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Abstract:

Objective(s): A new model of care for the management of patients with delirium was developed and evaluated.

Method: A 4-bedded Close Observation Unit (COU) was introduced. The model comprised an education strategy for assistants in nursing (AIN), environmental adaptations and AIN to patient ratio of 1:4. Outcomes in all patients with delirium before and after introduction of the new model of care were compared.

Results: 105 patients were admitted to COU, of whom 100 (95%) were diagnosed with delirium. In-hospital mortality improved after introduction of the unit (15% versus 5%; $p=0.002$) without significant change in length of stay, discharge destination or falls frequency.

Conclusion: A dedicated unit for delirium management within medicine achieved a reduction in mortality.

Introduction

Delirium is common with reported rates of 30%, and beyond, for older medical in-patients [1]. The management of patients with delirium in hospital represents a challenge and outcomes suffer as a consequence. Delirium itself obscures presentation and identification of the precipitating diagnosis, behaviour changes result in decreased awareness of personal need and present a barrier to administering care and support. Affected patients are at risk from their own behaviour and often experience falls [2]. In hospital mortality for delirium is high (up to 14.3%) and in survivors, poor functional recovery and institutionalisation are common [3,4].

Delirium is preventable in up to one third of hospitalized medical patients [5]. However, little is known as to the best way to manage patients with delirium. No single intervention is likely to promote benefits for heterogeneous conditions like delirium. Management studies in delirium have been inconclusive at best but have usually relied on a consultative approach [6]. Delirium units are cost-effective and can improve patient care although comparative data has not been published [7]. It is clear nurse education is pivotal to promote understanding around delirium and translate concepts into practice. In keeping with other geriatric syndromes, evaluation of a multicomponent approach, embracing nurse education, affords an opportunity to advance delirium management and outcomes.

In this study, we aimed to develop, and evaluate, a new model of care for the management of patients with delirium at greatest risk to themselves through behavioural or psychiatric disturbance.

Methods

Study design

The study comprised a before and after intervention design. Usual care of patients with delirium was undertaken before intervention. The intervention comprised a delirium unit. Comparison of demographics and outcomes from the new unit (July-November 2011) were compared over the same period with historical control. (July-November in 2010).

Description of Usual Care

Usual care prior to introduction of the new model of care for patients with delirium comprised admission to one of two general medical wards via the emergency department then emergency medical unit. The ward under evaluation comprised 3 separate 4-bedded (bay) areas and 7 single rooms. Prior to inception of the Close Observation Unit, patients with delirium were managed within the ward staff complement of five RN's and one AIN's for 19 patients. Delirious patients

were distributed throughout the ward. If behaviour was deemed at risk then additional specialling (1:1 AIN to patient ratio with the same registered nurse quota) was undertaken.

Description of the Close Observation Unit

The intervention was based on conversion of a bay, hosting 4 patients, into a Close Observation Unit (COU). Evaluation of the unit took place from July to November in 2011. Prior to deployment, Nursing staff (AIN's) had undertaken a full day training and educational programme for the management of patients with delirium. The training package was facilitated by nurse educators and included presentations for; definitions of delirium and dementia, environmental considerations, communication styles, practice partnership models of care and the operations of a close observation unit. The unit was primarily staffed by assistants in nursing (AINs) at a ratio of one to every four patients continuously. Registered nurses (RNs) provided oversight of this unit as part of their normal clinical case load within existing staff resources. Staffing levels from medical and multidisciplinary teams remained unaltered. For all patients in the COU, multifaceted hourly behavioural observations were undertaken, including measures of agitation using the Pittsburgh agitation inventory and pain using a verbal pain scale [8,9]. Targeted nursing based interventions were used to manage behavioural and psychiatric escalation (toileting, nutrition, diversion activity, mobility, and reduced stimuli). The patient environment was adapted with inclusion of a wall clock, orientation reminders and a patient biography. Additionally, a safer environment was introduced through specific high/low profile beds, split rails to minimize the risk of entrapment and height adjustable arm chairs to allow patients to safely sit out of bed.

Selection and description of Participants

Patients were selected for the COU based a diagnosis of delirium made by nursing staff according to Confusion Assessment Method (CAM) criteria [10] accompanied by a score of > 2 on the Pittsburgh Agitation Rating Scale for either agitation, aggression, vocalisation or resistiveness and/or a Falls score of >21, indicating a high falls risk [11]. Patients were discharged from the unit, to a

place of consultant team discretion, once falls risk dropped to a low to moderate falls risk and in the absence of neuropsychiatric disturbance (Pittsburgh Agitation Rating Scale score 0) for 24 hours.

Exclusion criteria included primary diagnosis of mental health problem or patients requiring isolation for infection control.

Technical Information

The close observation unit did not alter the structure of medical input which remained as daily clinical ward rounds (Monday-Friday). On-call reviews were undertaken according to clinical need. The medical model of care and responsible consultants remained unchanged for the duration of the study. All patients were admitted into the medical service via the Emergency department followed by the acute medical admissions unit (EMU). Local multidisciplinary clinical guidelines for the management of delirium were in place prior to the intervention.

Statistics

Demographic data was collected on all patients admitted to the COU including age, diagnostic code, gender, length of stay and mortality. Additionally, a retrospective collection of data from the hospital coding system, for all patients coded as having delirium within internal medicine services, was undertaken for the same five month periods, in 2010 and 2011.

Outcome data collected included; total length of stay, discharge destination and in-hospital falls and mortality. Delirium was determined before the intervention and in patients not admitted to close observation unit (COU) from hospital ICD-10 diagnostic codes. Results were analysed before (2010; historical controls) and after (2011) its introduction, within internal medicine services.

Statistical analysis was conducted using IBM SPSS (Statistical Package for Social Sciences) statistics 19 with a level of significance (p-value) set at 0.05. Descriptive data analysis were undertaken to examine distribution. Continuous variables (eg. Age and length of stay) were

compared between the two groups using independent t-tests. Pearson Chi-Square statistic was used to investigate categorical data including gender, mortality and discharge destination. The main outcomes measures were length of stay (LOS), discharge destination, mortality and falls.

Results

In the five month period July to November 2010 there were 175 patients with an ICD code of delirium admitted with delirium. This compares with 237 delirium cases in 2011, an increase of 26%. 105 patients were admitted to COU, of whom, 100 (95%) were diagnosed with delirium.

On average, patients in historical control were 79.6 (SD11.1) years old with 51% females.

In comparison with historical controls, the age of patients in the COU cohort was not statistically different (M = 80.29, SD = 11.26 compared with (M = 79.6, SD = 11.11); $t(271) = 0.49$), $p = 0.63$.

Both cohorts did not differ in gender $\chi^2(2, N = 175) = p = 0.43$. Additionally, the LOS of patients in the COU (M = 22.68, SD = 28.49) was no different from those admitted in the 2010 sample (M = 24.71, SD = 35.95); $t(271)$, $p = 0.30$.

Comparisons between all patients with delirium in the period for 2010 and the same period 2011 are displayed in table 1.

The prospective diagnosis of delirium on COU compared with a retrospective coding of delirium (sensitivity 58% and specificity 86%).

Conclusion

We have developed a new model of care to identify and proactively manage patients at greatest risk of adverse event from delirium. A significant reduction in mortality was achieved that is also lower

than published in-hospital mortality rates (5% compared with 14.3%) [3]. No such improvement was demonstrated for the outcome measures of falls, discharge home or length of stay. In some respects these results come as no surprise given the limitations of multicomponent intervention strategies on falls prevention in hospital [12]. Reassuringly, no falls were observed whilst patients were on the COU, only after discharge outside the unit. There may be factors unrelated to delirium and the COU that may have been accountable for falls in these cases. Length of stay may not have reached a statistically significant reduction but a trend towards a 3 day decline may have clinical importance. If the realisation of an actual difference then this equates to potential cost savings and a reduction of iatrogenic complications for the frail older patient. This is also comparable with other published work on management strategies in delirium (22 days versus mean 19.1 days) [13]. Discharge destination may not have been improved but the high overall attainment of home discharge (81% versus 77%) throughout the study is favourable given published rates of institutionalisation after delirium [4].

If we are able to consider the close observation unit as representing those patients with the most disturbed neuropsychiatric features, and perhaps the most poorly with delirium, then the equivalence, or non-inferiority, compared to historical control is in itself a cautious success. It should be emphasised that the gains were achieved with only the cost of an additional 1.6 full time equivalent (FTE) appointment of an AIN within a 19 bedded ward. This potentially reduced the need for specialising and the cost-effectiveness of our intervention and is an area of ongoing focus by our group.

Management studies in delirium have been frustrated by poor evidence for efficacy and this remains at odds with the replicated gains made in preventative strategies. Some of this disparity may owe its origins to differences in approach. A dedicated unit, with the advantages of continuity of care, may share more of the multifaceted features in common with preventative approaches. Taking a high

risk group such as delirium and attempting to further stratify them seems counterintuitive until the additional threats that delirium pose in the acute phase is considered: treatment failure through non-adherence and risk to self through behavioural and psychiatric features. Outcomes with delirium are poor, but, we argue, they are potentially modifiable. Using standard measures to attempt to identify those immediately at greatest risk (through falls and neuropsychiatric disturbance) and pro-actively managing these problems attempts to ameliorate the proximal threat. Improvement in mortality has been observed in other disease specific areas, such as stroke units, that focus a critical mass of expertise [14]. We may need to borrow a similar approach for patients with delirium.

The limitations of this study include the mixture of data collection techniques and the established hazard of relying on retrospective data and discharge diagnosis by diagnostic coding. The weak sensitivity and specificity suggests that concordance between case-finding methods is far from ideal. The disproportionately poor sensitivity suggests that the historical cohort had less delirium and would tend to diminish the effect of genuine relationships between the two groups. A pragmatic approach to data collection from historical control in the equivalent time period in the year before was felt to be associated with less patient variation than would have been seen in season to season or month to month changes.

The Close Observation Unit employed a comprehensive and multifaceted approach targeting environment, nurse education and processes of care. Achievement of a reduction in mortality demonstrates that delirium can be managed effectively with an improvement in outcomes. There remains a clear clinical imperative for the prospective evaluation of new models of care in delirium.

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