Systematic intervention for elderly inpatients with delirium: a randomized trial

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Objective: To assess a systematic intervention in cases of delirium in elderly inpatients.
Design: Randomized, controlled trial.
Setting: University-affiliated, primary acute care hospital.
Patients: Patients aged 75 years or over admitted to the medical department. They were screened within 24 hours after admission, and 88 patients with delirium (according to the criteria of the *Diagnostic and Statistical Manual of Mental Disorders,* third revised edition) were detected and enrolled in the trial. The patients were randomly allocated to the treatment group (42) or the control group (46); all were followed up until the end of the study.
Intervention: Patients were assessed on enrolment and 1, 2, 4 and 8 weeks later. Those in the treatment group received a consultation by a geriatric internist or psychiatrist and follow-up by a liaison nurse. Those in the control group received regular medical care.
Outcome measures: Short Portable Mental Status Questionnaire (SPMSQ), Crichton Geriatric Behavioural Rating Scale (CGBRS), use of restraints, length of hospital stay, discharge to a setting providing more care than was needed before admission and mortality rate.
Results: Two weeks after admission, patients in the treatment group showed an improvement in their mean SPMSQ scores, from 8.2 (standard deviation [SD] 1.9) to 7.9 (SD 2.5), whereas the control group showed a deterioration, from 8.4 (SD 1.7) to 9.1 (SD 1.1); this difference had disappeared by the end of the 8-week period ($p < 0.05$). Mean CGBRS scores were higher in the treatment group (32.0 [SD 8.6]) than the control group (28.5 [SD 9.4]) on enrolment and had improved more markedly by the end of the 8-week period (to 23.9 [SD 7.8] v. 25.0 [SD 7.0], $p = 0.06$). There was no statistically significant difference between the groups in use of restraints, length of hospital stay, discharge to a setting providing more care than was needed before admission or mortality rate.
Conclusion: The beneficial effects of systematic detection and intervention in cases of delirium in elderly inpatients were small.

Objectif : Évaluer une intervention systématique dans les cas de délire chez des patients âgés hospitalisés.
Conception : Essai contrôlé randomisé.
Contexte : Hôpital de soins actifs primaires affilié à une université.
Patients : Patients de 75 ans ou plus admis au département de médecine. Ils ont été examinés dans les 24 heures suivant l'admission et l'on a repéré 88 patients atteints de délire (selon les critères du *Diagnostic and Statistical Manual of Mental Disorders*, troisième édition révisée). On les a inscrits à l'essai. Les patients ont été répartis de façon aléatoire entre le groupe de traitement (42) ou le groupe témoin (46). On a effectué un suivi dans tous les cas, jusqu'à la fin de l'étude.
Intervention : On a évalué les patients au moment de l'inscription et 1, 2, 4 et 8 semaines plus tard. Les patients du groupe de traitement ont reçu une consultation auprès d'un interne en gériatrie ou d'un psychiatre et une infirmière de liaison a effectué le suivi. Les patients du groupe témoin ont reçu des soins médicaux ordinaires.
Mesures des résultats : *Short Portable Mental Status Questionnaire* (SPMSQ), *Crichton Geriatric Behavioural Rating Scale* (CGBRS), utilisation de dispositifs de contention, durée de l'hospitalisation, libération dans un contexte fournissant plus de soins que ceux dont le sujet avait besoin avant l'admission et taux de mortalité.

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Résultats : Deux semaines après l'admission, les résultats SPMSQ moyens des patients du groupe de traitement se sont améliorés pour passer de 8,2 (écart type [ET] 1,9) à 7,9 (ET 2,5), tandis que ceux des patients du groupe témoins se sont dégradés pour passer de 8,4 (ET 1,7) à 9,1 (ET 1,1); cet écart avait disparu à la fin de la période de 8 semaines ($p < 0,05$). Les résultats CGBRS moyens étaient plus élevés chez les sujets du groupe de traitement (32,0 [ET 8,6]) que chez ceux du groupe témoin (28,5 [ET 9,4]) au moment de l'inscription au projet et s'étaient améliorés davantage à la fin de la période de 8 semaines (pour passer à 23,9 [ET 7,8] c. 25,0 [ET 7,0], $p = 0,06$). Il n'y avait pas d'écart statistiquement important entre les groupes quant à l'utilisation de dispositifs de contention, la durée de l'hospitalisation, la libération dans un contexte fournissant plus de soins que ceux dont les sujets avaient besoin avant l'admission, ou le taux de mortalité.

Conclusion : Les effets bénéfiques de la détection systématique et de l'intervention dans les cas de délire chez les patients âgés hospitalisés sont minimes.

Delirium is an organic mental disorder characterized by acute onset, altered level of consciousness, fluctuating course and disturbances in orientation, memory, attention, thought and behaviour.[1] It occurs in 11% to 26% of elderly medical inpatients[2–13] and appears to be associated with significant increases in length of hospital stay, rates of admission to long-term care institutions, functional disability and rates of death.[12–16] Moreover, despite the potential benefits of prompt treatment involving medical and nursing interventions[7,8,14,17–19] 84% to 95% of cases are not recognized by attending physicians.[7,10]

These findings suggest that hospitals should institute programs to detect delirium and intervene in its management. However, there is little evidence that such programs would have a positive impact on outcome. Thus, we conducted a randomized clinical trial to determine whether systematic detection and treatment of elderly medical inpatients with delirium would reduce cognitive impairment, abnormal behaviour, functional disability, use of restraints, length of hospital stay, need for increased care after discharge and rate of death.

Methods

Design

The trial was conducted at St. Mary's Hospital Center, Montreal, a university-affiliated, primary acute care hospital of 400 beds. Patients aged 75 years and over admitted to the medical department (excluding those with a primary diagnosis of cerebrovascular accident) constituted the sampling frame of the study. Within 24 hours after admission a research associate screened each patient for eligibility: patients were included in the study if they spoke English or French and had not been admitted to the intensive care unit (ICU) or the cardiac monitoring unit (CMU) or referred to oncology or geriatric services. Eligible patients who scored 5 or more on the Short Portable Mental Status Questionnaire[20] (SPMSQ), indicating moderate to severe cognitive impairment, were assessed by the study nurse with the use of the Confusion Assessment Method (CAM).[21] Those in whom delirium was diagnosed (according to the criteria of the *Diagnostic and Statistical Manual of Mental Disorders*, third revised edition[22] [DSM-III-R]) were enrolled in the study and randomly allocated (without stratification) to either the treatment or the control group. After allocation the research associate, who was blind to group assignment throughout the study, completed assessment 1 using the SPMSQ and the Crichton Geriatric Behavioural Rating Scale (CGBRS).[23]

The treatment group received the intervention and the control group received regular medical care. The intervention comprised two parts: consultation by a geriatrician or geriatric psychiatrist and follow-up by a liaison nurse. The consultation was completed within 24 hours after referral and involved a review of the patient's chart or interviews with the patient, family or staff to determine the previous psychiatric and medical history, history of the present illness, personal and family history, and current mental status. This information was used to make a diagnosis, determine the probable cause(s) of the delirium and make treatment recommendations. The findings and recommendations were summarized on the regular hospital consultation form and flagged in the progress notes.

The nurse visited daily during the patient's stay (up to a maximum of 8 weeks) to assess his or her condition, review the medical record, ensure that previous recommendations had been implemented, liaise with family members and discuss management with the patient's nurses with the use of a protocol (Table 1) attached to the patient's care plan. When appropriate, the nurse discussed management problems with the geriatrician or geriatric psychiatrist who had completed the consultation, and when necessary the specialist reassessed the patient. At least once a week for 8 weeks the nurse recorded in the progress notes the results of a new mental status examination, information on compliance with previous recommendations and any additional recommendations.

One, 2, 4 and 8 weeks after enrolment, the research associate reassessed patients in both treatment and control groups using the same measures. After the fifth and final assessment the research associate collected information from each patient's medical record. Five kinds of information were collected on the treatment group: (a) whether the initial consultation was noted in the patient's record; (b) whether restraints had been used, as reported in the

nursing notes on the days of the study assessments; (c) the length of hospital stay during the study period and whether the patient had been discharged (and to where) or had died; (d) the consultant's initial recommendations and the extent of compliance with them; and (e) dates of follow-up visits, additional recommendations and the extent of compliance with these recommendations. Compliance was assessed through examination of the patient's hospital order sheets, nurses' medication sheets and the results of consultations and laboratory tests for the week after each recommendation.

The research associate collected the same kind of information on (a), (b) and (c) from the control group. In addition, it was noted whether the delirium had been detected by the attending physician.

Measures

Measures included the SPMSQ, the CAM and the CGBRS.

The SPMSQ is a widely used, observer-rated 10-item questionnaire that evaluates orientation, memory and concentration. The test–retest reliability is reported to be 0.8. Scale scores range from 0 (no impairment) to 10 (severe impairment). At a cut-off point of five errors the instrument is reported to have a sensitivity of 41%, specificity of 100% and positive predictive value of 100% in identifying medical inpatients with organic brain syndromes.[6]

The CAM is a structured interview that assesses the nine symptom domains of delirium specified in the DSM-III-R: acute onset and fluctuating course, inattention, disorganized thinking, altered level of consciousness, disorientation, memory impairment, perceptual disturbance, psychomotor activity and sleep/wake disturbance. The behaviours and symptoms associated with each domain are described in explicit terms so that a trained interviewer can conduct the assessment. Because the CAM includes direct questions as well as observations it can be used to evaluate both communicative and noncommunicative patients. The CAM was validated against the clinical judgement of a psychiatrist and found to have a sensitivity of 97% and a specificity of 92%.[21] Interrater agreement (κ) with trained personnel was 1.0.

The CGBRS is a rating scale for abnormal behaviour and activities of daily living, completed by an interviewer in conjunction with someone in close contact with the patient (e.g., a nurse or family member). For this study the scale was modified for greater reliability.[25] It included 10 items (walking, orientation, comprehension, cooperation, restlessness, dressing, feeding, continence, sleep and objective mood), each scored from 1 to 5. The total score could range from 10 (no impairment) to 50 (severe impairment).

The nurse and research associate were trained in the use of the measures before data collection began. This training included discussion and trial rating of cases until satisfactory interrater agreement was obtained. During the study approximately every 10th patient was assessed independently by the nurse or research associate and the principal investigator (M.C.), and interrater reliability was calculated. Interrater agreement (κ) on the CAM was 1.0, and the interrater correlation coefficients (r) for both the SPMSQ and the CGBRS were greater than 0.9.

Table 1: Nursing intervention protocol*

Environment
Sensory input: not excessive, inadequate or ambiguous. Room should have adequate light and be quiet. Some patients prefer radio or television for familiar background stimulation. Present one stimulus or task at a time. Medication schedules should not interrupt sleep.
Orientation
Room should have a clock, calendar and chart of the day's schedule. Keep the patient in the same surroundings. Verbal reminders of the time, day and place should be used frequently. Evaluate the need for eyeglasses, hearing aids and foreign language interpreters.
Familiarity
Obtain familiar possessions from home, particularly objects from the bedside, to help orient the patient. Request family members to stay with the patient. They provide the basis for correct orientation, effective communication, support and aftercare planning. Discuss familiar areas of interest, such as hobbies and occupation. Allow the same staff members to care for the patient.
Communication
Instructions and explanations should be clear, slow-paced, simple and repetitive. Use face-to-face contact. Convey an attitude of warmth and kind firmness. Frequently address the patient by name and convey identifying information, such as "I am your nurse." Acknowledge the patient's emotions and encourage verbal expression.
Activities
Avoid physical restraint. Allow free movement, provided the patient is safe. Encourage self-care and other personal activities to reinforce competence and enhance self-esteem.

*Adapted from Beresin.[24] Reproduced with permission from the publisher, Decker Periodicals.

Data analysis

Given that we wished to detect a change in the measures of at least one standard deviation at the 0.05 level of significance, the power of the statistical tests had be 0.8 for a sample of 30 or more.[26]

Three statistical methods were used to analyse the data. Significant differences (at the 0.05 level) between treatment and control groups ("intention to treat" analysis) were determined by multivariate analysis of variance to show main effects between groups (G), repeated observations over time (T) and G × T interactions. Mean differences between pairs of continuous demographic

and clinical variables were analysed by means of *t* tests and of categorical variables by χ^2 techniques.

Ethical issues

Assent was obtained (according to Medical Research Council of Canada guidelines[27]) from all patients eligible to participate in the trial. Patients in the control group received regular hospital care, and although these patients were not initially referred to a geriatrician or geriatric psychiatrist, the attending staff were free to request a consultation at any time.

Results

Sample characteristics

During the study period 972 patients aged 75 years or older were admitted to the medical department; of these, 488 were excluded from the study. The reasons for exclusion were language barrier (n = 47), admission to the ICU (n = 47) or the CMU (n = 84), referral to oncology (n = 49) or geriatric (n = 196) services, discharge (n = 22), death (n = 8), a combination of these reasons (n = 33) and refusal to participate (n = 2). Of the 484 eligible patients 174 (36%) had an SPMSQ score of 5 or more, and 88 (18%) were diagnosed as having delirium and were enrolled in the study. The patients with an SPMSQ score of 5 or more were significantly older than the admitted (85.5 v. 82.6 years, t = 6.03, $p < 0.001$) and the eligible patients (85.5 v. 83.3 years, t = 5.21, $p < 0.001$). The proportion of female to male patients did not differ significantly between the groups.

Forty-two patients were allocated to the treatment group and 46 to the control group. Initially, there were no significant differences between the groups in mean age, sex distribution or mean SPMSQ and CGBRS scores (Table 2). Of the 42 patients in the treatment group 3 were discharged or died before they could undergo assessment 1. Of the 46 control patients 14 had a consultation with a geriatrician or a geriatric psychiatrist at the request of staff during the study period. There were no significant differences in demographic and clinical variables or in the initial measures between these patients and the ones not so referred. A diagnosis of delirium (acute confusional state) was recorded in the chart by the attending physician in 16% of the control cases.

According to DSM-III-R criteria 11 patients (28%) in the treatment group had delirium alone, 22 (56%) had delirium superimposed on dementia (Alzheimer's disease in most cases), and 6 (16%) had delirium superimposed on another psychiatric disorder. The delirium was attributed to drugs (n = 1), cardiovascular disease (n = 1), infection (n = 4), other causes (n = 7) or a combination of factors (n = 16). The cause was not determined in 10 cases.

Initial recommendations were made for all 39 patients in the treatment group who underwent assessment 1; for 25 there were follow-up recommendations. Initial recommendations included investigations (n = 4), drug prescriptions (n = 3), other (n = 7) or a combination (n = 25). Follow-up recommendations included investigations (n = 1), drug prescriptions (n = 1), other (n = 3) or a combination (n = 20). The number of follow-up notes by the nurse ranged from 0 to 8 (mean 3.0); 97% of eligible notes were completed. The rates of full compliance with the initial recommendations ranged from 77% for investigations to 96% for other types; the rates for follow-up recomendations ranged from 50% for investigations to 91% for other types.

Outcomes

Of the 88 subjects enrolled in the study 44 were discharged, 13 remained in hospital, and 31 died. The initial scores on the SPMSQ and CGBRS were higher (patients were more impaired) among those who died than among those who survived, but the differences were not statistically significant.

The mean scores of the treatment and control groups are presented for each measure of each assessment in Table 3. Multivariate analysis of variance for those who survived the 8 weeks (n = 57) showed a significant difference in improvement on the SPMSQ over time between the treatment and control groups ($F = 2.47$, $p < 0.05$) and a marginally significant difference in improvement on the CGBRS ($F = 2.30$, $p = 0.06$). The pattern of the results did not change whether or not those who died were included in the analysis.

Table 2: Characteristics at enrolment of treatment and control groups of elderly medical inpatients with a diagnosis of delirium

Characteristic*	Treatment group *n = 42*	Control group *n = 46*
Mean age (and standard deviation [SD]), yr	86.8 (5.9)	85.4 (6.3)
Proportion of women, %	71.4	58.7
Mean SPMSQ score (and SD)	8.7 (1.8)	8.9 (1.6)
Mean CGBRS score (and SD)	33.6 (9.1)	32.5 (8.5)

*SPMSQ = Short Portable Mental Status Questionnaire; CGBRS = Crichton Geriatric Behavioural Rating Scale. The groups did not differ significantly in any characteristic.

At each assessment there were no significant differences between the treatment and control groups in the use of restraints, length of hospital stay, discharge rate, discharge to a setting providing more care than was needed before admission or mortality rate. There were no significant differences in outcome between patients in the treatment group who received a consultation from a geriatrician versus a geriatric psychiatrist. Patients in the treatment group without dementia or with a specific cause of delirium were more likely to improve, significantly so at 2 weeks ($\chi^2 = 4.05$, $p < 0.05$ and $\chi^2 = 5.99$, $p < 0.02$ respectively).

Discussion

This trial was carried out to determine whether systematic detection and intervention in cases of delirium would be effective in reducing cognitive impairment, abnormal behaviour, functional disability, use of restraints, length of hospital stay, need for increased care after discharge and mortality rate. The impact was found to be small. There was a significant difference in SPMSQ scores and a marginally significant difference in CGBRS scores between the treatment and control groups over time, but differences on other outcome measures were not statistically significant. Patients without dementia or with a specific cause of delirium were more likely to improve.

The clinical importance of the significant differences in outcomes is debatable. The SPMSQ scores improved in the treatment group and worsened in the control group during the first weeks after admission, but there was little difference between the groups at 8 weeks. It appears that detection and intervention may have resulted in more rapid recovery of cognitive function, although the import of this finding is not clear. The CGBRS scores, on the other hand, improved in both groups throughout the study, more so in the treatment group. The size of this improvement in the treatment group (8.1 points) as compared with the control group (3.5 points) is probably clinically relevant.

Eight features of the study may have reduced the magnitude of the treatment effects. First, we excluded patients admitted to the geriatric department, and these patients may have had more treatable conditions. When we systematically screened samples of these patients, however, the 23% who had delirium did not differ from the delirious patients enrolled in the study in terms of age, sex, initial SPMSQ and CGBRS scores, presence of dementia or probable cause(s) of delirium. Second, our screening procedure selected patients with moderate to severe cognitive impairment (SPMSQ score of 5 or more); clearly, many patients with mild delirium were not detected. Third, cases were identified at the time of admission (prevalent cases); patients in whom delirium developed during the hospital stay (incident cases) might have been more responsive to detection and intervention. Fourth, the intervention involved just consultation with a geriatrician or a geriatric psychiatrist with follow-up as necessary, although rates of compliance with the recommendations were generally high. Fifth, the relatively small number of cases (n = 88) in our sample reduced the power of the study, but we had decided at the outset that differences of less than one standard deviation in our principal measures were probably not clinically important. Sixth, 3 patients in the treatment group did not

Table 3: Results on outcome measures over 8 weeks of follow-up*

Outcome measure†	Treatment group	Control group
Mean SPMSQ score (and SD)		
Enrolment	8.2 (1.9)	8.4 (1.7)
Week 1	8.0 (2.6)	8.7 (1.5)
Week 2	7.9 (2.5)	9.1 (1.1)
Week 4	7.7 (2.5)	8.6 (1.7)
Week 8	7.7 (2.5)	7.8 (2.6)
Mean CGBRS score (and SD)		
Enrolment	32.0 (8.6)	28.5 (9.4)
Week 1	29.3 (8.7)	28.1 (6.9)
Week 2	27.9 (8.9)	27.3 (7.0)
Week 4	27.6 (8.5)	26.1 (6.8)
Week 8	23.9 (7.8)	25.0 (7.0)
Proportion requiring restraints, %	37	29
Mean length of stay, d	25.3	22.7
Proportion requiring greater care after discharge, %	7	7
Mortality rate, %	33	37

*The mean SPMSQ and CGBRS scores are for the 57 patients who were alive after the follow-up period. The remaining outcome measures are for all 88 patients.
†The groups differed significantly in the SPMSQ and CGBRS scores over 8 weeks: $F = 2.47$ ($p < 0.05$) and 2.30 ($p = 0.06$) respectively by multivariate analysis of variance.

receive the intervention, and 14 patients in the control group received a consultation. Seventh, the characteristics of the enrolled patients may have reduced the impact of the procedures: the patients were relatively old (mean age 86.1 years) and very ill (mortality rate 35%), more than half were demented as well as delirious, and in few cases could the delirium be attributed to a single cause. Finally, the Hawthorne effect, whereby implementation of the study resulted in improved detection and management of all patients with delirium, may have reduced the observed differences between the treatment and control groups.

This study provides a model for evaluating the effectiveness of a geriatric service for a specific condition.[28] In this case the beneficial effects were small. In future trials the impact of these procedures might be increased by either targeting cases more likely to respond or else intervening more intensively. In the first instance, studies could examine the effect of selecting patients who are younger, have milder cognitive impairment and are less physically ill, patients without dementia or whose delirium has a specific cause, and incident instead of prevalent cases. In the second instance, the intervention could be augmented by regular follow-up by the geriatric specialists or more rigorous application of the nursing care protocol. If such strategies can increase effectiveness, then systematic detection and intervention in cases of delirium may have a role to play in the management of elderly medical inpatients.

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