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Geriatric Assessment Unit Versus General Medical Ward

A
Thesis
Presented to
the Faculty of Pharmacy
University of Manitoba

in
Partial Fulfillment
of the Requirements for
the Degree
Master of Science

by
Marilyn R. Yakabowich, B.Sc. Pharm.
© August, 1986

GERIATRIC ASSESSMENT UNIT VERSUS GENERAL MEDICAL WARD

BY

MARILYN R. YAKABOWICH

A thesis submitted to the Faculty of Graduate Studies of the University of Manitoba in partial fulfillment of the requirements of the degree of

MASTER OF SCIENCE

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A B S T R A C T

The creation of geriatric assessment units are the offspring of the growing number of elderly people and an awareness that today's health professionals have failed to meet the complex care needs of this segment of the population. Among several fundamental deficiencies are inappropriately admitting patients to institutions who could benefit more from living at home, incomplete and inaccurate medical assessments, inappropriate prescribing of medication, and a major shortage of well-trained and concerned professionals in primary and long-term geriatric care.

Fifty-eight patients over age 70 years were randomized onto either the geriatric assessment unit (GAU) or the general medical ward (GMW) at two teaching hospitals in Winnipeg. The purpose of the study was to determine if acutely ill geriatric patients admitted via Emergency receive equivalent care on a geriatric assessment unit in comparison to the care received on a medical ward. The adequacy of the research instruments and methodology used in the study will also be assessed. A much larger study will be conducted based on the experiences of this pilot study.

Patients were prospectively monitored in hospital and telephoned postdischarge at 1 month. There was no difference in age, sex, living arrangement prior to hospitalization and health status between the two groups. However, the mean number of drugs prescribed on a regular basis (GAU 6.6 ± 0.8, GMW 4.7 ± 0.9; $p<0.05$), the mean number of drugs prescribed with hypotensive side effects (GAU 1.8 ± 0.3, GMW 1.2 ± 0.3; $p<0.05$) and the number of patients who received psychotropic drugs (GAU 26/29 patients, GMW 14/29 patients; $p<0.05$) were higher on the geriatric assessment unit. As well, on geriatrics, there were fewer

foley catheters inserted (GAU 0/0 patients, GMW 10/29 patients; $p<0.05$) and fewer physical restraints used (GAU 16/29 patients, GMW 27/29 patients; $p<0.05$). The geriatric patients on the geriatric assessment unit remained in hospital for a longer duration (35.7 ± 6.5 days versus 18.6 ± 4.5 days, respectively; $p<0.05$) and upon discharge, more patients from the geriatric assessment unit were able to return to their previous place of residence (GAU 23/29, GMW 15/29; $p<0.05$).

The findings of this pilot study suggest that a geriatric assessment unit may improve certain aspects of care of an older adult as well as introducing aspects of care not currently available to patients in traditional settings such as more thorough diagnosis reflected in the greater number of drugs prescribed, improved patient outcome parameters such as the use of fewer catheters and restraints, and the issue of optimal placement.

Table of Contents

PAGE

List of Tables VIII

List of Figures IX

I. **Introduction** 1
Problems 2
Responses 7
Geriatric Assessment Units 8
Review of Research 8
Purpose 14

II. **Materials and Methods** 16
Hospital Setting 17
Subjects 17
Criteria for Admission 19
Data Collected on Admission 19
Data Collected in Hospital 21
Data Collected Upon Discharge 26
Data Collected at One Month Post Discharge 26
Analysis of the Data 26

III. **Results** 28
Baseline Variables 29
Off-Service Patients 29
Drug Prescribing 29
Drug-Related Adverse Patient Events 32
Patient Outcome Parameters 34
In-Hospital Mortality Rate 35
Placement Outcome 35
One Month Post Discharge Follow-Up 35

IV. **Discussion** 38
Problems Encountered 39
Drug Prescribing 41
Drug-Related Adverse Patient Events 48
Patient Outcome Parameters 49
Length of Hospitalization 57
Placement Location 58
Mortality Rate 58
One Month Post Discharge 59
Assessment of Research Instruments 60

Table of Contents Continued

V. **Conclusion** 63

VI. **Appendices** 65
Appendix 1 66
Appendix 2 68
Appendix 3 70
Appendix 4 72
Appendix 5 74

VII. **Bibliography** 81

List of Tables

TABLE		PAGE
1.	Summary Description of the Geriatric Special-Care Unit at Health Sciences Center and St. Boniface Hospital	18
2.	Baseline Variables in 29 Patients Assigned to a Geriatric Assessment Unit (GAU) and in 29 Assigned to a General Medical Ward (GMW)	30
3.	Patients Who Were Off-Service Upon Randomization Due to a Shortage of Beds	30
4.	Quantitative and Qualitative Data Comparing Drug Administration between the GAU and GMW	31
5.	Quantitative and Qualitative Characteristics of Drug-Related Adverse Patient Events (Drapes) Occurring in Patients on the GAU and GMW	33
6.	Comparison of Patient Outcome Parameters between GAU and GMW Patients	36
7.	Comparison of Mortality Rate While in Hospital between Patients on a GAU and Those on a GMW	36
8.	Comparison of Placement Outcome in Those Patients Treated on a GAU and a GMW	37
9.	One Month Post Discharge Follow-Up	37

List of Figures

FIGURE		PAGE
1.	Flow Chart for Subject Selection	20
2.	The Prevalence of Adverse Drug Reactions in Relation to the Numbers of Prescribed Drugs	50
3.	Reasons for Falls in Old Age	53
4.	Reasons for Pressure Sores in Old Age	55

I. INTRODUCTION

It is a well known fact that elderly patients have more varied problems and health care needs than their youthful counterparts. The elderly are more prone to suffer from chronic and multiple diseases and are vulnerable to social, psychological and economic stresses. There is a growing awareness that contemporary health professionals fail to meet the complex care needs of the elderly. Several fundamental deficiencies are listed: inappropriate institutionalization of patients who could benefit more from living at home, all too frequent incomplete and inaccurate medical assessments, inappropriate prescribing of medication, and a major shortage of well-trained and concerned professionals in primary and long-term geriatric care.

One of the prime deficiencies of the existent system is inappropriate admission to an institution. Many recent studies have concluded that a substantial proportion, perhaps a third, of elderly patients in long-term facilities could live at home or in facilities providing lower levels of medical care (Rubenstein et al, 1982). Inappropriately admitting a patient to an institution is not only expensive but has many adverse effects on patients including depression, lowered activity levels, disinterest in the outside world and extensive use of chemical restraints such as psychotropic drugs.

Incomplete and inaccurate medical diagnoses are often made in geriatric patients whose illnesses frequently present atypically. An incorrect diagnosis is made in many elderly patients with congestive heart failure, left ventricular failure, pneumonia and urinary tract infections, especially when central nervous system symptoms such as

confusion and delirium are the presenting features (Exton-Smith and Windsor, 1979). Such patients may subsequently be given psychotropic medication with consequent worsening of their mental and physical state. Hodkinson (1973) has shown that preexisting dementia (often unrecognized), defective hearing and vision, and parkinsonism are important predisposing factors in the development of confusional states while pneumonia, cardiac failure, urinary infection, carcinomatosis, and hypokalemia are precipitating factors.

Another deficiency of the existent health care system that impacts on the elderly is a shortage of well trained and concerned professionals in primary and long-term geriatric care. This shortage of professionals arises partly from the negative attitudes toward the elderly. Medical students, for example, find their patience is overtaxed by tedious geriatric history-taking and examination (Adams, 1977). The investigation and diagnosis of diseases in childhood and early adult life are more straightforward, and cure is often more dramatic than improvement and slow partial rehabilitation of the elderly. As well, medical students have difficulty distinguishing those changes which can be accepted without concern from pathological changes which need investigation (Adams, 1977). This is further complicated frequently by mental and physical evidences of disintegration in the nervous system.

Lastly, inappropriate drug use in the elderly is another vast problem leading to suboptimal care in this population. As the study contained within this thesis places major emphasis on this aspect of health care in the elderly, a more indepth background is in order. Polypharmacy, for example, is very well documented in the

literature. A study of medication use by the elderly in the general hospital and nursing homes reported an average usage of 5 to 12 drugs per day per patient (Kalchthaler et al, 1977). In 12 Veterans Administration Hospitals, a survey showed that 77% of patients were receiving 10 or more drugs per day (Fraccnia et al, 1975). Daws and Bell-Irving (1973) found that at the time of admission to a 169-bed extended care unit in Vancouver, British Columbia, the average patient was receiving 7 to 9 drugs. After implementation of a drug monitoring and review program, this was effectively reduced to fewer than 3 drugs per patient. Polypharmacy not only increases the potential for drug interactions but can lead to drug-related adverse patient events.

Psychotropic agents are commonly prescribed for elderly patients, especially when they are using multiple drugs (Fraccnia et al, 1975). A study by Ingman and associates (1975) found that the more independent and mentally alert the geriatric patient was, the more likely the patient was to receive a psychotropic agent as compared to the senile, docile patient. The study implied that psychotropic agents are being employed to sedate active geriatric patients. The use of psychotropic agents concurrently occurs frequently. Salzman and VonderKolk (1979) found combinations of flurazepam and diazepam to be a common occurrence. Psychotropics are not devoid of side effects. Most psychotropic agents cause constipation and 67% of patients surveyed by Fraccnia and associates (1975) were receiving at least one laxative in addition to the psychotropic agent(s). Studies by Leroyd (1972) reported chest infections as a common consequence in apathetic, immobile, well-tranquilized patients and many cardio-

vascular accidents were thought to be precipitated by a drop in blood pressure induced by psychotropic drugs.

In addition to physicians overprescribing medication to elderly patients, inadequate drug monitoring is another problem. Central nervous and cardiovascular system drugs are often prescribed for an acute condition but after a particular time period may no longer be necessary. Dennis (1979) analyzed over 1,000 repeat prescriptions for psychotropic drugs which were given without the doctor seeing the patient. The analysis showed that the duration of repeat prescribing correlated positively with patient age and inversely with the adequacy of patient monitoring by his/her general practitioner. Inadequate contact between patient and physician when drug prescriptions are renewed was also reported by Kierman and Isaacs (1981) from London.

Elderly patients are frequently prescribed medications on a pro re nata (prn) or "as needed" regimen. This type of prescribing is often seen for analgesics, sedative/hypnotics, and laxatives which are frequently unnecessary. The use of 'prn' medications increases the number and complexity of the patient's drug regime resulting in an increased likelihood of drug-related adverse patient events.

A drug utilization review showed that proper use of certain medications and reducing the number of drugs given to geriatric patients created a subjective improvement in the patient's health (Letourneau, 1974). Leroyd (1972), in a study surveying 236 geriatric patients admitted to a regional psychogeriatric service, concluded that most elderly patients are over-medicated, and that deterioration of a patient's condition appeared to be correlated to higher doses of drugs being given and the variety of medications prescribed.

Improvement often occurred when drugs were discontinued.

Age-related disease may not be treatable, and drug treatment may in fact induce drug-related adverse patient events. For example, one-third of all persons over seventy years of age exhibit some disturbance in heart rhythm as a result of hypertrophy of the myocardium and to a certain extent an increase in collagen tissue. This usually does not produce morbidity; therefore, treatment with anti-arrhythmics is unnecessary and may, in fact, aggravate the disease process (Pagliaro and Benet, 1975). Vasodilators will also not relax thickened, noncompliant or calcified arteries which may be responsible for increasing the systolic pressure. Use of such agents can, and frequently do cause complications (Friend, 1961).

Older adults are often susceptible to drug-related adverse patient events (DRAPEs), as polypharmacy and the physiological and pathological changes with aging frequently result in an unpredictable drug response in the elderly. In a study of 714 hospitalized patients at John Hopkins Hospital, Seidl and associates (1966) found that 24% of patients over the age of 80 years had drug-related problems compared with 11.8% of patients 41-50 years old. In Belfast, a study showed the overall incidence of adverse drug reactions to be 10.2% in 1160 patients, but 15.4% in patients over age 70 (Hurwitz, 1969).

There are other factors which can increase a patient's susceptibility to DRAPEs aside from polypharmacy and physiological and pathological changes of aging. Certain drug classes, for example, are more likely to cause a DRAPE in the elderly because the elderly are less able to compensate for certain adverse drug effects than

their younger counterparts. The Boston Collaborative Drug Surveillance Program has shown that the drugs most frequently implicated in DRAPEs in the elderly are old and established, namely digoxin, quinidine, heparin, warfarin, aspirin, penicillin, corticosteroids and oral hypoglycemic agents (Levy et al, 1973). In hospitalized patients, race and sex have been suggested as risk factors for drug-related adverse patient events; Whites having a higher incidence than Blacks and women having a higher incidence than men. This has been found by several researchers including Cluff et al, 1964; Seidl et al, 1966; Stewart and Cluff, 1971; Caranasos et al, 1974; Domecq et al, 1980. Another important factor influencing a patient's susceptibility to drug-related problems is their past history of such events. Levy and coworkers (1979) found that a positive history for at least one drug-related problem was reported in 41.7% of patients admitted for an adverse drug reaction, compared to only 26.8% of patients admitted for other causes. In a separate population, Levy and associates (1979) found 32% of patients experiencing an adverse drug reaction also experienced a previous reaction. In contrast, only 2.3% of all other monitored patients had reported previous reactions.

An awareness of the many dilemmas facing elderly patients has triggered several responses from the health care sector in the areas of education, research and clinical programs (Weksler et al, 1983; Rodestein, 1983; Rai et al, 1985). Education in geriatrics has progressed with the establishment and growth of schools of gerontology, the organization of curricula aimed at geriatrics within schools of medicine, pharmacy, nursing and others as well as the

initiation of geriatric fellowship programs. There is also a growth of research in geriatrics in the areas of pharmacokinetics, drug utilization, medical disorders such as Alzheimer's disease and health services. Geriatric day hospitals and outpatient follow-up clinics are clinical programs which have been recently tested and implemented. A major advancement of clinical programs has been the development of special units designed to assess the full spectrum of geriatric needs, to effect a comprehensive plan of care, and often to provide at least initial steps toward rehabilitation, when appropriate. These units, termed geriatric assessment units, are an outgrowth of the special-purpose wards established in Great Britain to assess the special needs of the geriatric patient.

Geriatric assessment units originated in Great Britain between the World Wars. Since that time, the British system for geriatrics has served as a model for geriatric care in several countries with socialized or regionalized medical systems. These specialized geriatric units have taken several forms. They have been established on acute-care hospital wards, in outpatient facilities and in long-term care institutions. Some units provide only minimal assessment but extensive rehabilitation, others provide comprehensive diagnostic assessment without providing therapy and, still others, combine extensive assessment with therapy and rehabilitation.

While distinct from one another, all of these units appear useful in improving many of the problems currently identified with the older population. For example, several researchers studied the impact of geriatric assessment units on placement location following discharge from hospital. Rubenstein and colleagues (1981) found that following

treatment in their geriatric assessment unit, discharge placement was improved for 48% of the patients. Over half of the 62 discharged patients went home or to board and care homes (facilities which provide minimal care to elderly patients and allow them to maintain a maximum level of independence), and about a quarter went to skilled nursing facilities. Prior to their transfer to the geriatric assessment unit, about 80% of the geriatric unit patients were judged by their general ward physicians to require long-term institutional placement, and most of these patients had already been placed on waiting lists for these facilities. Thirty, or almost half of the patients received a placement location different than had been expected. Fourteen of these patients had been definitely expected to need institutional care, but went home; 12 had been expected to probably need institutional care, but went home; and 4 were expected to need nursing home care but were placed in board and care homes. For 22 patients, placement was unchanged from expectations (19 requiring institutionalization and 3 going home), and 10 patients required transfer back to the general service or died in the geriatric assessment unit. Similarly, Williams and associates (1973) studied the effects of an outpatient evaluation and placement program on patients who were referred specifically for nursing home placement. They found that only 38% of these patients actually needed placement in nursing homes or in chronic-care psychiatric hospitals, 39% needed only board and care or health-related facilities and 23% were able to remain home, usually with the help of community services. Analysis by an independent team of experts found that 84% of patients had been appropriately placed after the program began, compared with only

50-60% before the establishment of the program. Schuman and associates (1978) demonstrated an increase in the number of patients discharged home from their chronic care hospital, following institution of a new geriatric service, from 29% to 40%. Balaban (1980) showed that fewer patients were discharged to institutions from the geriatric unit than from the control group of patients treated on the other inpatient wards (14% versus 18%) but this was not statistically significant. Teasdale and associates (1983), however, were not able to prove that a multidisciplinary team applying a comprehensive medical care approach to geriatric patients in the hospital increased the number of patients discharged to home, nor did it reduce the incidence of nursing home placements or deaths. Teasdale's results need to be interpreted with considerable caution though, as there were two faults in the methodology of the study. The first of these is that the study population was too broad: it was selected on the basis of an age of 75 years or more and the presence of a "medical illness requiring hospitalization". It is currently thought, however, that only certain subpopulations of elderly people admitted to hospital will show greater benefit if cared for in a geriatric service. This subgroup generally includes those too frail to return home following their acute-ward stay, and does not include those with clearly too poor a prognosis to derive major benefit (for example, patients with end-stage cancer). Without excluding the latter group beneficial outcome is more difficult to identify. Teasdale and associates also assembled their control group from post hoc matching (matching after selection of study group) and not from random allocation. Nonrandomly assigned control groups contain numerous threats to validity and are of limited value in demonstrating

treatment effectiveness.

Length of hospital stay is another outcome compared in geriatric assessment unit versus general medicine unit studies. Saunders and associates (1983), found that patients on a geriatric assessment unit had shorter average lengths of stay than did patients of the same age cared for on other wards. Burley and associates (1979) studied the influence of a geriatrician on an acute medical ward and found that mean and median lengths of stay for patients were reduced with mean stay for all women aged over 65 years reduced from 25 to 16 days ($p<0.05$) and for women aged over 85 years from 50 days to 19 days ($p<0.05$). The proportion staying under two weeks was significantly increased in both sexes, and the proportion discharged home versus those transferred to convalescent wards was also increased. Similarly, Schuman and associates (1978) as well as Popplewell and Henschke (1982) found that mean length of stay was decreased on a geriatric assessment unit versus other wards.

Geriatric assessment units have also made an impact on improving diagnosis of new, treatable problems. Rubenstein and associates (1981) diagnosed an average of four new treatable conditions for each patient assessed despite the fact that each patient had recently received an apparently complete evaluation on an acute medical or surgical ward. Of the new diagnoses, about one per patient was considered to indicate a major, treatable condition with an important impact on the quality of life. Such "major" diagnoses included suicidal depression, stroke, severe malnutrition, myxedema, large pleural effusion, depression causing "pseudodementia", reversible incontinence, cancer and chronic drug reactions. Furthermore, a mean of 2.8 new "minor" treatable

disorders were identified per patient. These included urinary-tract infections, presbycusis, correctable visual disturbances, anemia, skin cancer, ill-fitting dentures and seborrheic dermatitis. A similar study which stressed psychiatric as well as medical assessments, found 184 new major psychiatric conditions in 241 patients transferred from acute medical and surgical wards (Cheah et al, 1979). Most of these new diagnoses seemed to stem from an awareness of the need for more thoroughly evaluating elderly patients.

Functional status, such as mental and physical function, is another widely measured outcome in various studies. Frequently, appropriate and accurate diagnoses of the elderly as well as health care commonly requires an investigation of the extent to which physical, mental, functional and socio-environmental disorders contribute to the problem that caused admission of the elderly person to hospital. Because care of the elderly is so complex, a multidisciplinary team approach for geriatric assessment and treatment has become the predominant mode of practice in geriatric assessment units; this practice is not generally found on other wards. The multidisciplinary team usually consists of physicians, nursing staff, social workers, psychologists and representatives from ancillary services, such as occupational therapy, physical therapy, dietetics, audiology, pharmacy and dentistry. Since there are these several different disciplines working together functional status may be superior on a geriatric assessment unit compared to other wards. Lefton and associates (1983) compared the functional status of 50 subject patients cared for on a geriatric assessment unit with 50 control patients. Twenty-four of the subject patients improved in their capacity to walk, compared with 12 controls.

This difference was statistically significant. Twenty-five subjects showed an improvement in activities of daily living, as did 18 controls. This difference was also statistically significant. A larger proportion of test patients became more independent during their hospitalization compared to the controls. Balaban (1980), Rubenstein and associates (1981) and Sloane (1980) also examined functional status as an outcome measure and showed substantial improvement during a patient's stay on a given geriatric assessment unit. Rubenstein and associates (1981) stated that the improvement in the patients' functional status was based on several factors, including improved diagnosis, attention to rehabilitation and allowing increased time for recovery.

The impact of geriatric assessment units on numbers of medication used has also been examined by some researchers. Clarfield and associates (1983) studied the problem of whether polypharmacy could be managed better on a geriatric ward than on the other wards of an acute-care hospital. They found that for certain classes of drugs, namely those for the central nervous and cardiovascular systems, they could safely decrease the doses administered to elderly people. Ingman and associates (1979), after establishing a geriatric care center, found there were decreases in the numbers of drugs prescribed and received. Initially, approximately six drugs were prescribed per patient. Almost half of these drugs were neuroactive, and many patients received two or three analgesics or major analgesics. About 38 nonrecommended drugs, by the criteria of the authors, were being prescribed for 30 of 131 patients sampled. Other findings included decreases in prn drugs and of fixed-dose combination drugs.

Similarly, Rubenstein and associates (1981) found that the mean number of drugs prescribed for patients treated on the geriatric assessment unit were reduced by 32%. In addition, the mean number of daily drug doses were decreased by 43%.

Other possible benefits of admitting elderly patients to geriatric assessment units which have not been examined to date by other researchers include less frequent use of physical and pharmaceutical restraints, decreased use of indwelling urethral catheters, fewer falls and injuries sustained while in hospital, a qualitative improvement in drug usage (such as types of drugs and incidence of DRAPEs), and more appropriate nursing care.

Most of the reports from North American geriatric assessment units suggest that comprehensive geriatric assessment and rehabilitation lead to improved patient outcomes. However, few studies have addressed this issue in a randomized and controlled fashion. Previous reports have been primarily descriptive, quasiexperimental studies with precare and postcare comparisons of patients treated on a geriatric assessment unit which is insufficient to demonstrate the effectiveness of a geriatric assessment unit. The improvement observed in these comparisons may be from the effect of time alone , chance, or bias and not the geriatric assessment unit. With an aging population and increasing burdens by the young and old on acute medical facilities, it is vital to study the most cost effective and best type of facility required for the management of acute illness in an older person.

The purpose of this pilot study was twofold: first, to evaluate care on a geriatric assessment unit as compared to that on a general medical ward and second, to assess the adequacy of the research

instruments used in the study with the intent of conducting a much larger study based on the experiences of this study. The geriatric assessment units and general medical wards were compared in terms of inpatient outcome factors, quantity and quality of drugs prescribed and postdischarge outcome of hospitalized acutely ill elderly persons. Specifically, the parameters that were used to examine differences between the two types of facilities included:

1) in-hospital patient mortality rate
2) length of hospitalization
3) numbers and types of medications used in hospital and postdischarge
4) numbers of drugs prescribed with anticholinergic, hypotensive and sedative side effects
5) frequency and severity of drug-related adverse patient events
6) placement location upon discharge
7) presence of decubitus ulcers
8) use of physical restraints such as mitts, anklets, wristlets, jackets, bedrails
9) use of indwelling urethral catheters
10) patient mental status defined by the Short Portable Mental Status Questionnaire and Set Test
11) number of readmissions and drug-related problems 1 month postdischarge.

II. MATERIALS AND METHODS

This study was undertaken at the two teaching hospitals in Winnipeg, Manitoba: St. Boniface Hospital and the Health Sciences Center. St. Boniface General Hospital contains 850 beds, of which 160 comprise the Department of Geriatric Medicine and 40 of these 160 constitute the geriatric assessment unit (GAU). At the Health Sciences Center, there is a 36 bed geriatric assessment unit contained within a 600 bed general medical facility.

In both hospitals the primary purposes of the GAU are acute care (care of conditions having a short and relatively severe course, for example, pneumonia, exacerbation of chronic obstructive pulmonary disease) and rehabilitation while the secondary purposes are education and research. The patient population served by both GAUs is usually those individuals over 65 years of age (may accept younger patients) and they must have multiple problems requiring assistance from a variety of disciplines. The source of the patients admitted to either GAU may be admissions from the outpatient clinic and Emergency room as well as in-hospital transfers. In both hospitals, gerontological nursing, rehabilitation and recreation therapy, social work and other health care options are available, although only St. Boniface General Hospital has ready access to clinical psychology. Both facilities have active resident teaching programs with ward residents from internal medicine and family practice training in the geriatric units. Neither GAU is equipped to handle cases requiring intensive care, major surgery, and other medical specialties. A summary description of the geriatric assessment unit at the Health Sciences Center and St. Boniface General Hospital is included (Table 1).

The subjects under study were elderly individuals (over 70 years

TABLE 1: SUMMARY DESCRIPTION OF THE GERIATRIC SPECIAL-CARE UNIT AT HEALTH SCIENCES CENTER AND ST. BONIFACE GENERAL HOSPITAL

Purpose:	
Primary:	Acute care and rehabilitation (maintaining or improving functional status)
Secondary:	Education; research
Location:	Acute-care university hospital
Source of patients:	Admissions from outpatient clinic and ER; in-hospital transfers
Criteria of admission:	Age 65 years and older (may take younger); multiple problems; need for team care
Organization:	
Basic Team:	Attending physician and house staff; nurses; occupational therapist; physical therapist; social service worker
Additional support:	Nutritionist; pharmacist; psychologist
Approach to assessment:	Multidimensional: functional capacity as measured by OT and PT; identification of patient's resources by social-service worker; clinical judgement of MD for each patient rather than fixed battery of tests; overall functional assessment by daily observation by nursing staff
Size of unit:	36 beds (Health Sciences Center) 40 beds (St. Boniface General Hospital)
Desirable length of stay:	Short Term (30 days or less)
Type of record:	Problem-oriented medical record
Follow-up capability:	Geriatric out-patient clinic; day hospital; nursing home visits; family physician

of age) who presented to the Emergency Departments of both Health Sciences Center and St. Boniface Hospital and for whom medical admission or mixed medical and social admission was deemed necessary by the Emergency room physician and admitting medical resident. These patients had previously resided at home or in a nursing home. Patients were not accepted for the study if:

a) their private physician vetoed their entry into the study;
b) the patient or a competent relative (if the patient was mentally incompetent) refused to give written informed consent (Appendix 1);
c) they required critical care, elective procedures such as surgery, or special procedures such as pacemaker insertion and heart catheterization;
d) they were in the terminal phase of a severe medical disorder, for example, end-stage cancer.

Upon admission to the Emergency room, patients were randomly allocated to geriatric medicine or general medicine by a medical resident using sealed envelopes. The envelopes were prepared by the geriatric secretary at the Health Sciences Center on an ongoing basis. For example, 20 envelopes were prepared initially (10 designating GAU and 10 GMW) and when these were used up another series of 20 were prepared. Many subjects did not go directly to the appropriate ward and were cared for off-service on other wards such as Ophthalmology and the Observation Unit. However, as soon as room was available on the appropriate ward the patient was transferred (Figure 1). All patients were prospectively monitored in hospital by a pharmacist.

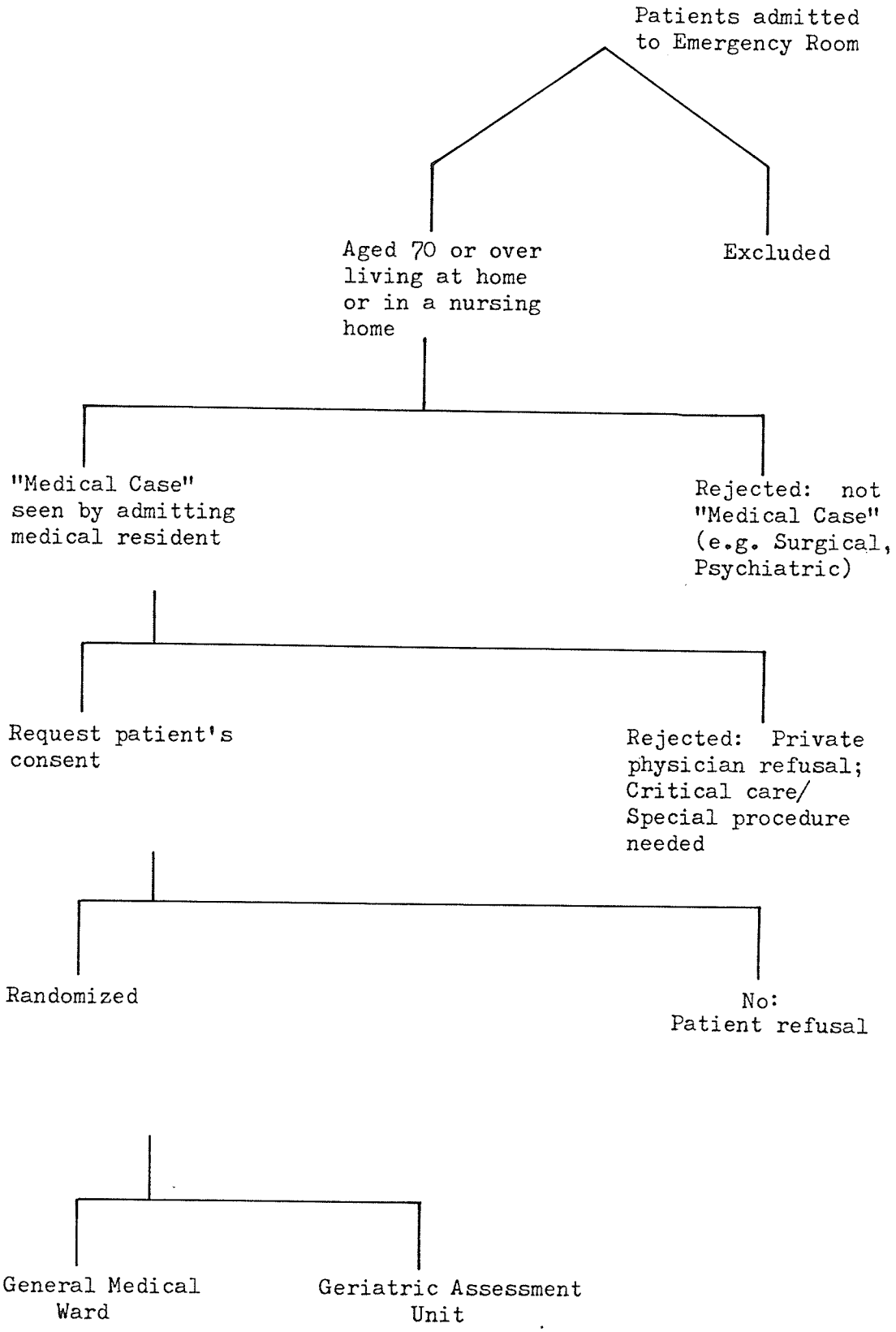
On admission, the following baseline parameters were obtained:

1) number, dose and types of medication used at home,
2) drug schedule (frequency),
3) health status, prior to admission,
4) presence of decubitus ulcers.

Data concerning medication used by the patient prior to admission was obtained by conducting a medication history with each patient as

Figure 1

FLOW CHART FOR SUBJECT SELECTION



well as reviewing the patient's chart. Occasionally, the patient's physician was contacted if a discrepancy arose between the chart and information conveyed by the patient.

To assess health status prior to admission a scale was adopted from Naujoks and associates (1983) (Appendix 2). The health status was scored from 0 to 5 with 0 meaning very healthy and 5 meaning extremely ill. The score was based on the descriptions, using the disease examples merely as guides to diseases which can have varying degrees of severity. If a patient had more than one disease, each with a different health score, he/she was rated according to their highest health score. For example, if a patient had a history of rheumatoid arthritis which was of mild severity (health score=2) and congestive heart failure which was of moderate severity (health score=4), the patient was scored a 4.

The presence of decubitus ulcers upon admission was obtained from the chart in the nurses' report of their initial patient assessment.

While in hospital, patients were visited at regular intervals (two to three times weekly), their charts reviewed and each patient was discussed with his/her respective careproviders. The following parameters were monitored:

1) number and types of prescribed medication;
2) drug regimen (dose, frequency);
3) length of therapy;
4) number of drugs prescribed with anticholinergic, hypotensive and sedative side effects;
5) drug-related adverse patient events and their characteristics (for example, reason(s) for the drug-related problem, cause-effect relationship and clinical manifestations);
6) use of physical restraints, for example, mitts, anklets, wristlets, jackets, bedrails;
7) use of foley and condom catheters;

8) incidence of falls;
9) development of decubitus ulcers;
10) assessment of mental status within the first week of admission and during the second week of hospitalization.

Medication use during hospitalization was ascertained by reviewing the patient's chart. Combination drugs were evaluated as their single entities. Topical drug application (excluding steroid creams), lozenges and gargles employed were not counted with prescribed drugs. All drugs ordered and administered as a single dose formed part of the total number of drugs prescribed during hospitalization, but were disregarded in terms of causing anticholinergic, sedative and hypotensive side effects. Examples included preoperative and preadmission medications taken only once.

The number of drugs prescribed with anticholinergic, sedative and hypotensive side effects, as listed in Goodman and Gilman's (1980), "The Pharmacological Basis of Therapeutics" 6th edition, were also ascertained by chart review. Some examples of classes of drugs that were investigated for the above side effects included antidepressants, antiemetics, antipsychotics and sedative/hypnotics.

Drug-related adverse patient events (DRAPEs) were assessed in this study as well. In general, there are two ways in which the incidence of drug-related adverse patient events are detected. Most are identified through spontaneous observation and reported to either a central agency or through medical journals or abstracts. A less common yet more thorough technique for assessing the incidence of DRAPEs is intensive monitoring or active surveillance. Active surveillance was the technique used in this study.

A drug-related adverse patient event was suspected if a patient

was exposed to a drug and one or more of the following occurred: 1) there was a change in the dose of the medication; 2) the drug was discontinued; 3) the patient had a history of drug-related adverse patient events; 4) there was a change in the patient's symptoms; 5) new symptoms developed especially those which are common manifestations of drug-related problems such as rash, electrolyte abnormalities, or blood dyscrasias.

To determine whether a suspected event was truly drug-related, an algorithm adopted from that utilized by Naujoks and associates (1983) (Appendix 3) was used. This algorithm asked a series of questions, in sequence, the answers to which yielded a score intended to measure the cause-effect relationship between suspected drug and an event. The probability of the DRAPEs were described as definite, probable, possible, conditional and doubtful and are defined in Appendix 3.

A DRAPE was regarded as any undesirable effect of drug therapy secondary to such things as inadequate treatment, expected pharmacologic side effect, medication error, unexpected pharmacologic event, terminal illness, drug interaction, experimental treatment and others as defined below:

inadequate treatment - this is a side effect resulting from the appropriateness of the drug regimen; was the dose too high or too low? Was the drug given for an excessive period of time? Was it the right drug?

expected pharmacologic side effect - this is a side effect resulting from the pharmacological action of a drug, unrelated to the therapeutic effect and not due to overdosage. These side effects included those which were listed in the "Compendium of Pharmaceuticals and Specialities" (1984).

medication error - this is a side effect resulting from errors in drug administration such as the wrong dose of a drug or wrong drug being given to a patient.

unexpected pharmacological event - this is a side effect resulting from an idiosyncratic response or hypersensitivity response:
idiosyncratic response - an unusual response that is qualitatively different from the expected response. For example, a central nervous stimulant rather than depressant effect of phenobarbital;
hypersensitivity response - denotes an allergic response to a drug. For example, anaphylaxis due to penicillin.

terminal illness - this is a side effect resulting from cancer chemotherapy in a terminal patient.

drug interaction - this is a side effect resulting from the interaction of two or more drugs when they are given concurrently, which can lead to synergistic, additive or antagonistic effects of drug action.

experimental treatment - this is a side effect resulting from the use of unapproved drugs, an unapproved dose of a drug or a drug being used for unapproved indications.

other - any side effect that does not fit into the above definitions.

Similarly, the DRAPEs were subjectively characterized in terms of their severity according to the following definitions:

mild - those reactions which do not require drug discontinuation, antidotal or corrective therapy, or do not prolong hospitalization;

moderate - those reactions requiring corrective measures and discontinuation of the medication or prolong hospitalization;

severe - reactions considered life-threatening or fatal.

If a DRAPE was suspected, the patient's attending physician and/or resident physician were asked to score the cause-effect algorithm to determine the probability of the DRAPE. As well,

both the physician and the patient's nurse were asked to provide the reason(s) for the event, severity and whether or not hospitalization may have been prolonged due to the suspected drug-related event. The final decision as to whether or not an event was drug-related and a characterization of the event, however, was made by the pharmacist.

The use of physical restraints, foley and condom catheters, incidence of falls and presence of decubitus ulcers were all ascertained by examining the patient's chart and discussing the patient with his/her nurse.

Mental status was assessed using the Short Portable Mental Status Questionnaire (SPMSQ) (Appendix 4) and the Set Test. Both of these tests have been tested, standardized and, in practice, found to be reliable, valid and quick in the assessment of mental function in old age (Isaacs and Akhtar, 1972 and Pfeiffer, 1975). The SPMSQ is a 10 item test administered by interview with scoring done by counting the number of correct answers. This test examines several diverse aspects of intellectual functioning. Orientation to surroundings, for example, is tested by the question "what is the name of this place"; "what is your mother's maiden name" is a test for remote memory; and the question on telephone number (or street address) is a practical question about self-care skills in the community. Other questions reveal the patient's awareness of current events, memory for more distant events, and mathematical ability. The Set Test requires the subject to recall items in four diverse categories: animals, colors, fruits and towns or cities. A maximum of 10 points is awarded for each of the four sets, a maximum of 40 points in total.

This test is a more thorough investigation of memory and concepts than the SPMSQ which tests intellectual function in a more broader aspect as exemplified above.

The SPMSQ was conducted during the first week of admission. The Set Test was also conducted during the first week of admission as well as the second week of admission to determine if any improvement in mental functioning had occurred. These tests were not conducted on those patients who refused to participate, those who were too ill to answer (comatose), or those who were deaf, aphasic or spoke a different language.

Upon discharge from hospital, the following information was obtained from the patient's chart:

1) length of hospitalization and outcome;
2) numbers and types of drugs prescribed as well as the drug regimen.

The discharge date or date of death was used to determine length of hospitalization. If the patient was discharged, destination and phone number were obtained.

At one month postdischarge, patients were interviewed by telephone to ascertain whether or not they had experienced any problems with their drugs and also if they had been readmitted to hospital since discharge.

Other parameters were documented but were not used for the purposes of this study due to the insufficient number of subjects. For a detailed sample of the type of data collected refer to Appendix 5.

The study data were analyzed by computer utilizing SAS (Statistical Analysis System) for differences between the general medical

ward and geriatric assessment unit patients on the following variables: mortality rate, length of hospitalization, numbers and types of medications including those drugs prescribed with anticholinergic, sedative and hypotensive side effects, frequency of drug-related adverse patient events, placement location upon discharge, presence of decubitus ulcers, use of physical restraints, use of indwelling urethral catheters, patient mental status, number of readmissions and drug-related problems following discharge. The tests that were used to detect statistical significance were the z-test of equality of proportions and the Wilcoxon rank sum test. Significance was established at a level of $p<0.05$ using a two-tailed test.

To ensure homogeneity between the two groups the following demographic variables were evaluated using univariate analysis: age, sex, living arrangement before admission, number of medical problems and number of medications taken on a regular basis prior to admission. Correlation coefficients were also used to assess possible relationships between variables. For example, length of hospitalization was correlated with the number of drugs that the patient received while in hospital. Severity of illness was correlated with number of diseases and number of drugs used prior to admission. Similarly, number of diseases was correlated with number of drugs used prior to admission. As well, the Short Portable Mental Status Questionnaire was correlated with the Set Test.

III. R E S U L T S

Data collection began in October, 1984 and continued for 15 months until completion at the end of January, 1986. A total of 58 patients were enrolled in the study, 29 were randomly assigned to the geriatric assessment unit (GAU), and 29 to the general medical ward (GMW). Table 2 illustrates characteristics of the two study groups. There were no differences between the two groups in the 6 variables evaluated. Therefore, no trends were apparent that might have introduced systematic bias into subsequent outcome measures.

The number of subjects who did not go directly to their appropriate ward upon randomization was 4 from geriatrics and 3 from medicine. Table 3 illustrates the off-service ward these patients were on and their duration on these wards. The average length of stay for those patients initially randomized to geriatrics was 6.5 days versus 5.7 days for those randomized to medicine (not significant).

An evaluation of the prescribing patterns on the two wards revealed very few differences in the numbers and types of drugs prescribed (Table 4). Although there was no difference in the mean total number of drugs prescribed on each ward, there was a greater number of drugs prescribed for regular use on the GAU. As well, the number of drugs prescribed with hypotensive side effects and the number of patients who received psychotropics as a whole were also higher on the GAU. Upon discharge, the mean number of drugs prescribed did not differ between the two groups.

Of the antidepressants prescribed, clomipramine was utilized most frequently on the geriatric assessment unit with 3 of 7 patients (42.9%) on the drug followed by doxepin with 2 of the 7 patients (28.6%) receiving it. On the medical ward, neither of these drugs

TABLE 2: BASELINE VARIABLES IN 29 PATIENTS ASSIGNED TO A GERIATRIC ASSESSMENT UNIT (GAU) AND IN 29 ASSIGNED TO A GENERAL MEDICAL WARD (GMW)

	GAU N=29	GMW N=29	P
DEMOGRAPHIC VARIABLES:			
Mean Age (mean ± S.E.M.)	79.5 ± 1.1	80.0 ± 1.2	NS
Sex (% Male)	51.7	62.1	NS
Living Arrangement Before Admission:			
Home (%)	58.6	58.6	NS
Apartment (%)	27.6	34.5	NS
Nursing Home (%)	6.9	0.0	NS
Hotel (%)	6.9	6.9	NS
MEDICAL VARIABLES:			
Severity of Illness Prior to Admission (PTA) (mean ± S.E.M.)	2.8 ± 0.2	2.4 ± 0.2	NS
Number of Medical Problems PTA (mean ± S.E.M.)	2.4 ± 0.2	2.3 ± 0.3	NS
Number of Medications Taken on a Regular Basis PTA (mean ± S.E.M.)	4.6 ± 0.7	3.8 ± 0.7	NS

TABLE 3: PATIENTS WHO WERE OFF-SERVICE UPON RANDOMIZATION DUE TO A SHORTAGE OF BEDS

INITIALLY RANDOMIZED TO	NUMBER OF PATIENTS	OFF-SERVICE WARD	NUMBER OF DAYS
Geriatrics	1	Medicine	2 Days
	1	Ophthalmology	6 Days
	1	Medicine	5 Days
	1	Medicine	13 Days
Medicine	1	Observation Unit	7 Days
	1	Observation Unit	2 Days
	1	Observation Unit	8 Days

TABLE 4: QUANTITATIVE AND QUALITATIVE DATA COMPARING DRUG ADMINISTRATION BETWEEN THE GAU AND GMW

	GAU N=29	GMW N=29	P
NUMBER OF DRUGS PRESCRIBED:			
Total (mean ± S.E.M.)	9.2 ± 0.9	7.4 ± 1.2	NS
Regular Basis (mean ± S.E.M.)	6.2 ± 0.7	4.7 ± 0.8	P < 0.05
PRN Basis (mean ± S.E.M.)	2.5 ± 0.4	1.6 ± 0.4	NS
Anticholinergic S.E. (mean ± S.E.M.)	0.8 ± 0.3	0.3 ± 0.1	NS
Sedative S.E. (mean ± S.E.M.)	1.8 ± 0.3	1.0 ± 0.3	NS
Hypotensive S.E. (mean ± S.E.M.)	1.8 ± 0.3	1.2 ± 0.3	P < 0.05
On Discharge (mean ± S.E.M.)	4.2 ± 0.6	2.9 ± 0.5	NS
NUMBER OF PATIENTS RECEIVING:			
Psychotropics (total)	26 (89.7%)	14 (48.3%)	P < 0.05
Antidepressants	7 (24.1%)	3 (10.3%)	NS
Antipsychotics	7 (24.1%)	3 (10.3%)	NS
Sedative/Hypnotics	12 (41.4%)	8 (27.6%)	NS

had been prescribed. Of the 3 medical ward patients receiving antidepressants, the drugs prescribed were as follows: imipramine, trazodone and maprotiline. It was also noted that twice as many males as females on both wards were utilizing antidepressants.

The antipsychotics most commonly prescribed on the geriatric unit included perphenazine, thioridazine and haloperidol (prescribed for 4, 3 and 2 of the 7 patients, respectively). The only antipsychotic prescribed on the medical ward was haloperidol.

Oxazepam was the sedative/hypnotic used by 58.3% of patients (7 out of 12) on the geriatric unit and 87.5% of patients (7 out of 8) on the medical ward. Triazolam was used by 16.7% of patients (2 out of 12) on the geriatric unit and 25.0% of patients (2 out of 8) on the medical ward. Two patients from each ward were using more than one sedative/hypnotic. The number of patients who received the sedative/hypnotic on a regular basis was 16.7% for the geriatric ward versus 50.0% for the medical ward while the number who received the drug on an "as needed" basis was 83.3% for the geriatric ward versus 75.0% for the medical ward.

There was no difference between the groups in the number of patients who experienced at least one drug-related adverse patient event (DRAPE) while in hospital (Table 5). Although the number of patients experiencing more than 1 DRAPE was also not different between the groups, it was only on the medical ward that patients experienced greater than 1 DRAPE per person. An examination of the sex and age (in quintiles) of persons experiencing DRAPEs and drugs implicated in causing DRAPEs did not reveal any significant trends that would explain the incidence rates found on either wards.

TABLE 5: QUANTITATIVE AND QUALITATIVE CHARACTERISTICS OF DRUG-RELATED ADVERSE PATIENT EVENTS (DRAPES) OCCURRING IN PATIENTS ON THE GAU AND GMW.

	GAU N=29	GMW N=29	P
Number of Patients Who Experienced at Least			
1 Drape	7 (24.1%)	5 (17.2%)	NS
2 Drapes	0	2 (6.9%)	NS
3 Drapes	0	1 (3.4%)	NS
4 Drapes	0	1 (3.4%)	NS
Sex (of Patients Who Experienced at Least 1 Drape):			
Male	2 (6.9%)	3	NS
Female	5 (17.2%)	2 (6.9%)	NS
Age (of Patients Who Experienced at Least 1 Drape):			
65-70	1 (3.4%)	1 (3.4%)	NS
71-75	1 (3.4%)	1 (3.4%)	NS
76-80	3	0	NS
81-85	1 (3.4%)	1 (3.4%)	NS
86-90	1 (3.4%)	2 (6.9%)	NS
Drug(s) Implicated in All Drapes; Cause - Effect Relationship: Heparin - Extension of CVA; Inadequate Treatment - Hematoma; Inadequate Treatment	2	0	NS
Pethidine - Vomiting; Expected Side Effect	1	0	NS
Indomethacin - Leg Edema; Expected Side Effect	1	0	NS
Doxepin - Drowsiness; Expected Side Effect	1	0	NS
Haloperidol/ Thioridazine - Drowsiness; Expected Side Effect	1	0	NS
Furosemide - Hypokalemia; Expected Side Effect - Elevated Serum Creatinine; Expected Side Effect	0	2	NS
Aluminum/ Magnesium Hydroxide - Diarrhea; Expected Side Effect	1	0	NS
Verapamil - Hypotension; Expected Side Effect	0	1	NS
Codeine/ Phenytoin - Drowsiness; Inadequate Treatment	0	1	NS
Morphine - Nausea and Vomiting; Expected Side Effect	0	1	NS
Docusate Calcium - Diarrhea; Inadequate Treatment	0	1	NS
Digoxin - Nausea; Expected Side Effect	0	1	NS
Heparin/ Warfarin - Bruising; Expected Side Effect	0	1	NS
Warfarin - Nose Bleed; Inadequate Treatment	0	1	NS
Severity of All Drapes:			
Mild	4 (13.8%)	6 (20.7%)	NS
Moderate	3 (10.3%)	3 (10.3%)	NS
Severe	0	0	NS
Prolonged Hospitalization of All Drapes:			
Yes	1 (3.4%)	1 (3.4%)	NS
No	6 (20.7%)	8 (27.6%)	NS

The number of patients who were physically restrained while in hospital was lower on the geriatric unit than on the general medical ward (16 patients or 55.2% versus 27 patients or 93.1%, respectively; $p<0.05$) (Table 6). The type of restraint used most often on both the medical ward and the geriatric unit was the bed rail. Catheters were also used with a greater frequency on the general medical ward compared to the geriatric unit with 12 of 29 patients (45.6%) on the medical ward using a catheter compared to none on the geriatric unit. Ten of these 12 patients on the general medical ward were using foley catheters.

There was no difference in the number of patient falls or development of decubitus ulcers while in hospital for patients treated on either of the two wards (Table 6). The mean mental status score for the Short Portable Mental Status Questionnaire also did not differ between the two groups nor did the Set Test score differ between the groups for either of the time periods tested (Table 6). As well, patients on both wards had an improved Set Test score over that obtained in the initial assessment.

The duration of stay in hospital was almost doubled for those patients randomized to geriatrics compared to those randomized to medicine. The mean length of stay was 35.7 days for those on geriatrics versus 18.7 days for those on medicine ($p<0.05$) including those patients waiting nursing home placement. If those patients waiting nursing home placement were excluded, the mean length of stay was 34.6 days for those on geriatrics versus 16.4 days for those on medicine ($p<0.05$). If one excluded those patients who died during hospitalization, the mean length of stay was 31.9 days

for those patients on geriatrics versus 18.2 days for those patients on medicine ($p<0.05$).

The mortality rate between the two groups while in hospital did not differ (Table 7). This trend was followed if patients were categorized by sex, age (quintiles) and reason for death.

The number of patients discharged to a new place of residence such as a personal care home or hospital who were previously living at home or in a personal care home was no different on the medical ward compared to the geriatric assessment unit (Table 8). However, the number of patients who returned to their previous place of residence such as own home, apartment, personal care home, or hotel was higher for those patients initially randomized to geriatrics.

At one month postdischarge follow-up, the number of patients who experienced DRAPEs did not differ between the groups. As well, there was no difference in the number of patients readmitted into hospital within one month of discharge (Table 9).

A substantial positive association was found to exist between length of hospitalization and the number of drugs prescribed while in hospital ($r=0.57$, $p<0.001$), the severity of illness and number of diseases ($r=0.67$, $p<0.001$) and the Short Portable Mental Status Questionnaire and the Set Test ($r=0.57$, $p<0.001$). A moderate positive association was found to exist between severity of illness and number of drugs used prior to admission ($r=0.46$, $p<0.001$) and the number of diseases and number of drugs used prior to admission ($r=0.47$, $p<0.001$).

TABLE 6: COMPARISON OF PATIENT OUTCOME PARAMETERS BETWEEN GAU AND GMW PATIENTS

PARAMETER	GAU N=29	GMW N=29	P
RESTRAINTS:			
Both Bed Rails	13 (44.8%)	21 (72.4%)	P< 0.05
Geriatric Chair	1 (3.4%)	1 (3.4%)	NS
Tied in Chair/Bed	1 (3.4%)	3 (10.3%)	NS
Possey Vest	0	2 (6.9%)	NS
Possey Mittens	1 (3.4%)	0	NS
Total	16 (55.2%)	27 (93.1%)	P< 0.05
CATHETERS:			
Foley	0	10 (34.5%)	P< 0.05
Condom	0	2 (6.9%)	NS
Total	0	12 (41.4%)	P< 0.05
NUMBER OF PATIENTS WHO FELL	2 (6.9%)	5 (17.2%)	NS
DECUBITUS ULCERS	4 (13.8%)	3 (10.3%)	NS
MENTAL STATUS:			
Short Portable Mental Status Questionnaire (mean ± S.E.M.)	6.4 ± 0.5	5.7 ± 0.4	NS
Set Test 1st Week (mean ± S.E.M.)	28.4 ± 2.0	24.6 ± 1.9	NS
Set Test 2nd Week (mean ± S.E.M.)	31.8 ± 2.0	27.4 ± 1.9	NS

TABLE 7: COMPARISON OF MORTALITY RATE WHILE IN HOSPITAL BETWEEN PATIENTS ON A GAU AND THOSE ON A GMW

	GAU N=29	GMW N=29	P
Number of Patients Deceased	2 (6.9%)	5 (17.2%)	NS
Sex: Male	0	3 (10.3%)	NS
Female	2 (6.9%)	2 (6.9%)	NS
Age: 75-80	0	2 (6.9%)	NS
81-85	1 (3.4%)	0	NS
86-90	1 (3.4%)	2 (6.9%)	NS
91-95	0	1 (3.4%)	NS
Reason: Cerebral Vascular Accident	2 (6.9%)	1 (3.4%)	NS
Cachexia	0	1 (3.4%)	NS
Pneumonia	0	1 (3.4%)	NS
Cardiac Arrest	0	1 (3.4%)	NS
Congestive Heart Failure	0	1 (3.4%)	NS

TABLE 8: COMPARISON OF PLACEMENT OUTCOME IN THOSE PATIENTS TREATED ON A GAU AND A GMW

	GAU N=29	GMW N=29	P
Returned to Previous Place of Residence	23 (79.3%)	15 (51.7%)	$P < 0.05$
Died	2 (6.9%)	5 (17.2%)	NS
Discharged to a New Place of Residence	4 (13.8%)	9 (31.0%)	NS

TABLE 9: ONE MONTH POST DISCHARGE FOLLOW-UP

	GAU N=29	GMW N=29	P
Number of Patients Who Experienced Drapes	4 (13.8%)	5 (17.2%)	NS
Number of Patients Readmitted into Hospital	2 (6.9%)	3 (10.3%)	NS

IV. DISCUSSION

This pilot project was conducted in order to obtain baseline data, and also to evaluate the study instruments and methodologies with the intentions of conducting a much larger scale study in the near future. The study revealed some interesting findings; however, due to weaknesses identified, these findings must be interpreted with caution.

The largest problem encountered was the recruitment of patients. Subjects for the study were selected from patients admitted to hospital through the Emergency room meeting the eligibility criteria as assessed by both the Emergency room attending physician and medical resident. As there is a high turnover in resident staff at the Emergency Department of both hospitals, there was a definite lack of awareness about the study and thus many patients were not randomized. In addition, medical residents who were familiar with the study found the recruitment procedures (randomization and obtaining consent) time consuming. In order to overcome the problem of accrual rates it is important to ensure that residents understand the objectives and methodology of the study and that this be reinforced on an ongoing basis possibly through seminars at regular intervals, especially each time the resident staff changes. One could also improve the subject number by offering the medical residents some type of remuneration for every patient that is recruited into the study.

Another difficulty encountered in the study was the lack of adherence to the exclusion criteria for age. Patients should have been excluded from the study if they were under the age of 70; however, 3 out of the 58 patients (5.2%) were between 65 and 70. It is important, therefore, to ensure that all persons involved in patient

recruitment have a thorough understanding of the eligibility criteria. This may again be facilitated by meetings at regular intervals to provide information and feedback on the study.

Once recruited for the study, patients were immediately randomized to either the geriatric assessment unit or general medical ward. However, due to a bed shortage direct transfer to the appropriate ward was often not possible. In this study there were 4 patients who had been randomized to the GAU yet spent an average of 6.5 days on a medical ward. Although they still received care from a geriatrician, the nursing care was not equivalent to that of a geriatric ward. As well, these patients did not have direct access to the other members of the multidisciplinary team normally available on the GAU until transfer to that ward. Three patients who had initially been randomized to medicine stayed off-service for an average of 5.7 days and the care provided to them may also not have been similar to that provided by a medical ward. It is not known whether these problems affected the study results, however, in future practice patients should only be randomized if a bed will be available on the appropriate ward within a standard time period (for example, 48 hours).

A final problem identified was a lack of control for medical diagnosis upon admission to hospital. As a result, it is difficult to conclude that the differences identified were due to the influences of either ward alone. Although the upcoming study will have more patients and with proper randomization the types of medical conditions should be equal, a mechanism for documenting types of medical diagnoses should be implemented to check for homogeneity between the two groups.

Regardless of the shortcomings identified, this pilot study has identified factors requiring further investigation and it will provide baseline information from which a larger study can be derived.

One of the parameters examined was drug use between the two groups. The systematic and indepth approach used in this study to assess drug usage has never previously been conducted in similar studies evaluating patient outcome factors between the GAU and GMW. Ingman and associates (1979), prior to establishing a geriatric care program, identified 38 "non-recommended" drugs prescribed for 30 of 131 patients sampled. What constituted non-recommended drugs was not defined. Other studies are equally vague in evaluating and delineating drug usage between the wards; therefore, various aspects of drug usage were examined.

The number of drugs prescribed on a regular basis was found to be higher on the geriatric unit compared to the medical ward; however, there was no difference in the number of drugs prescribed on a prn basis between the two groups. Other researchers have found a decreased usage of "drugs" following transfer to a geriatric assessment unit from a medical ward. Most studies, though, do not specify whether both prn drugs and regular basis drugs were counted. For example, Rubenstein and associates (1981) found that the mean number of drugs prescribed for patients on a geriatric assessment unit was reduced by 32%; the study does not differentiate between regular and 'pro re nata' drugs. Ingman and associates (1979), on the other hand, specified that after establishing a geriatric care center, there were decreases in the number of drugs prescribed and received on a regular

basis as well as decreases of prn drugs.

One possible explanation for higher regular drug use on the geriatric assessment unit compared to the medical ward is the longer duration of stay in hospital for these patients. Patients randomized to the geriatric assessment unit remained in hospital nearly twice as long as did those patients randomized to the general medical ward. This theory is substantiated by the strong positive correlation found between the length of hospitalization and the number of drugs prescribed while in hospital. In studies that have been conducted in the past, some researchers have found decreased number of drugs prescribed and received and also decreased lengths of stay for patients on a geriatric ward compared to other wards (Rubenstein et al, 1981; Popplewell and Henschke, 1982). Another possible explanation for the higher drug use on the geriatric ward is the diagnosis of new, treatable problems. It was observed, although not specifically documented, that more diagnoses were made on the geriatric assessment unit than the medical ward. Both the longer stay in hospital coupled with the discovery of new, treatable disorders may have led to the increased number of regular drugs prescribed and received in those patients on the geriatric assessment unit. It should be noted that aging is normally associated with an increased number of diseases and medical problems and polypharmacy may not, therefore, be inappropriate.

Psychotropic drugs were frequently prescribed to patients on both wards in this study. Psychotropics as a whole were used by more patients from the geriatric assessment unit than from the medical ward; however, there were no differences in the number of patients from each group who received individual drug categories (that is,

antidepressants, antipsychotics and sedative/hypnotics). The overall higher use of psychotropics in the patients on the geriatric assessment unit may again be secondary to a more thorough diagnosis of patients since a multidisciplinary team consisting of social workers, nurses and others is available resulting in an increased likelihood that psychological disorders will be identified.

Antidepressants are frequently prescribed to geriatric patients as depression has been cited as the most common psychological disorder of advanced age (Salzman, 1982). In this study 17% of the total number of patients enrolled were depressed (3% of all patients on both wards had been diagnosed as depressed upon admission to hospital) which is consistent with the 5 to 20% incidence of depression in older Americans estimated by Gurland (1976). The drugs most commonly prescribed for the treatment of depression in the elderly are the tricyclic antidepressants. On the basis of the side effects produced, desipramine and nortriptyline are the two drugs of choice in the elderly due to their minimal potential for causing anticholinergic toxicity and orthostatic hypotension, respectively. These side effects are common to many drugs used by this age group and are the least desirable because they can aggravate preexisting medical conditions, create new problems, lead to more drugs being added to the patient's drug regimen and lead to poor compliance. Doxepin, a tertiary amine tricyclic with sedating and modest anticholinergic properties, has been reported to be less cardiotoxic than nortriptyline and may also be useful in older adults (Vohra et al, 1975). Trazodone, which is a newer antidepressant, is thought to be clinically effective in the elderly and have relatively low anticholinergic properties.

Clomipramine is also a good choice for use in the aged as it has low sedative side effects.

Antipsychotics are frequently employed to control negative patient behavior such as agitation, wandering, belligerance and assaultiveness as well as to assist with nighttime insomnia. Whether their use for these indications is appropriate is questionable. The two groups of drugs most commonly prescribed as antipsychotics are the phenothiazines and the butyrophenones. Trifluoperazine and fluphenazine, both phenothiazines, are recommended for geriatric patients because of their low incidence of side effects (they cause minimal sedation, anticholinergic and cardiovascular toxicity). Haloperidol, a butyrophenone, is another drug of choice in this group also because of it's low incidence of side effects (sedation, anticholinergic and cardiovascular toxicities).

Sedative/hypnotics are frequently employed in the geriatric patient for nighttime sedation and to relieve anxiety. Insomnia is a common problem amongst the elderly characterized by a difficulty in initiating or maintaining sleep and a feeling of tiredness upon awakening (Salzman, 1982). Feelings of uselessness, the experience of physical and intellectual decline, and the loss of loved ones or peer support systems may be a cause for anxiety which may also in turn be the etiology of insomnia. The most common class of drugs employed in the elderly as sedative/hypnotics are the benzodiazepines. They are the drugs of choice over other sedatives such as barbiturates; because they are less likely to cause adverse respiratory or hemodynamic effects; they are safer in overdose; they are more consistly effective; and they have a lower abuse potential. Those benzodiaze-

pines most suited for use in a geriatric patient are the shorter acting ones, namely oxazepam and triazolam. They do not undergo biotransformation to active metabolites as some of the longer acting benzodiazepines do and there is less chance of accumulation and prolonged effect; however, this preferred use of the short acting benzodiazepines has been disputed due to their potential for causing early awakenings and withdrawal symptoms upon abrupt discontinuation (Richelson, 1984).

In this study there were numerous types of psychotropic drugs prescribed to the geriatric patients. Antidepressants prescribed for patients on the geriatric assessment unit and for all but two patients on the general medical ward were considered to be appropriate for the treatment of depression in the geriatric population. One patient on the general medical ward was using imipramine which is not a recommended drug in the elderly due to its increased potential for causing anticholinergic side effects and orthostatic hypotension. Another patient, also on the medical ward, was receiving maprotiline which has significant anticholinergic and sedative side effects. Antipsychotics prescribed for patients on the general medical ward and for all but three patients on the geriatric assessment unit were considered to be appropriate. The 3 patients on the geriatric assessment unit were all using a nonrecommended antipsychotic, thioridazine, which is not a drug of choice in the elderly due to its increased potential for causing sedation, anticholinergic and cardiovascular toxicity. Oxazepam and triazolam were the only sedative/hypnotics prescribed on both wards and these were considered to be appropriate. Despite the relatively high use of psychotropic

drugs and the identified deficiencies in psychotropic drug choices, drug-related problems were observed in only two patients; drowsiness was experienced by both patients due to doxepin in one and thioridazine/haloperidol in the second event. Both drug-related problems were expected pharmacological side effects.

The lack of differences between the number of drugs used in the psychotropic drug categories as well as the types of drugs used between the two groups was unexpected. It was initially assumed and supported in the literature that drug-related knowledge of general medicine physicians treating the elderly would be significantly lower than that of experts in the field of geriatric medicine (Ferry et al, 1985). This pilot study was conducted at two teaching hospitals, where all undergraduate medical students take a mandatory course in clinical pharmacology with an emphasis on drug usage in the elderly. Therefore, the general medical ward residents were familiar with appropriate drug use for the elderly. It would be interesting to conduct this study in a non-teaching hospital to determine if there are any differences in the prescribing habits of the licensed general medicine practitioners. As none of the non-teaching hospitals in Winnipeg have geriatric assessment units, this type of project is currently not feasible.

The number of drugs that were prescribed with anticholinergic, hypotensive and sedative side effects was another aspect of drug therapy evaluated. These specific side effects were chosen because they can be detrimental in an older person; drugs commonly prescribed to older adults possess one and often a combination of these effects; and the elderly tend to be more susceptible to these symptoms.

Anticholinergic side effects include dry mouth, constipation, urinary retention, blurred vision, confusion, aggravation of glaucoma and prostatic hypertrophy. Many of these symptoms are primary complaints of older persons, therefore, anticholinergic toxicity frequently goes undetected. Anticholinergic toxicity is more likely to occur if greater than one drug with anticholinergic effects is administered concurrently or if the dose of one drug is too high. Drugs commonly implicated in causing anticholinergic side effects include antihistamines such as diphenhydramine and belladonna alkaloids such as atropine and scopolamine as well as the antidepressants and antipsychotics as previously discussed.

Orthostatic hypotension, characterized by an excessive fall in blood pressure upon assuming the erect position from a supine position, can lead to dizziness and falls. As well, severe reductions in cerebral blood flow can produce sudden syncope, generalized seizures, heart attacks or strokes. Antihypertensives, antidepressants and antipsychotics are all examples of drugs which can cause orthostatic hypotension especially in the older population.

Sedation, for the most part, is an undesirable effect of a drug although it has been used therapeutically for nighttime insomnia or less frequently daytime anxiety. However, sedation may lead to confusion and disorientation in older adults which may intensify in the evening (Sundown syndrome) and combine to produce acute agitation and nighttime insomnia. Sedating drugs include sedative/hypnotics, antidepressants, antipsychotics and antihistamines such as diphenhydramine.

Despite the number of drugs that had been prescribed with anti-

cholinergic, hypotensive and sedative side effects there were few drug-related problems in either of the two groups. Specifically, daytime sedation was observed in 3 patients (2 from the GAU and 1 from the GMW) due to doxepin, haloperidol/thioridazine and codeine/phenytoin and orthostatic hypotension was observed in one patient from the GMW due to verapamil. The only difference between the two groups was in the number of patients prescribed drugs with hypotensive side effects. More patients on the geriatric assessment unit received drugs with hypotensive side effects probably as a direct result of patients from this group receiving a greater number of antidepressants and antipsychotics.

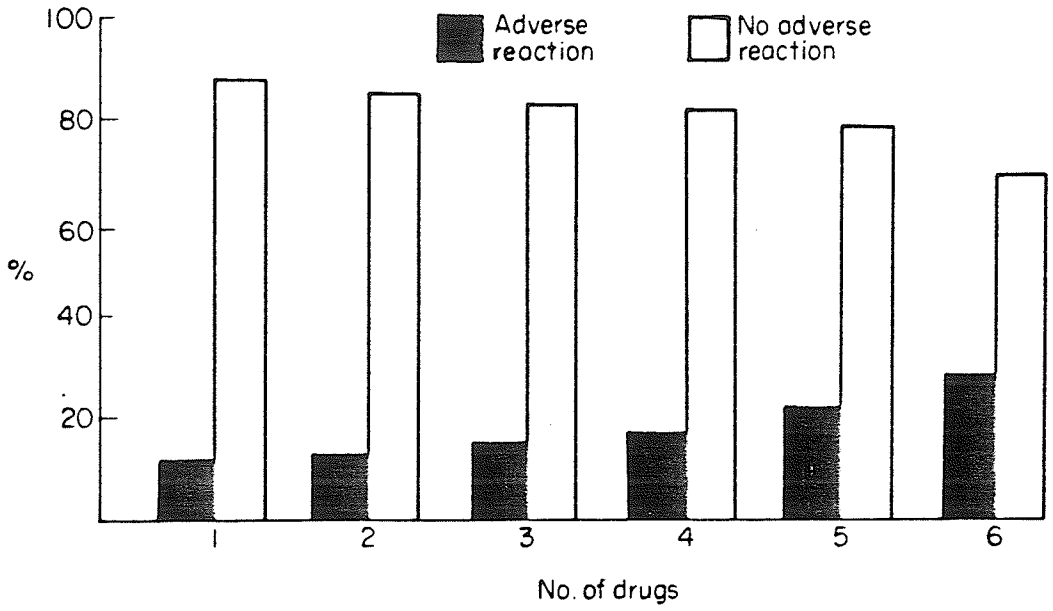
Drug-related adverse patient events are an important consideration of drug therapy as they can lead to morbidity, mortality, polypharmacy, and financial expense. There was no difference in the incidence of drug-related adverse patient events in those patients managed on the geriatric assessment unit compared to those on the medical ward. In general, published estimates of the incidence of drug-related adverse patient events in hospitalized patients of all ages range from 1.5 to 35% (Wang and Terry, 1971; Borda et al, 1978). The wide range of incidences which have been reported stems from the inadequate surveillance methods used to detect DRAPEs in addition to other methodological weaknesses including the lack of a control group, the lack of control for severity of illness and the lack of appropriate use of denominators for calculating the incidence of DRAPEs. The incidence rates found in this study (24.1% on the GAU and 17.2% on the GMW; not significant) are on the high side of this range which may be due to the fact that active surveillance was used

to detect DRAPEs. Active surveillance reportedly produces a higher incidence of DRAPEs than does voluntary reporting (Hutchinson et al, 1983). The slightly higher but not significant percentage of drug-related adverse patient events on the GAU versus GMW may be due to the larger mean number of drugs received while in hospital. Many researchers have studied the problem of adverse drug reactions and have suggested that increasing the number of drugs taken increases the incidence of adverse drug reactions (Figure 2). Other predisposing factors which may have contributed to the minor differences in the incidence of DRAPEs such as old age, drug type (for example, digoxin, quinidine, heparin, warfarin, aspirin, penicillin, corticosteroids and oral hypoglycemic agents), white race, female sex and past history of such an event were also evaluated; however, both groups were similar with regards to these patient characteristics. Identification of such trends would require a larger number of patients.

The number of drugs received by the patients at discharge did not differ between the two groups which is consistent with the overall lack of identified difference in drug usage between the GAU and the GMW. Again, it appears that the medical ward physicians were knowledgeable in geriatrics and were aware that it is important to keep the number of drugs prescribed for geriatric patients to a minimum to enhance compliance and reduce error making.

The use of physical restraints on hospital wards has come under considerable criticism in recent times because of their infringement on patient freedom and their potential for causing patient injuries. Restraints are typically imposed for patient self-protection and occasionally to protect others (patients and medical staff). Often,

Figure 2: The prevalence of adverse drug reactions in relation to the numbers of prescribed drugs (Crooks and Stevenson, 1979)



however, restraints are used without justification. For example, health personnel may fear legal responsibility for patients who suffer accidental injuries while unrestrained. Also, reduced staff/patient ratios may impel staff to use restraints on a patient who is bothersome or who wanders off the ward because the staff doesn't have time to watch the patient.

In this study, restraints were used more often on the medical ward than on the geriatric assessment unit. This difference is eliminated if bedrails are not included as a restraint. Oftentimes, bedrails are requested by a patient for their own safety and comfort and this aspect may bias the results. It is therefore recommended for the upcoming study, that bedrails, as requested by a patient, should not be considered a restraint.

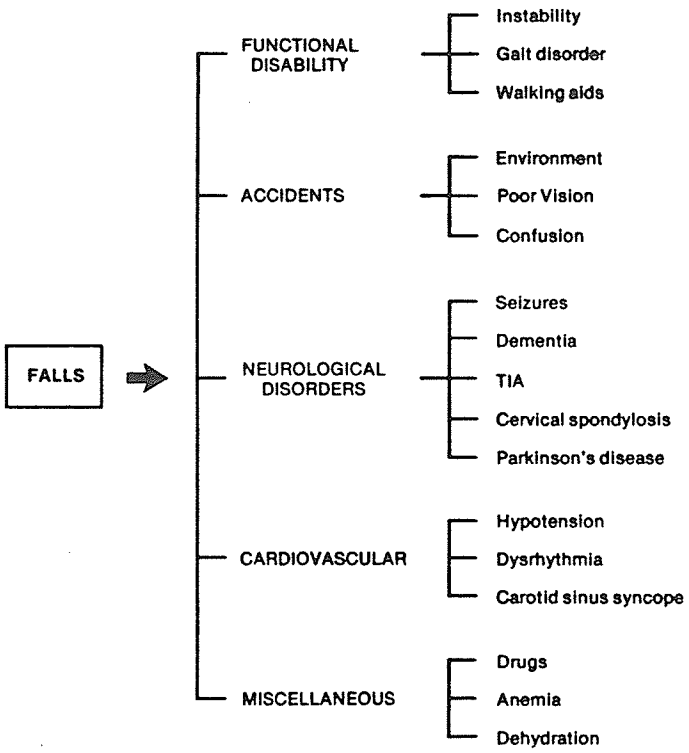
The higher use of catheters on the medical ward compared to the geriatric ward is further evidence that differences in care exist between the two wards. Urinary or condom catheters are generally used for the treatment of urinary retention or urinary incontinence, however, often their use is inappropriate. Frequently, for convenience, an incontinent patient will be catheterized while undergoing tests for their problem to avoid dealing with the bathing, cleansing, changing and sorting of foul linen which accumulates. Although none of the catheterized patients in this study developed complications, bacteriuria and, more seriously, urinary tract infections are potential sequelae. Staff on the medical ward should be instructed as to whom should be catheterized and the possible adverse consequences of inappropriate catheterization.

The differences identified in the use of restraints and cathe-

ters are a direct reflection of the department's training policies. Educational sessions for staff on the geriatric wards places a greater emphasis on the geriatric age group. The younger population is less susceptible to the adverse consequences of restraints and catheterization; therefore, instruction on the true indications for these procedures receive less emphasis.

The incidence of falls is another patient outcome parameter that was investigated. It is well recognized that falls among elderly people are a common and important cause of serious morbidity such as hip and leg fractures, concussions and hematomas often leading to lethal complications. The incidence of falls in old age is high for a variety of reasons (Figure 3). From a physiological point of view, falls may be secondary to the compromised control of posture and balance which occurs in old age. From a pathological point of view, falls may be the result of postural hypotension, epilepsy, hypoglycemia, vertigo and drugs such as sedative neuroleptics. As well, falls may arise because of the environment. For example, there have been anecdotal reports of patients tripping over the tubing of their portable oxygen equipment (Drinka and Bryan, 1985). In this study the actual incidence of falls was found to be 6.9% for those randomized to geriatrics and 17.2% for those randomized to medicine (combined incidence of falls was 12.1%), however, there were no serious consequences as a result of the patient falls. This is lower than the incidence of falls identified by Sehested and Severin-Nielsen (1977) where 134 of 511 (26%) hospitalized elderly patients fell and may be the result of the small number of subjects enrolled in the study. An examination of the reasons for falling in this

Figure 3: Reasons for falls in old age

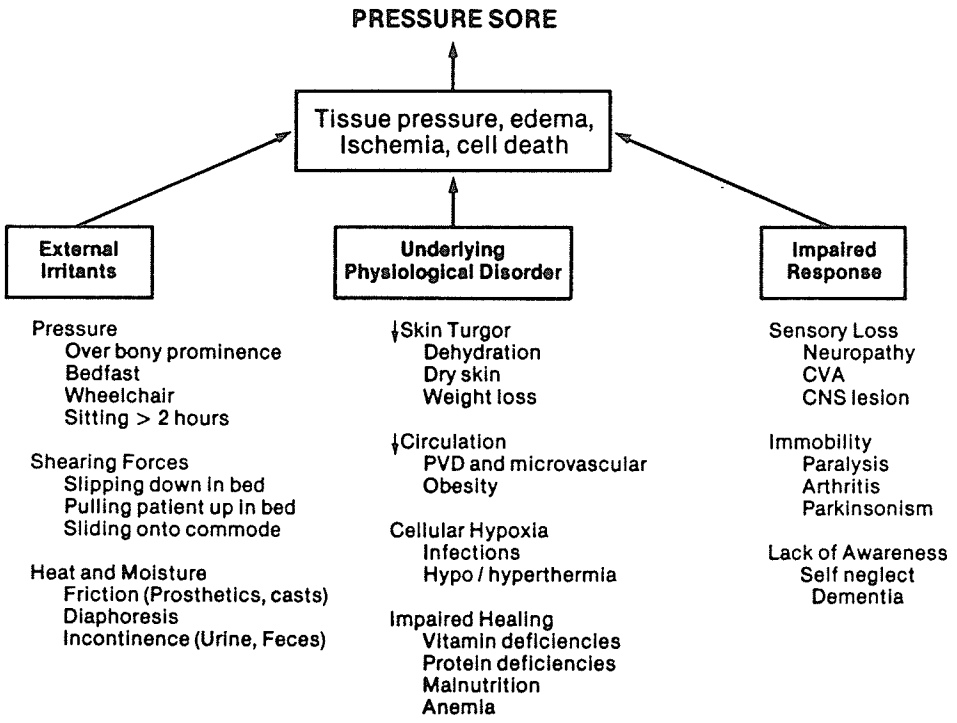


study revealed that four patients fell due to the environment, one due to his condition, one possibly from her drug regimen and a last patient for some unknown reason. A much larger study may be necessary to detect differences in the incidence of falls and their consequences between patients on a geriatric assessment unit or general medical ward if they do indeed exist.

Hospitalized geriatric patients are also at an increased risk of developing decubitus ulcers or pressure sores especially if they are immobile. Heat and moisture as a result of incontinence is another major cause for decubitus ulcers. Other predisposing factors are listed in Figure 4. Pressure sores are preventable by educating staff as to the reason(s) for their occurrence and consequences to the patient. Their equally frequent occurrence on both wards reflects shortcomings in patient care, perhaps, lack of vigilance, staff shortage, mishandling of a heavy patient or poor control of incontinence.

Caregivers often assess the mental status of the elderly in order to differentiate affective psychiatric illness from organic brain syndromes. It can also serve as a guide for further diagnostic evaluation as well as provide information on the patient's support requirements and capacity for self-maintenance. Patients with organic impairment, for example, usually cannot be relied upon to carry out prescribed medical regimes consistently and independently. Instead, they require continuous assistance or supervision from trained health personnel or responsible family members. Mental status scores may also be indicative of acute and chronic illnesses or a change in mental status caused by over-the-counter or prescribed drugs. In

Figure 4: Reasons for pressure sores in old age



this study the Short Portable Mental Status Questionnaire was used to obtain baseline intellectual function and to compare mean scores between the two groups to check for homogeneity of mental status. Two items which occur on this test, that is, the present and immediate past president (substituted by prime minister), have come under some criticism as such items may become increasingly irrelevant to the elderly (Rubenstein and Abrass, 1985). Since there was no difference in the scores between the two groups one can assume that the two groups were homogeneous with respect to mental status upon admission to hospital. It is recommended for the upcoming study that a second SPMSQ be conducted just prior to discharge in order to evaluate changes in mental status over hospitalization.

The Set Test was also administered to test mental status and to check the validity of the SPMSQ. As well, because this test concentrates more on the patient's memory and idea of concepts than the SPMSQ those intellectual deficits that would go unnoticed in the SPMSQ may be picked up by the Set Test. Again, patients did not score any differently between the two groups; however, this test was administered twice throughout hospitalization and each group scored higher the second time. This is an expected finding because it is assumed that upon admission, when patients are the sickest, their mental function may not be clear; however, with medical treatment and an improvement in their presenting condition, their mental function should also improve. The improved Set Test results may also be due to patients knowing the correct responses the second time the test was administered.

It is interesting to note that although, in this study, differences

were identified between the GAU and GMW in their use of physical modalities such as restraints, urinary catheters and number of drugs, this was not reflected by differences in the incidence of the outcome parameters measured such as falls, decubitus ulcer formation, mental status, and DRAPEs which one would think should be affected. This suggests, once again, that a much larger study may be necessary to more fully evaluate this apparent discrepancy.

The finding that patients cared for on the geriatric assessment unit remained in hospital longer than did those on the medical ward is in contrast to findings by other researchers. Saunders and associates (1983), for example, found that patients on a geriatric assessment unit had shorter average lengths of stay than did patients of the same age cared for on other wards. Burley and associates (1979) studied the influences of a geriatrician on an acute medical ward and found that mean and median lengths of stay for patients were reduced, with mean stay for all women aged over 65 years reduced from 25 to 16 days and for women aged over 85 years from 50 days to 19 days. Excluding all patients who died in the study prior to doing analysis on the data had no effect on the differences in the length of hospitalization identified between the two groups. As well, factoring out those patients on the both wards waiting for placement did not affect differences in the length of stay. It is hoped that the larger study will further investigate length of hospitalization.

One positive consequence of or one possible reason for the greater length of hospital stay for GAU patients is an increased access to occupational, rehabilitative, recreational and social work services. Optimal care for a frail elderly patient with deteriorating

ability to function requires careful attention. The decision regarding discharge and placement location should be made once maximum attainable health and function has been achieved which may require multidisciplinary care and time to recover. Although these added services may increase the cost of a given patient's hospital stay, in the long run, this philosophy to patient care could be clearly economical if it reduced the use of other services such as nursing home care and readmittance to hospital. As well, the overall well-being of the patient at home would be superior to that in an institution. That more patients from the GAU were able to return to their previous place of residence following discharge from hospital may be an indication of the positive influences of the multidisciplinary care provided and prolonged hospitalization. As well, fewer patients from the geriatric assessment unit (14% versus 31%, respectively) were discharged to a personal care home, long-term or other chronic care facility but this difference was not statistically significant. This finding is consistent with other researchers. Balaban (1980), for example, showed that 14% of patients were discharged to institutions from the special unit versus 18% from other inpatient wards but this difference was also not statistically significant.

The mortality rate during hospitalization for both groups of patients did not differ. This is not consistent with a study conducted by Rubenstein (1981) who found that, at one year, patients assigned to a geriatric assessment unit had a much lower mortality rate than controls (23.8 versus 48.3%, $p<0.05$ respectively). Other researchers have found that patients cared for on a geriatric

assessment unit have lower mortality rates than those cared for on a medical ward following 3 to 12 months discharge from hospital. Mortality rate for a period postdischarge may be a better indicator of quality of care than death at discharge because some patients may die shortly after randomization independent of the care given and this factor will be recommended for the upcoming study.

At one month postdischarge the interviews conducted did not reveal any differences between the 2 groups. Although a telephone interview is not the most reliable method of obtaining information from patients, lack of funds and time for home visits made it impossible to obtain data by more accurate methods such as observing the patient in his/her own home. No serious errors in drug taking were revealed, for example, but this must be interpreted with caution because of the use of the verbal interview. These findings may be due to the patient counselling that occurred on both wards either from a pharmacist or nurse prior to discharge from hospital (12 patients from each ward were counselled) as it has been reported that verbally counselling patients just prior to dishcarge reduces errors in medication taking (McBean and Blackburn, 1982; Macdonald et al, 1977; McKenney et al, 1973).

During the first month postdischarge there was also no difference in the number of drug-related adverse patient events between the groups. Drug-related problems can arise because of a variety of factors; however, intentional noncompliance and unintentional noncompliance and the use of multiple and inappropriate drugs have been identified as major causes of drug-related problems leading to hospital admission (Bergman, 1981;

McKenny, 1976). The lack of difference between the groups in this study in terms of the number of DRAPEs postdischarge may be due to the appropriate prescribing of medication by both groups of physicians upon discharge from hospital.

Within one month of their initial discharge, 9% of patients were readmitted, there being no difference between the two groups. This compares to 18% in a study that examined geriatric readmissions within 3 months of discharge from hospital (Victor and Vetter, 1985). Hospital readmissions have been found to be related to the patient's degree of physical mobility as well as relapse of the patient's original medical condition (Victor and Vetter, 1985). In this study 2% of patients were readmitted because of a relapse of their original condition while the remaining 7% were readmitted for new problems.

The research instruments used in this pilot study were felt to be adequate. The scale to assess health status was a valuable tool. It helped to compare the two study groups to ensure that they were equivalent with regards to severity of illness prior to entry. The positive correlation between the health status score and the number of diseases as well as the number of medications strengthened the validity of the scale used. Although the scale provided an objective assessment of health, a few problems were encountered. It was difficult at times to score a disease or illness that was not listed in the table. It was also sometimes difficult to score diseases that seemed to be more severe than, for example, a 3 yet not quite as severe as a 4. In cases such as these the subjective nature of the decision increases dramatically. For the larger study it may be better to use the 7 numbered scale as was done by the

original authors, Tallarida and associates (1979), to eliminate these problems.

The mental status tests (Short Portable Mental Status Questionnaire and Set Test) were other instruments used in this pilot study. Correlation between the two was also positive. There are many types of mental status tests available, however, some are very detailed and lengthy. The tests used in this study appear to be just as valid and reliable as their longer counterparts (Albak, 1982). As well, they are good tests to administer to an elderly patient who is prone to fatigue during an interview, to become distressed when his/her intellectual capacity is evaluated, and to have difficulty grasping complex psychological questions.

The algorithm that was used to assess drug-related adverse patient events was a final research instrument used in this study. This algorithm was very well accepted by the attending and/or resident physician as well as the patient's nurse. Again, more elaborate and time consuming systems are available (Hutchinson et al, 1979; Tallarida et al, 1979), however, this system appears to adequately analyze each case of suspected drug-related adverse patient event(s) in a more practical approach in terms of time and complexity. One of the advantages of this algorithm is that it takes into account the presence of concurrent illnessess and other drugs which could in themselves cause the problem suspected. However, the disadvantage of the algorithm is that it may not always be consistently accurate due to disagreements which arise amongst health professionals in the scoring of the algorithm. This lack of consistency appears to be a problem regardless of the method used to test DRAPEs and suggests

that further work is needed to devise the optimal system for assessing causality in drug-related adverse patient events. The major advantage of an algorithm is that for a small expenditure of time standardized and objective results are obtained.

Another research instrument that could be recommended for the upcoming study is a scale to assess depression in the elderly upon admission and then once again at discharge. Since 17% of the patients were on antidepressants, it would be interesting to determine the incidence of true depression in these patients. The test could be repeated 2 to 4 weeks later and if the patient was initiated on an antidepressant during hospitalization one could determine whether or not the patient was benefitting from the drug therapy. There are various scales available to test depression, however, the Geriatric Depression Scale and the Hamilton Rating Scale for depression (Yesavage et al, 1983) have been tested in the elderly, found to be reliable and valid and are therefore recommended.

V. CONCLUSION

The results of this study indicate that there are some differences between the geriatric assessment units and general medical wards in terms of the care provided, drug prescribing policies of physicians and overall outcome of a hospitalized acutely ill elderly person. The following parameters were greater on the geriatric assessment unit: the mean number of drugs prescribed on a regular basis, the number of patients who received psychotropic drugs, the mean number of drugs prescribed with hypotensive side effects, duration of stay in hospital and the number of patients who returned to their previous place of residence following discharge from hospital. There were more frequent use of catheters and physical restraints on the general medical ward.

It is very difficult to make any definitive conclusions about this pilot study due to the small number of patients enrolled in the study, the inadequate length of the study and the various problems encountered. However, several interesting findings warrant more research in the area. The results do suggest that geriatric assessment units can have beneficial effects on patient outcomes such as placement location and diagnostic accuracy. Whether or not their cost, extra time and personnel are justified requires further investigation.

V I. A P P E N D I C E S

A P P E N D I X 1

CONSENT FORM: GERIATRIC STUDY

Geriatrics is that branch of Internal Medicine dealing with illness in people who are over 70 years of age. We want to improve the care that older people receive in hospitals, by comparing treatment of patients on a specialized Geriatric ward with that received on a regular medical ward. If you agree to participate in this project, there is a 50 % chance of going to the Internal Medicine ward, and a 50 % chance of going to the Geriatric ward. This method of deciding to where you will be admitted makes our study scientifically more accurate. Regardless of which ward is chosen, you will be cared for by specialists in the best way possible. After discharge, you may resume seeing your regular physician.

There will be no special tests or procedures apart from those which are requested by your physicians. Our nurse will visit you regularly in hospital and telephone you after discharge in order to see how you are doing.

At any time, you can withdraw from this study and refuse to be contacted again. This will not affect the care that you receive from your doctors or the hospital.

_____ _____

Date Patient's signature

_____ _____

Witness Relative's Signature if Patient is Unable to Sign.

A P P E N D I X 2

SCALE TO DETERMINE THE SEVERITY OF ILLNESS

0. A mild disease or condition with symptoms which are of little discomfort and which is not serious.
   e.g. atrial fibrillation
   surgical procedures
   horseshoe kidney

1. A mild to severe disease or condition with symptoms which are not progressive, do not occur with regularity, and are of mild to severe discomfort.
   e.g. mild to severe headache
   hay fever
   pyelonephritis
   subacromial bursitis
   anemia
   eczema

2. A chronic disease or condition which is partially to completely incapacitating (confining a patient to bed), but is not considered life threatening or life shortening.
   e.g. bronchial asthma
   grand mal epilepsy
   venous stasis dermatitis
   gout
   PUD
   pernicious anemia
   Addison's disease
   male gonorrhea
   rheumatoid arthritis
   multinodal nontoxic goiter
   psoriatic arthritis
   psychiatric disturbances
   Alzheimer's disease
   glaucoma

3. A disease or condition which is serious enough to shorten life expectancy but which is not considered life threatening.
   e.g. HTN
   COPD
   CAD
   IHD
   PVD
   MI
   Parkinson's disease
   IDDM
   AODM
   CRF (dialysis)
   aortic stenosis (without CHF)
   ventricular arrhythmias
   Chron's disease
   emphysema

4. A disease or condition which is considered life-threatening (death is 1 to 2 years) but which is not a medical emergency.
   e.g. CHF
   tertiary syphilis
   squamous cell carcinoma
   breast CA
   EtOH abuse with hepatic encephalopathy/hepato-renal syndrome
   HTN 2° to renal transplant

5. A disease or condition which is considered a medical emergency and which will terminate within 1 year or less.
   e.g. all severe cardiac arrhythmia
   lung CA
   met CA rectum
   right hypernephroma with IVC extension

A P P E N D I X 3

ALGORITHM TO ASSESS DRAPES

1) A reasonable temporal sequence from the commencement or cessation of the drug treatment.

2) Drug levels established in body fluids or tissues compatible with the signs or symptoms.

3) A known response pattern.

4) The signs or symptoms were improved by dose adjustments, stopping or reinstitution of the drug therapy.

5) The signs and symptoms could not reasonably be explained by the known characteristics of the patient's clinical condition.

6) The signs and symptoms could not reasonably be explained by the effects of other drugs.

7) The signs and symptoms reappeared on repeated exposure to the previous drug regimen.

definite	1 or 2 + 3 + 4 + 5 + 6 + 7
probable	1 or 2 + 3 + 4 + 5 + 6
possible	1 or 2 + 3 + 4
conditional	1 or 2 + 4 + 6
doubtful	all others

A P P E N D I X 4

SHORT PORTABLE MENTAL STATUS QUESTIONNAIRE (SPMSQ)

Eric Pfeiffer, M.D.

Instructions: Ask questions 1-10 in this list and record all answers. Ask question 4A only if patient does not have a telephone. Record total number of errors based on ten questions.

+	-

1. What is the date today? _____ (Month / Day / Year)
2. What day of the week is it? _____
3. What is the name of this place? _____
4. What is your telephone number? _____
4A. What is your street address? _____ (Ask only if patient does not have a telephone)
5. How old are you? _____
6. When were you born? _____
7. Who is the President of the U.S. now? _____
8. What was President just before him? _____
9. What was your mother's maiden name? _____
10. Subtract 3 from 20 and keep subtracting 3 from each new number, all the way down.

_____ Total Number of Errors

To Be Completed by Interviewer

Patient's Name: _____ Date _____

Sex: 1. Male 2. Female

Race: 1. White 2. Black 3. Other

Years of Education: _____

1. Grade School
2. High School
3. Beyond High School

Interviewer's Name: _____

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A P P E N D I X 5

GERIATRIC VS GENERAL MEDICINE UNITS STUDY

DATA SHEET I

Patient Name _____ Hospital Number _____ Ward _____ Geriatric _____ Medicine _____

Date of Admission _____ Date of Discharge _____

Birthdate _____ Sex: M F

Admitted from: _____ Discharged to: _____

Discharge Address: _____

_____ Telephone No.: _____

Care provider: _____

Severity of illness on admission: _____

Past Medical History: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Reasons(s) for admission: _____

_____

_____

_____

_____

_____

_____

_____

Diagnosis(es) at discharge:

Drug regimen on admission (prescription and non-prescription):

Adherence to drug regimen PTA: _____

Method:
1. pill count
2. asking patient
3. serum levels
4. other _____

* * * * * * * * * *

Drug Regimen During Hospitalization:

DRUG + SIG	Starting Date	Date D/C'd	Duration (days)

Drug levels:

Drug/Date _____

_____

_____

_____

_____

_____

Total number of drugs prescribed with anticholinergic S.E.: _____

Total number of drugs prescribed with sedative S.E.: _____

Total number of drugs prescribed with hypotensive S.E.: _____

Was the patient counselled on their medications prior to discharge? _____

Will the patient be using a medication reminder system? _____

Was the patient involved in a self-medication program prior to discharge? ____

* * * * * * * * * * *

One month follow-up: Date: _____

Adherence to drug regimen:
Method: 1. asking the patient
2. other _____

_____

_____

_____

Any changes in drug regimen? YES NO

If yes, specify _____

_____

_____

Drug-related problems since discharge:

1. None
2. Number: _____

Specify: _____

_____

_____

_____

_____

Readmissions since discharge:

1. None
2. Number: _____

Reasons: _____

_____

_____

_____

* * * * * * * * * * *

Six month follow-up Date: _____

Adherence to drug regimen:
Method: 1. asking the patient
2. other _____

_____

_____

_____

Any changes in drug regiman? YES NO

If yes, specify _____

_____

_____

_____

Drug-related problems since discharge:

1. None
2. Number: _____

Specify: _____

_____

_____

_____

Readmissions since discharge:

1. None
2. Number: _____

Reasons: _____

_____

_____

_____

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