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# Caring and Disability
# in Long-Stay Institutions

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## Abstract

The paper investigates the empirical relationship between the dependency characteristics of elderly residents and the amount of care provided by health care professionals in a selected number of long-stay institutions in Ireland. The results confirm a positive, if not always significant. relationship between care provision and increasing dependency on a Guttman. activities of daily living-based scale of disability. The relationship between care provision and increasing severity on other dimensions of disability is not always positive. Type of institution also influences the provision of care hours by category of dependency.

**Keywords:** Care, Disability, Resource Use. Category of Dependency

**JEL Classification:** 112. J14

# 1 Introduction

Very little is known about the process of care of elderly persons in long-stay institutions. In particular, there is only limited information on the relationship between the dependency characteristics of residents and their use of resources. There are models which qualitatively describe the process of care (Wade, Sawyer and Bell, 1983) but few empirical studies have managed to establish a quantitative basis to test the predictive power of such models. Work has been done on estimating cost functions for long-stay institutions (Nyman, 1988; Darton and Knapp, 1984); but so far, no study has managed to establish a fine relationship between disaggregated classifications of disability and resource use. Finding out what long-stay institutions actually do to residents—the process of care—is the first step on the road to determining the best practice in this area, including the important issue of whether some institutions are better than others in the care they provide to residents.

The focus in this paper is on the relationship between the dependency characteristics of old people in institutions and the amount of care provided by nurses, attendants and paramedical staff. More disabled residents are generally assumed to make a greater demand on the time of carers than those who are less disabled. The aim of this study is to explore the validity of this presumption by finding out more about the incremental resource implications of various disabilities. The standard classical linear regression model is used to explore the relationship between care provision and dependency. Hours of care provided by health care professionals is the dependent variable and Guttman classification of dependency is the primary source for the independent variables in the model. Dummy variables are used to represent the qualitative nature of the dependency information contained in Guttman scales.

The paper begins with a discussion of methods, spread over three sections. In section 2, data sources are outlined. The measurement of dependency is explored in section 3. The theoretical relationship between resource use and the dependency of old people in long-term care is examined in section 4. The model and results are set out in sections 5 and 6. Conclusions are brought together in section 7.

# 2 Data Sources

Four long-stay institutions were selected for inclusion in the study. Institutions were selected by a committee of experts (which included the authors of this

paper) in the field of care of the elderly on the basis of their general representativeness of the type of long-stay care available in the country. It is acknowledged that this method of selection may introduce some bias into the study but resources were not available to survey the greater number of institutions which a random selection would warrant. In any case, there was unanimous agreement that the institutions selected were typical of the different types of long-stay care available in the country. The relevant management authority in each institution chosen for inclusion in the study was written to with a view to eliciting their co-operation for the study. In no case was co-operation refused.

Institution 1 is a large, mainly long-stay, institution containing over 300 beds located in a town with a population of close to 10.000 people. Admission to Institution 1 is governed by an assessment procedure administered by an admissions committee which operates through a weekly case conference at which representatives from the three programmes—acute hospital, special hospital and community care—are present. Medical referrals and public health nurses reports are obtained on standard forms and this information is scored to assess the degree of urgency attached to each case. Most of the referrals now come from the consultant physician/geriatrician who works in the general hospital in the same town. This consultant handles the bulk of geriatric illness that comes into the acute hospital but he would also see old people in the long-stay institution on a consultation basis, i.e. when required to by the medical officer in Institution 1. There is, therefore, a degree of interaction between the local acute hospital and the long-stay institution mediated through the consultants multifaceted responsibilities in the area.

The second institution is located in Dublin and is part of a very large medical campus incorporating a modern acute care teaching hospital. Institution 2 contains an active assessment unit dedicated to keeping old people out of long-stay care for as long as possible. There is also a day hospital attached to the long stay unit. The availability of assessment and day hospital facilities allows for continuity in care for old people in this institution. Two consultant geriatricians oversee the process of admission. assessment and rehabilitation at the hospital.

Institutions 3 and 4 are quite similar in that both are located in medium-size towns with a population of between 2.000 and 3.000 people. Both place less emphasis on pre-entry assessment and post-entry rehabilitation of old people than Institutions 1 and 2. There is, for instance. no formal pre-entry assessment of elderly persons at all in Hospital 3. There are admissions committees in both institutions but there is no consultant geriatrician to oversee the process of care in either hospital. Medical care for patients in both hospitals is provided by a part-time medical officer. Institution 3 differs from Institution 4 in that it contains more psycho-geriatric patients recently transferred to it from the nearby psychiatric hospital.

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## 2.1 Selecting patients

The sample of residents taken from each of the four institutions is divided into two categories: those patients who are defined as being on the boundary separating community from institutional care and the rest of the patient population (Table 1). In Hospital 1, at the pilot stage of the project, the marginal group was defined as the last 40 admissions prior to the commencement of the study. For each of the remaining institutions, the marginal group comprised the total number of old people aged 65 years and over admitted to the institution in the two months prior to the study. The reason for the change in definition was that it became apparent at the pilot stage that some of the last 40 admissions included non-geriatric cases, some of whom required acute medical care rather than long-term care.

Elderly residents who were not members of the marginal group. i.e. those who were in for longer than two months or not part of the last forty admissions in Institution 1. were systematically sampled using a one in three sampling fraction across all four institutions. The distinction between the two groups was made in order to ensure that recent admissions were adequately represented in the sample. thereby making it less likely that very long-term residents would be over-represented in the analysis. There were other reasons for dividing the sample in this way but these concern aspects of the analysis not relevant to this paper. For instance, the distinction between marginal cases and the rest is important. if one is concerned with placement and the development of a boundary of care model (O'Shea and Corcoran. 1990).

## 2.2 Generating Care Estimates

The presence of 'joint costs' in long-stay institutions complicates the generation of data on care provision. A good deal of ambiguity surrounds the specification of labour contracts within long-stay institutions. so that it is not always clear who does what for whom at what time. There are care regimes, of course, but, more often than not, patient need determines the form and timing of care interventions. For the purposes of this study. information on caring within the institutions was collected from senior nurses and paramedical personnel with immediate responsibility for the organisation and delivery of care to resident elderly persons.

Asking people to estimate the demands placed on their time. and that of their colleagues and subordinates, by the care needs of particular residents, is a relatively crude way of eliciting information. However. the alternative of asking

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nursing and attendant staff to keep detailed time diaries or time budgets (Nissal and Bonnerjea, 1982) was not a feasible option. Hospitals have a much more complex sociotemporal order than households (Zerubavel, 1979). Within the latter, caring occurs typically on a one to one basis whose continuity is unbroken. In hospitals, caring is a matter of relationships between collectivities and occurs on the discontinuous basis of shift working. Trying to use time budgets in such a setting, with a relatively large sample of elderly persons, would have required resources for data collection, processing and analysis which were not available. It may also have represented an onerous, and thereby unacceptable, burden on hospital staff whose co-operation was crucial to the collection of any data. It should also be borne in mind that the fieldwork for this study was taking place shortly after major cutbacks in public health care expenditure and the laying off of part-time and temporary staff in hospitals. In such circumstances, asking carers to fill in detailed time-budgets was likely to cause some concern among staff and perhaps lead to spurious responses.

# 3   Measurement of Dependency

The measurement of the dependency of old people in this study was taken at a point in time rather than over a period. The problems caused by institutionalisation per se were, therefore, outside the scope of the analysis. It should be pointed out, however, that there is a body of literature which suggests that nursing actions can cause dependency in elderly persons rather than vice versa (Miller, 1984). For instance, the slowness of an elderly person in performing some activity may be seen as getting in the way of the efficient running of the ward and staff may insist on taking over the performance of that task. Pressured into passivity, the elderly persons ability to function independently may gradually erode in such an environment and his or her level of dependency will correspondingly increase. The possibility of this sort of behaviour occurring is not, however, taken into account.

The measurement of dependency in this study is done by nurses. The rating of disability by the latter opens up the possibility of respondent bias. For instance, there is evidence that health professionals tend to classify health states into more severe categories of dependency than would the patient themselves (Rosser and Watts, 1972). Patient self-rating may, however, be even more unreliable due to incompleteness of coverage. Only the more alert and less frail old people may be able to respond to the questionnaire (Rockwood et al., 1989). Such was the experience in this study. Only 44 per cent of old people were able to respond to questions about their own health. Therefore, for practical reasons nurse ratings are used to assign dependency.

A pragmatic approach was used to choose the most appropriate measure of dependency for use in the study. Following the successful application of a Guttman scale by Williams et al (1976) and Wright and his colleagues (1981) on a relatively large sample of elderly people, a similar type of scale was used after first of all having been tested on a pilot study of old people in Institution 1. Fewest errors occurred when the scale items were ordered as follows:

- cannot bathe without help

- cannot walk outdoors without help

- cannot walk indoors without help

- cannot dress without help

- cannot get out of bed without help

- cannot sit or stand without help

- cannot use the toilet without help

- cannot wash hands and face without help

- cannot feed without help

The scale was satisfactory in terms of reproducibility and scaleability, achieving conventional levels of significance of greater than 0.9 and 0.6 respectively. The robust nature of the scale was taken as evidence of its suitability for use throughout the study.

The basic idea of Guttman scaling is to test the hypothesis that a set of items form a cumulative uni-dimensional scale. The scale suggests that there is an order about the onset of disability, such that if the number of disabilities suffered are known so is the function the person concerned is likely to lose next. Thus, from the above scale, if a person has three items of disability he or she cannot bathe without help, cannot walk outdoors without help and cannot walk indoors without help. The next disability he or she will suffer is the loss of the ability to dress without help. This approach is, however, only concerned with the ordering of items and not with the magnitude of the interval between them.

The distribution of elderly persons in the institutions by category of dependency is shown in Table 2. One would expect, a priori, that most old people in long-stay care would be very disabled (Wright et al, 1981). It is not surprising, therefore, to find that 55 per cent of the elderly population surveyed can be assigned to the two most dependent categories. What is surprising, however, is

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that 22 per cent of the old people are either free from disability (as defined by the scale), or have only one disability, that of not being able to bathe without help. Perhaps the reason for this is the uni-dimensional nature of the scale used to measure dependency. Such a possibility is explored further below, when additional measures of dependency are used to complete the profile of patients in each hospital.

Originally, sixty-two old people were defined as non-scale types. meaning that they did not conform to the cumulative ordered loss of abilities implied by the Guttman Scale shown above. However, this number was significantly reduced by the procedure of assigning the elderly person without a perfect scale pattern to the rank associated with the perfect scale pattern most similar to their own. Assignment was made on the basis of error minimisation. When more complex non-scale error was present the elderly person was assigned to the relevant scale point which already contained the highest proportion of subjects (Torgerson, 1967). In this manner fifty-four of the non-scale types were reallocated to Guttman scale points.

The Guttman scale has been chosen to represent the degree of disability of the elderly persons, as measured by their abilities on each of the scale items. If, however, the original nine-item scale is used an insufficient number of old people are represented at some points of the scale. particularly between scale points 2 and 7, inclusive. To overcome this problem. the scale shown in Table 1 is collapsed to one comprising five items (Table 3). Only by doing this is it possible to compare, in a statistically meaningful way, the caring provision for elderly persons in each hospital by category of dependency.

Category A represents elderly persons who have either no disability on any of the scale items or else only have the disability of being unable to bathe without help. Category B represents elderly persons who cannot, without help, walk outdoors and bathe or cannot, without help. walk indoors. walk outdoors. or bathe. Old people classified as Category C dependency represent those who are located between scale points 4 to 7 of the original scale. The least dependent of this category cannot, without help. dress. walk indoors. walk outdoors. or bathe; the most dependent cannot, without help. use the toilet. sit or stand. get out of bed. dress, walk indoors, walk outdoors. or bathe. Category D is equal to scale point 8 of the original scale. Category E is equal to scale point 9 of the original scale.

Thus far, the measurement of dependency has been confined to physical activities of daily living. The problem with this approach is the omission of many other important attributes of incapacity. Combining ordinal measures of physical distress with other aspects of disability is not, however. an easy task. The reality is that there is little or no information on how individuals trade-off var-

ious forms of disability (Wright, 1986; Blackwell et al., 1992).

One way of overcoming some of the limitations of uni-dimensional scaling is to use aggregated cardinally determined point scales to assess severity of condition. The Crichton Royal Behavioural Rating Scale (CRBRS) is a good example of this approach (Evans et al, 1981). Wright (1986) is, however. critical of cardinal measurement on the basis that it assumes that abilities and incapacities are not only cumulative but additive as well. Neither can a cardinal scale guarantee homogeneity of dependency across scale points because various combinations of disabilities can yield the same score. There is no doubt that within the objectives of particular studies the aggregation of point scales can provide useful information. However, they are not a solution to the problems of combining scale but may. as Wright (1987) points out, be a convenient method of making quick progress.

The decision to consider additional aspects of dependency in this study is based on the belief. articulated above, that the physical measures of dependency which make up the Guttman scale are not. on their own. sufficient to capture the multi-dimensional nature of disability (Gibbins et al. 1982). Choosing what additional measures to include is, however, a difficult task. The approach taken here is to incorporate those aspects of dependency from the CRBRS scale not already in-cluded in the Guttman scale. These are as follows: continence. communication. co-operation and restlessness. In addition. a specific mental health variable is included (incorporating the characteristic 'memory' from the CRBRS). Each additional indicator was initially measured ordinally from fully able to com-pletely disabled along a four or five point index. However, a simpler. if cruder. profile of dependency can be obtained by dividing each indicator into high and low dependency. with the former representing poor health.

There is a strong positive, mostly linear, relationship between increasing de-pendency on the Guttman Scale and the proportion of patients experiencing difficulties on the additional health indicators (Table 4). Only 3 per cent of pa-tients in Category A are severely incontinent. while 69 per cent in Category E can be described as experiencing severe problems in this area. The proportion of elderly persons having problems with mental health increases from 12 per cent in Category A to 66 per cent in Category E. Similarly. while only 8 per cent of patients in Category A are uncommunicative, 73 per cent are so defined in Category E. The picture is the same for unco-opertiveness and restlessness. if less dramatically so.

Most of the worry with regard to the uni-dimensional nature of the Guttman measurement of dependency is that many important non-physical attributes of incapacity are not properly assessed. It is clear from the above. however, that there is a relationship between severity on physical activities and the proportion

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of elderly persons having difficulties in other areas. This finding bears out the view of Kyle et al (1987) who argue that many forms of dependency are adequately reflected, albeit indirectly, in the Guttman scale. Incapacity on additional indicators give rise to problems in carrying out activities of daily living included in the Guttman scale.

# 4 Resource Use and Dependency

There are four models which seek to describe in a qualitative way the process of care in long-stay institutions (Wade, Sawyer and Bell, 1983). The "supportive" model of care is characterised by consultation and involvement of the elderly in the care regime. The process is consumer oriented with much of the impetus for activities originating with the elderly person. The "protective" model also encourages some degree of choice and consultation but within the frontiers laid down by staff. Even more constrained is the "controlled" model of care in which the patient is completely subordinate to the care regime. Most restrictive of all. however. is the "restrained" model which operates purely for the convenience of care staff. According to Wright (1985), patients or residents cared for under this approach are deprived of choice and are essentially "batch processed".

Within this qualitative framework there is, not surprisingly. an on-going debate about the optimal provision of nursing and attendant care for old people in long-stay care. Too much care can lead to a resident becoming institutionalised sooner than they might have. Too little care negates the purpose and benefits of being in care in the first place. All of this makes the enforcement of contracts very difficult in long-stay care since they are not very well specified to begin with. Providers (mainly nurses) have a lot of control over their own time and how they spend it helping old people in their care. The first step. therefore, to improving our knowledge of technical efficiency is to examine the actual process of care in institutions.

Process is concerned, therefore, with how old people are cared for in institutions: what kind of care do they get? for how long? how often? and with respect to what activities? The caring process ultimately determines the cost of care. A hypothetical relationship between category of dependency and average resource use is shown in Figure 1 for two hospitals. It is assumed that resource use and hence costs increases in both hospitals as dependency gets worse. Resource use at all levels is, however, assumed to be higher in Hospital 2 than in Hospital 1. If dependency has been measured correctly and there is no difference in the case mix of dependency or technology between the two hospitals then other factors must be causing the observed difference in costs. A major difficulty, however,

is that one cannot say for sure which hospital is providing the optimal level of care. It may be, for instance, that the less expensive form of care also produces inferior outcomes.

The situation is even more complicated if some hospitals concentrate caring resources on low dependent patients in the hope of slowing down the onset of greater disability. This possibility is explored in Figure 2, where, on this occasion. the assumption is that Hospital 1 concentrates most of its resources on low dependent old people, with the result that it has a declining average cost schedule. In contrast, Hospital 2 allocates the bulk of its resources to patients who are most severely disabled and, consequently. has an increasing cost schedule. However, once again, there is no way of knowing which hospital is providing the best care, at least not until the output side of the relationship has been quantified. Finding out what hospitals actually do is. however. the first step towards identifying optimal practice.

# 5 Dependency and Care: The Model

The objective of this study is to examine the relationship between the care provided by nurses, attendants and paramedical staff in institutions and the dependency characteristics of residents. The dependent variable care provision. measured in terms of time, is, in the first instance, regressed. using an Ordinary Least Squares (OLS) estimation procedure on the five Guttman categories of dependency set out earlier in this paper (Equation 1). The Guttman classification system represents qualitative factors which by themselves are not readily quantifiable. Some proxy must be constructed to represent them in a regression. The use of dummy variables allows the inclusion of qualitative variables in the classical linear regression model just like any other explanatory variable. yielding standard OLS results.

**Equation 1**

$$HC = \alpha_1 + \beta_1 CatgB + \beta_2 CatgC + \beta_3 CatgD + \beta_4 CatgE + \epsilon$$

The problem of multicollinearity, which is common to dummy variable analysis, is reduced by using one of the categories of dependency as the intercept (Balestra. 1990). The choice of category to fulfil this function is dictated primarily by *a priori* considerations. In this study the lowest category of dependency is used as the benchmark classification. The reason for this is primarily ease of interpretation. given the problems associated with alternative options such as

average dependency. It is difficult to define. let alone interpret. what is meant by average in terms of disability characteristics. At least, using the lowest category of dependency as a benchmark, the hypothesis that old people with more disabilities receive more hours of care can be tested for each hospital and is relatively easy to understand. It is, of course. possible to run the model to take account of average behaviour. This can be done by fitting the regression with the sum of the weighted coefficients of the category dummy variables constrained to zero (Suits. 1957; Kennedy, 1992).

Hours of care is also regressed on the additional health indicators. institutions and age (Equations 2 and 3). Dummy variables are also used to capture the qualitative nature of each of these variables.

## Equation 2

$$
\begin{aligned}
HC \quad = \quad & \alpha_1 \ + \ \beta_1 \text{CatgB} \ + \ \beta_2 \text{CatgC} \ + \ \beta_3 \text{CatgD} \ + \\
& \beta_4 \text{CatgE} \ + \ \Phi_1 \text{INC} \ + \ \Phi_2 \text{MH} \ + \ \Phi_3 \text{Comm} \ + \\
& \Phi_4 \text{Co-op} \ + \ \Phi_5 \text{R} \ + \ g_1 \text{Age}_1 \ + \ g_2 \text{Age}_2 \ + \ \epsilon
\end{aligned}
$$

## Equation 3

$$
\begin{aligned}
HC \quad = \quad & \alpha_1 \ + \ \beta_1 \text{CatgB} \ + \ \beta_2 \text{CatgC} \ + \ \beta_3 \text{CatgD} \ + \\
& \beta_4 \text{CatgE} \ + \ \Phi_1 \text{INC} \ + \ \Phi_2 \text{MH} \ + \\
& \Phi_3 \text{Comm} \ + \ \Phi_4 \text{Co-op} \ + \ \Phi_5 \text{R} \ + \\
& \gamma_1 I_2 \ + \ \gamma_2 I_3 \ + \ \gamma_3 I_4 \ + \ g_1 \text{Age}_1 \ + \ g_2 \text{Age}_2 \ + \epsilon
\end{aligned}
$$

In Equation 3 the intercept term is defined as old people in Guttman category of dependency A in Hospital 1 aged between 65 and 74 years enjoying good health on each of the additional health indicators specified in the model. Significance. if and when it occurs, must be interpreted in the context of this benchmark category. The inclusion of age as an independent variable may. at first sight. appear unnecessary, since any relationship between age and resource use may already be captured by the disability variables. However, just as the Guttman categories of dependency cannot be expected to capture all elements of disability. neither is it likely that all of the influence of age is accounted for in the disability variable. Age is divided into three categories: 65–74 which is included as part of the intercept term; 75–84 equal to $g_1$ and 85+ equal to $g_2$.

The *a priori* hypothesis in all regressions is that care provision increases as severity of dependency worsens along the Guttman scale, i.e. as one moves from Category A to Category E (Wright et al, 1981). Similarly, the expectation is that poor health status on the additional indicators (continence, mental status, communication, co-operation and restlessness) will also raise the quantity of care provided by hospital staff. Age is also expected to increase care provision.

Of course, greater disability on the Guttman categories could conceivably lead to less care (Figure 2). This situation could arise if providers decided to concentrate most caring resources on those old people 'not too far gone' to benefit from a caring intervention. Scarce resources may force providers to consider the relative net benefits of spending more time with the less disabled rather than with the severely disabled. More resources expended on the former may prevent or at least slow down their entry into the severely disabled category. Neither can one rule out entirely the possibility that patients who are uncommunicative, unco-operative, or mentally unstable may receive lower hours of care because of these particular characteristics. The absence of comparative published evidence in this area makes *a priori* reasoning difficult and essentially speculative.

The model shown in Equations 2 and 3 can also be adjusted to allow for interaction between categories of Guttman dependency and each additional health indicator. So far, the effect of any pair of values of dummy variables is assumed to be the sum of two separate effects, with the differential effect of each of the additional health indicators held constant across category of dependency. This means, for example, if average hours of care is higher when patients are incontinent, this effect is constant whatever the category of dependency of the patients. This assumption may not always be tenable. For instance, the influence of incontinence on hours of care for patients in Category A may be different from that of incontinence on caring hours provided to patients in Category E. Similarly, there may be multiplicative relationships between category of dependency and each of the additional indicators, as well as among the latter. Simplicity, ease of interpretation and an a priori assumption that multiplicative effects are quite small suggest that the additive model is adequate for the purposes of this study. Hence, the results shown in the next section relate to the model specified above.

# 6   The Results

Equation 1 of Table 5 shows the relationship between hours of care provided by nurses, attendants and paramedical staff and Guttman category of dependency. The overall equation is significant at the level of 1 per cent and explains 14 per

cent of the variability in care provision. Category D is significant at the level of 5 per cent while Category E, the highest level of dependency. is significant at the level of 1 per cent. It should be borne in mind that significance in this case is relative to the baseline Category A dependency, the lowest level of dependency. Old people in Category A receive 9 hours of specified care per week. There is a linear relationship between care and increasing dependency with people in the highest category of dependency receiving 21 hours more care per week than people in the lowest category of dependency. The results confirm a positive and increasing relationship between care and dependency though the overall equation has somewhat low explanatory power.

The inclusion of the additional health indicators: incontinence. mental health. communication, co-operation and restlessness, does not significantly improve the explanatory power of the model as seen in Equation 2 of Table 4. The adjusted $R^2$ increases but only to 18 per cent. Category D loses significance though Category E remains significant. this time at a level of 5 per cent. Category C is also significant at the level of 5 per cent. The baseline Category A should be interpreted as representing these old people in Guttman Category A aged between 65 and 74 with good health in each of the additional health indicators. Incontinence significantly increases hours of care by 9 hours. The positive relationship between hours of care and incapacity does not. however. hold for each additional indicator. Unco-operativeness significantly (at the level of 1 per cent) reduces the provision of specified care by 11 hours. The implication seems to be that care staff will not seek to coerce or cajole elderly residents who are unco-operative. The effect of age on hours of care is positive but insignificant.

The final regression equation considers the effect of hospital on care provision. When separate regressions were run for each hospital. using the independent variables contained in Equation 2, there were differences across hospitals in the number of care hours provided to people in the benchmark category of dependency. These equations are not shown in this paper but provide the background for the introduction of the dummies for hospital shown in Equation 3 of Table 4. The inclusion of the hospital dummies increases the explanatory power of the model to 29 per cent. Category of dependency E remains significant at the level of 5 per cent. Unco-operativeness is also significant at the one per cent level reducing hours of care once again, this time by 9 hours.

The significance of Hospital 2 in terms of its effect on care provision may reflect the fact that the ratio of nurses and attendants to residents in this hospital is high relative to the other institutions. The ethos of Hospital 2 is also much more focused on rehabilitation and keeping people out of long-stay beds. What the data may be picking up is the more intensive concentration of nursing and paramedical resources on rehabilitation in this hospital.

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No inference about efficiency can be made from these results. Care estimates are only one part of the efficiency equation. Without information on health outcomes it is impossible to say whether more or less care or the substitution of one form of care for another improves the health and well-being of old people. What the results do confirm is qualitative information gleaned from interviews with staff in Hospital 2 (Blackwell et al, 1992) who, when asked about the nature of their work, tended to put most emphasis on the continuum of care for old people and the role of assessment and rehabilitation in keeping people out of long-stay beds. The important point to note, however. is that staff in this hospital had the resources to enable them to emphasise the continuation of care and the roles of assessment and rehabilitation. Without such resources the emphasis on the continuum of care would remain an aspiration rather than a reality.

# 7 Conclusions

The relationship between care provision and dependency has been considered in this paper. A simple highly aggregated Guttman categorisation of dependency explains about 14 per cent of the variability in care provision. For high dependency categories the conventional wisdom is confirmed: there is a positive and significant relationship between care and disability. The inclusion of additional health indicators in the model does not significantly improve the explanatory power of the estimated equation. Additional health indicators are not always significant. Where they are significant they may lead to an increase or a decrease in care provision relative to the baseline lowest category of dependency. More precisely, incontinence significantly increases hours of care while unco-operativeness significantly reduces hours of care. The inclusion of a dummy variable for hospital improves the explanatory power of the model to just under 30 per cent. Hospital 2. which emphasises assessment. rehabilitation and the continuum of care significantly increases care provision relative to the benchmark category. A definitive judgement on the gains from this additional provision is, however, difficult without information on health outcomes.

The model described in this study is but a first step in the process of defining quantitatively the resource implications of the dependency mix of residents in long-stay institutions. A more comprehensive treatment of disability is obviously required if the model is to be of wider significance. However. the Guttman scale works reasonably well as a measure of disability in that it confirms the a priori hypothesis that the fewer activities of daily living an old people can do the more care he or she is likely to need. If one values simplicity and parsimony then the Guttman scale scores highly, particularly in a situation where

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one is interested mainly in the general relationship between resource use and dependency. Crude measures of dependency of the sort used in this study will almost certainly not suffice for the measurement of outcomes in care of the elderly. However, for cost function analysis or budgetary allocation procedures disability may be adequately reflected in Guttman scales.

**TABLE 1: The number of cases in the sample**

| Institution | Most Recent Admissions[1] | Long-Term Residents[2] | Total Number of Cases |
|---|---|---|---|
| 1 | 36 | 69 | 105 |
| 2 | 40 | 37 | 77 |
| 3 | 9 | 53 | 62 |
| 4 | 17 | 54 | 71 |
| TOTAL | 102 | 213 | 315[3] |
|  | 32% | 68% | 100% |

(1)  Comprising those people over 65 admitted in the two months prior to commencement of the study in Institutions 2, 3, 4 and the last forty admissions in Institution 1.

(2)  Those in for longer than two months in Institutions 2, 3, 4 and those not part of the last forty admissions in Institution 1.

(3)  Seventeen cases were subsequently dropped from the analysis either because they were less than 65 years of age or because they were acute rather than long-stay.

**TABLE 2: The distribution of dependency**

| Category of Dependency | Number of Patients | % |
|---|---|---|
| 0 | 20 | 6.7 |
| 1 | 45 | 14.1 |
| 2 | 8 | 2.7 |
| 3 | 13 | 4.4 |
| 4 | 9 | 3.0 |
| 5 | 6 | 2.0 |
| 6 | 6 | 2.0 |
| 7 | 18 | 6.0 |
| 8 | 48 | 16.1 |
| 9 | 117 | 39.3 |
| Non-scale | 8 | 2.7 |
| Total | 298 | 100.0 |

**TABLE 3: Adjusted Guttman Scale: Number and percentage of institutional elderly at each scale point**

| Category of Dependency | Number of Patients | % |
|---|---|---|
| A | 65 | 21.8 |
| B | 21 | 7.0 |
| C | 39 | 13.1 |
| D | 48 | 16.1 |
| E | 117 | 39.3 |
| Non-scale | 8 | 2.7 |
| Total | 298 | 100.0 |

**TABLE 4: Percentage of elderly persons in Guttman categories of dependency with poor health status on additional health indicators**

| Category | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| A | 3.0 | 12.1 | 7.5 | 15.1 | 7.5 |
| B | 9.5 | 23.8 | 11.8 | 23.5 | 5.9 |
| C | 10.5 | 20.5 | 19.4 | 27.8 | 5.6 |
| D | 46.0 | 46.0 | 35.1 | 27.0 | 16.2 |
| E | 69.2 | 66.4 | 73.1 | 59.1 | 26.9 |
| Non-scale | 0.0 | 62.5 | 12.5 | 50.0 | 25.0 |
| All | 37.3 | 42.0 | 38.9 | 37.3 | 16.4 |

Key:

1 = Incontinence
2 = Mental Deficiency
3 = Uncommunicative
4 = Unco-operative
5 = Restlessness

## TABLE 5: The relationship between care provision and dependency, age and hospital

| Independent Variable | Eqn. (1) Coefficient (t statistic) | Eqn. (2) Coefficient (t statistic) | Eqn. (3) Coefficient (t statistic) |
|---|---|---|---|
| Catg. of Dep. A (Intercept) | 9.2* (3.32) | 5.88 (1.31) | 6.05 (1.07) |
| Catg. of Dep. B | 2.47 (0.42) | 3.93 (0.59) | 0.51 (0.08) |
| Catg. of Dep. C | 8.36 (1.84) | 10.94** (2.19) | 4.01 (0.83) |
| Catg. of Dep. D | 10.99** (2.47) | 7.68 (1.56) | 2.86 (0.61) |
| Catg. of Dep. E | 21.33* (3.37) | 15.89** 3.16 | 11.20** (2.46) |
| Incontinence | | 8.81** (2.30) | 5.79 (1.49) |
| Mental Health | | 4.20 (0.96) | 1.43 (0.35) |
| Communication | | 3.28 (0.70) | 7.47 (1.65) |
| Co-operation | | -10.83* (-3.19) | -9.23* (-2.89) |
| Restlessness | | 1.96 (0.46) | -0.11 (-0.03) |
| Age $g_1$ | | 4.01 (1.07) | -1.60 (-0.33) |
| Age $g_2$ | | 5.18 (1.17) | 0.64 (0.18) |
| Hospital 2 | | | 17.70* (3.92) |
| Hospital 3 | | | 6.61 (1.30) |
| Hospital 4 | | | -1.60 (-0.33) |
| Adjusted $R^2$ | 0.14 | 0.18 | 0.29 |
| F | 10.23 | 5.15 | 6.95 |
| P | <.001 | <.001 | <.001 |

\* Significant at 0.01 level
\*\* Significant at 0.05 level
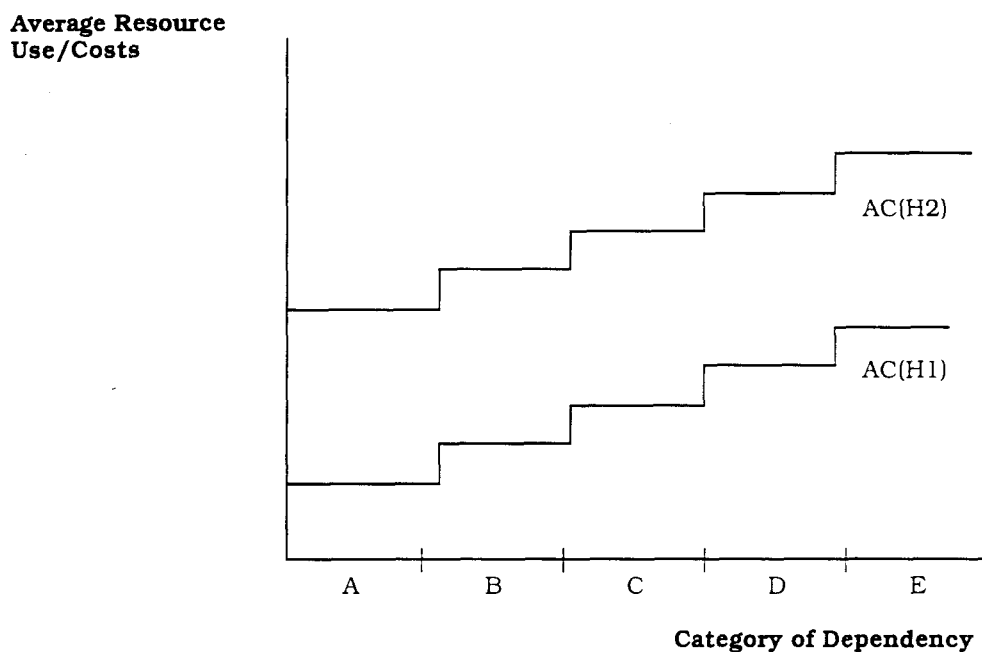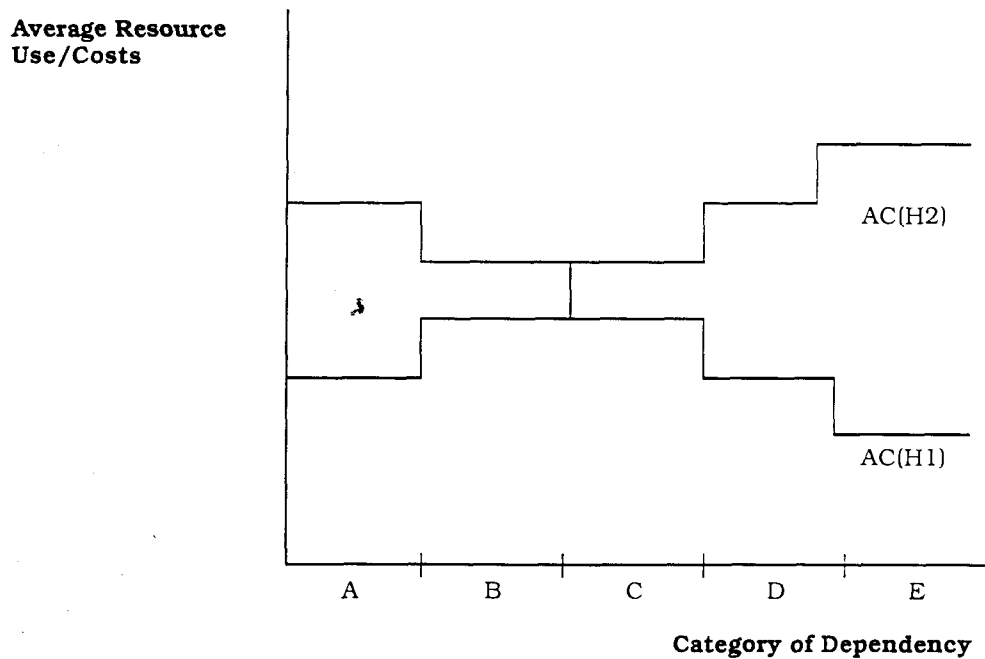
## FIGURE 1: Costs and dependency in long-stay care

**Average Resource Use/Costs**

AC(H2)

AC(H1)

A    B    C    D    E

**Category of Dependency**

## FIGURE 2: Costs and dependency in long-stay care

**Average Resource Use/Costs**

AC(H2)

AC(H1)

A    B    C    D    E

**Category of Dependency**

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