8  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 7.8                 |
| 7a                   |    | 8 | 8  | 8  | 8  | 8  | 8  | 8  | 8 | 7  | 8  | 8  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 8.0                 |
| 10ii                  |    | 8 | 8  | 8  | 8  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 8.0                 |
| 12b                  |    | 8 | 0  | 7  | 8  | 8  | 5  | 8  | 8 | 8  | 8  | 8  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 7.3                 |
| Good                  |    | 0 | 8  | 8  | 8  | 0  | 0  | 8  | 8 | 8  | 8  | 8  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 6.8                 |
| 5ei                   |    | 8 | 0  | 8  | 0  | 4  | 8  | 8  | 8 | 7  | 8  | 6  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 6.8                 |
| 6ei                   |    | 0 | 8  | 0  | 8  | 4  | 8  | 8  | 8 | 7  | 8  | 6  | 8  | 8  | 8  | 8 | 8  | 8  | 8  | 8  | 6.8                 |
| Fair                  |    | 0 | 0  | 1  | 2  | 6  | 1  | 0  | 5 | 3  | 5  | 2  | 2  | 0  | 6  | 2 | 4  | 4  | 5  | 5  | 3.0                 |
| 5fi                  |    | 0 | 3  | 1  | 0  | 3  | 3  | 3  | 5 | 3  | 5  | 0  | 4  | 5  | 2  | 4  | 2  | 5  | 5  | 6  | 3.0                 |
| Overall achievement rate for centre** | 5.6 | 5.8 | 6.1 | 6.3 | 6.5 | 6.6 | 6.6 | 6.9 | 6.9 | 7.0 | 7.0 | 7.1 | 7.2 | 7.2 | 7.3 | 7.3 | 7.5 | 7.6 | 7.6 | 7.7 | 6.9 |

* Average no. of patients per question, based on questions which were answered
** Average no. of patients per centre, based on centres which responded