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Delirium treatment practice, practice change, and influences: an online survey of clinicians

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Abstract

Background

Recent studies cast doubt on the net effect of antipsychotics for delirium.

Aim

To investigate the influence of these studies and other factors on clinicians' delirium treatment practice and practice change in palliative care and other specialties using the Theoretical Domains Framework.

Design

Australia-wide online survey of relevant clinicians.

Setting/Participants

Registered nurses (72%), doctors (16%), nurse practitioners (6%) and pharmacists (5%) who cared for patients with delirium in diverse settings, recruited through health professionals' organisations.

Results

Most of the sample (n=475): worked in geriatrics/aged (31%) or palliative care (30%); in hospitals (64%); and saw a new patient with delirium at least weekly (61%). More (59%) reported delirium practice change since 2016, mostly by increased non-pharmacological interventions (53%). Fifty-five percent reported current antipsychotic use for delirium, primarily for patient distress (79%) and unsafe behaviour (67%). Common Theoretical Domain Framework-categorised influences on respondents' delirium practice were: emotion (54%); knowledge (53%); and physical (43%) and social (21%) opportunities. Palliative care respondents more often reported: awareness of any named key study of antipsychotics for delirium (73% vs 39%, $p<0.001$); changed delirium treatment (73% vs 53%, $p=0.017$); decreased pharmacological interventions (60% vs 15%, $p<0.001$); off-label medication use (86% vs 51%, $p<0.001$: antipsychotics 79% vs 44%, $p<0.001$; benzodiazepines 61% vs 26%, $p<0.001$); and emotion as an influence (82% vs 39%, $p<0.001$).

Conclusion

Clinicians' use of antipsychotic during delirium remains common and is primarily motivated by distress and safety concerns for the patient and others nearby. Supporting clinicians to achieve evidence-based delirium practice requires further work.

Key words

Antipsychotic agents; Delirium; Implementation science; Palliative care; Psychological distress; Surveys and Questionnaires

Key statements

What is already known about the topic

- Delirium is common in older patients and those with life-threatening illness.
- Antipsychotics are widely used 'off-label' for delirium.
- Several recent studies and meta-analyses have cast doubt on the net effect of antipsychotics for delirium, in palliative care and other clinical contexts.

What this paper adds

- Most surveyed Australian clinicians reported changing their delirium treatment practice since 2016, with change predominantly an increase in non-pharmacological and a decrease in antipsychotic use, especially in palliative care.
- Clinicians' desire to address distress and risks of harm for the patient, their family, staff, other care recipients and visitors were key motivators for antipsychotic use during delirium; particularly when they lacked resources, support, and information about other clinical approaches.
- Dissonance between palliative care clinicians' knowledge and greater use of antipsychotics during delirium appeared attributable to an implicit imperative to respond to patient and family suffering during dying, a disinclination to generalise existing trial evidence to patients in the terminal stage, and uncertainty about what else to do.

Implications for practice, theory or policy

- Clinicians should continue to strive for workplace and wider learning, sufficient human resources, and instrumental interdisciplinary relationships that support them to deliver evidence-based and humane responses to patients with delirium.
- Multi-faceted initiatives to further reduce antipsychotic use during delirium are required, especially in palliative care.
- Delirium-related distress and safety concerns for patients, family, staff, and others nearby are clinically meaningful and should be explicitly acknowledged and addressed in healthcare institutions and future studies.

Introduction

Delirium is an acute neurocognitive condition that adversely affects many people with life-threatening illness, as well as those who care for them.¹⁻⁴ Antipsychotics are widely used in palliative care for delirium.⁵ Yet, in 2017, a large Australian multi-site, double-blind randomised controlled trial of risperidone or haloperidol or placebo for patients with disturbed perception, behaviour and/or communication during delirium in 11 palliative care units (the 'Agar *et al*' trial') reported significantly lower symptom scores, fewer extrapyramidal effects, lower use of crisis midazolam, and better survival in participants receiving placebo.⁶ In brief, trial participants with distressing delirium symptoms who received either of these two antipsychotics fared worse than those who did not.

As this trial challenged long-standing delirium treatment practice in palliative care, we sought to evaluate its impact in this context, two years' post-publication. However, consideration of associated evidence and national health policy led us to a broader evaluation. The first consideration was three systematic reviews/meta-analyses (2016-18) of studies from diverse settings and patient populations which reported no evidence that antipsychotics reduced delirium: duration; severity; distress, length of hospital or ICU stay; nor mortality, nor improved quality of life, compared to placebo.⁷⁻⁹ This evidence reinforced doubts about the net effect of antipsychotics for delirium, for patients in palliative care settings and elsewhere.

The second consideration was the Australian Commission on Safety and Quality of Health Care's (ACSQHC) Delirium Clinical Care Standard new requirement (2019-) of Australian hospitals to demonstrate routine primary interventions (i.e. treat causes, inform and reassure, and address basic needs such as for sleep, hydration and exercise), and to only use antipsychotics or other psychoactive medication if the patient remained significantly distressed after primary interventions and other non-drug strategies.¹⁰ Most inpatient palliative care services in Australia are hospital-based and must meet this standard of delirium care.

The third was the ubiquity of delirium: hospital prevalence is 20%, higher again in units where patients are older, cognitively impaired and/or seriously ill, and it is frequently distressing for patients, their families and clinicians, regardless of where it occurs.^{3, 11, 12} Responding effectively to the profound impact of delirium on very unwell patients is therefore not solely the concern of specialist palliative care clinicians. We concluded that our evaluation of delirium treatment practice and practice change in palliative care should allow for potentially multiple influencing factors (i.e. not just a single trial), as well as consider wider practice.

Hence, objectives of this study were to investigate clinicians' self-reported delirium treatment practice (last 12 months), practice change (since 2016), and influences (key studies and/or other factors), overall, and in palliative care versus elsewhere. We used the Theoretical Domains Framework of health behaviours and behaviour change to examine potential influences on clinicians' delirium treatment.¹³ The Theoretical Domain Framework has 17 domains, each with explanatory detail, that are located within the three broader interacting components of the COM-B capability-motivation-opportunity model of individuals' behaviour.¹⁴ *Capability* refers to psychological and physical capacity to engage in the relevant behaviour; *motivation* to reflective and automatic "brain processes" that drive behaviour; and *opportunity* to social and environmental factors external to the person. The Theoretical Domain Framework was a fitting framework because of its health behaviour focus, comprehensiveness, coherency, and wide application.¹³

Methods

Design

Online survey, reported according to the Checklist for Reporting Results of Internet E-Surveys (CHERRIES).¹⁵

Survey development

Initial survey items were tailored to four eligible clinician groups: medical practitioners, nurse practitioners, registered nurses and pharmacists ('clinicians'). Four discipline-specific versions of the survey were assessed for face, construct, and content validity by investigators, piloted with 11 clinicians (matched to the version for their discipline), then revised. Content was consistent across the four versions, with language adapted only to fit discipline-specific titles and roles, e.g. 'prescribed' versus 'administered' versus 'recommended' an antipsychotic (Supplementary file 1: Master survey). Final versions each had a maximum of 23 items: nine socio-demographic; one on frequency of encountering a new patient with delirium ('never' exited respondents); eight on current practice (recalled, hypothetical, goals of antipsychotic use); and five on practice change and influences (including prompts about the four key studies outlined above⁶⁻⁹). All closed-ended items (except gender and named studies) were mandatory, while open-ended items (key initial actions, other influences, descriptions of practice change, and additional final comments) were voluntary. Online versions were developed in Research Electronic Data Capture (REDCap)¹⁶ using adaptive questioning, paged presentation, set ordering, and the option to review/change responses, and were tested before recruitment.

Ethical procedures

To demonstrate respect for participants and reduce the risk of psychological discomfort, inconvenience and researcher-led responses, study decisions and actions included: informed, voluntary and anonymous participation; a brief, piloted, objective-aligned survey containing some open-ended items; and provision of contact details for the lead investigator and the Human Research Ethics Committee (HREC) officer in the invitation and landing page (Supplementary file 1: Master survey). The University of Technology Sydney HREC approved the study February 14, 2019 (UTS HREC REF NO. ETH18-2969).

Sample and recruitment

Australian clinicians of diverse specialties and settings were eligible; only clinicians who never saw a new patient with delirium were excluded. Clinicians were recruited April-July 2019 through 15 health professionals' organisations relevant to: the target disciplines; specialties and settings where patients are at higher risk of delirium (e.g. geriatrics, palliative care, residential aged care); a diverse sample (e.g. general practitioners, remote and isolated workforce); and the specialty of psychiatry, wherein delirium is classified as a neurocognitive condition¹ (Text box 1). Information about the study, including implications of participation and secure storage of data was provided on the survey landing page. Participation was voluntary, not incentivised, and implied consent.

Analysis

Because some organisations declined to disclose member numbers and some respondents may have had multiple memberships, we only calculated completion rates. All responses (i.e. both closed- and open-ended) relevant to *influences* on respondents' delirium treatment were considered against the 17 Theoretical Domain Framework domains and categorised by AH, who had training and experience in the method and considered each response against the framework's inbuilt guidance.¹³ Categorisation of open-ended responses about *delirium treatment* was iterative i.e. based on patterns in the data, first categorised by AH and independently checked by MS. Outcomes (awareness of named studies, practice change, current practice, and influences) were determined for the overall sample, and for palliative care versus respondents from other specialties. Descriptive statistics were used to summarise all responses, with percentages rounded to the nearest whole number. Group differences were calculated using Pearson's Chi-squared Test to determine significant associations at Type I Error with significant level $\alpha=0.05$ among parameters within the main category, and Goodness of Fit to observe statistically significant differences at 95% confidence intervals. Analyses were performed using the Statistical Package for the Social Science (IBM® SPSS Statistics 25) and Excel.

Text box 1: Professional organisations that distributed the survey invitation (n=15)

Medical

- The Australian and New Zealand Society of Palliative Medicine
- The Australian and New Zealand Society for Geriatric Medicine
- Royal Australian and New Zealand College of Psychiatrists
- The Internal Medicine Society of Australia and New Zealand
- Royal Australian College of General Practitioners (NSW, Victoria, WA)

Nursing

- Palliative Care Nurses Australia
- Australian College of Nursing
- Australian College of Nurse Practitioners
- Australian Association of Gerontology Nurses Special Interest Group
- Psychogeriatric Nurses' Association Australia Incorporated

Pharmacy

- Australian Association of Consultant Pharmacy
- Pharmaceutical Society of Australia
- The Society of Hospital Pharmacists of Australia

Multidisciplinary

- Sydney Partnership for Health, Education, Research and Enterprise Age and Ageing and Palliative Care Clinical Academic Groups
- CRANaplus (remote and isolated health workforce)

NB: Critical care professional organisations were not targeted because ICU delirium practice was recently reported¹⁷ and a Cochrane review of pharmacological interventions for delirium in critically ill patients was then pending.¹⁸ However, ICU clinicians remained eligible to participate.

Results

The online survey was opened 680 times. After removing respondents who never saw a new patient with delirium (n=36) and those who did not provide any response that informed outcomes (n=133), the sample was 475 (74% completion). The median completion rate of individual items by the included respondents was 80% (range 74-99%).

Respondent characteristics

Respondents were registered nurses (72%), medical practitioners (17%), nurse practitioners (6%) and pharmacists (5%), from all Australian states and territories. More (61%) saw a new patient with delirium at least weekly. Workplaces were primarily hospitals (64%) and residential aged care facilities (25%). Just under one third (30%) worked in palliative care, while geriatrics/aged care was the most common specialty of *other* respondents (31%).

Palliative care and *other* groups were comparable in gender, age, clinical background, post-graduate qualifications, setting of clinical practice, geographical location, fulltime equivalent work, and frequency of seeing a new patient with delirium daily and monthly. Significant differences included that the palliative care group contained more medical practitioners and fewer registered nurses or pharmacists; fewer with ≤ 5 years' experience and more with 11-19 years; and more from community, outpatient clinic and/or other settings. Proportionally more palliative care respondents saw a new patient with delirium at least weekly compared to *others*.

Table 1 provides respondents' demographics in detail.

Awareness and influence of the four named studies

Nearly half (49%) were aware of at least one of the four named studies (Supplementary table 1). Significantly more were aware of Agar *et al* compared to others (32% vs Schrijver *et al* 20% $p=0.001$, Neufeld *et al* 18% $p<0.001$, or Burry *et al* 19% $p<0.001$). Significantly higher proportions of palliative care respondents were aware of Agar *et al* compared to *others* (63% vs 19%, $p<0.001$) and aware of at least one named study (73% vs 39%, $p<0.001$). Most (77%) who were aware of any named study reported it *influenced* their delirium practice or practice change (Agar *et al* 70% - Schrijver *et al* 48%, $p=0.057$).

Practice change

More (59%) reported that they had changed their delirium treatment practice since 2016 (Supplementary table 2). The three most common characteristics of practice change were:

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increased non-pharmacological interventions (53%), decreased pharmacological intervention (32%), and increased communication with patients and families (22%). Eighteen percent reported other changes in pharmacological intervention, such as switching to a different antipsychotic or medication class (e.g. benzodiazepines, melatonin), or limiting use (e.g. only using antipsychotics as a last resort rather than as first line therapy). Only 3% reported increased use of delirium guidelines or protocols.

A significantly higher proportion of palliative care respondents reported delirium treatment practice change (73% vs 53%, $p=0.017$); practice change that was both non-pharmacological and pharmacological (46% vs 25%, $p=0.001$); and decreased pharmacological intervention (60% vs 15%, $p<0.001$). Proportionally less palliative care responders reported increased communication with patients and/or their family (13% vs 28%, $p=0.024$), increased screening and/or assessment (8% vs 21%, $p=0.021$), and increased medication review (1% vs 9%, $p=0.024$).

Current practice

The most often reported *key initial action* towards a patient with delirium in the preceding 12 months was assessment (87%; Supplementary table 3), with responses varying widely in comprehensiveness. Thirty percent nominated cognition/delirium screening or assessment; fewer reported non-pharmacological interventions (21%), communication with the patient/family (21%) and treatment of reversible causes (15%). Higher proportions of palliative care respondents nominated treatment of reversible causes (21% vs 13%, $p=0.26$) and pharmacological intervention (10% vs 4%, $p=0.014$) as a key initial action, compared to *other* respondents.

Regarding *pharmacological practice*, 62% reported current off-label medication use for delirium (Table 2). Antipsychotics were most often named (55%), then benzodiazepines (36%), melatonin (11%) and various others (2%). Of those using antipsychotics, 60% did so for more than one-third of their patients with delirium, including 21% who did so for more than two-thirds. Higher proportions of palliative care respondents reported using any off-label medication (86% vs 51%, $p<0.001$), antipsychotics (79% vs 44%, $p<0.001$) and benzodiazepines (61% vs 26%, $p<0.001$) for delirium, and off-label medication for more than two-thirds of their patients with delirium (26% vs 16%, $p=0.025$).

In the closed-ended item about the *goals of care when using antipsychotics for patients with delirium*, respondents most often reported it was to decrease the intensity of patient

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distress (79%) and/or restrain unsafe behaviours (67%; most often reported as physical aggression, as well as risk of falls, wandering, disruption to clinical care, verbal aggression, and ignominious acts). Fewer reported their goal was to decrease severity of particular features of delirium (38%), decrease overall delirium severity (35%), or decrease delirium duration (21%). There were no significant group differences in the goals of antipsychotic use (Table 2).

Three-quarters of the respondents who reported antipsychotic use for delirium in the preceding 12 months answered questions about a *hypothetical delirious elderly man with disruptive behaviour* (Supplementary table 4). Of these, 70% volunteered antipsychotics as their first medication choice. Fewer nominated benzodiazepines (17%), melatonin (3%) or other medication (5%). Only 6% explicitly stated they would not give medication in his situation; another 6% were unsure. Group differences were that a higher proportion of palliative care responders nominated haloperidol as their first choice of medication (57% vs 31%, $p=0.004$) and less recommended risperidone (12% vs 32%, $p=0.003$). For a *similar hypothetical patient without disruptive behaviour*, 57% reported that they would choose differently, 30% would not/would be unlikely to choose differently, and 13% were unsure. Fewer palliative care respondents were unsure if they would choose differently (6% vs 19%, $p=0.01$).

Influences

The most frequently reported influences on practice were within the Theoretical Domain Framework domains of emotion (COM-B *motivation*) (54%) and knowledge (COM-B *capability*) (53%) (Table 3). Factors categorised as emotion pertained to delirium-related distress of patients, their family, and others receiving care; behaviours that were dangerous or disruptive for the patient, staff, family, others receiving care, and visitors; and, for palliative care respondents, patient and family distress when the patient was imminently dying. More palliative care respondents cited emotional factors compared to *others* (82% vs 39%, $p<0.001$). Knowledge influences included awareness of the named studies (overall 30%), plus that gained from other scientific, academic and dissemination sources, involvement in delirium research, and clinical experience. Lack of knowledge, uncertainty, and requests for existing and new knowledge about delirium treatment were also cited.

Almost half (43%) of respondents reported physical influences (COM-B *opportunity*) such as resource limitations and institutional environments that increased the likelihood of delirium

and psychotropic medication use; and environmental resources (e.g. well-trained assistants in nursing) and salient personal events (e.g. witnessing an elderly family member's delirium experience) that shifted respondents' towards more interpersonal approaches to care. Social influences (COM-B *opportunity*; 21%) reported included collegial and interdisciplinary interactions, both in the clinical setting (e.g. consulting with expert clinicians; feeling pressured by other clinicians, involving family in care), and more widely via health policy and professional fora (e.g. Delirium Clinical Care Standard initiatives and Australasian Delirium Association meetings). While fewer responses related to beliefs about consequences (9%), divergent views about the benefits and harms of pharmacological intervention for delirium, along with some palliative care respondents' statements that the Agar et al trial did not apply to imminently dying patients, were noteworthy. Palliative care respondents more often reported COM-B *motivation* factors of goals (14% vs 1%, $p < 0.001$) and intention (to change their practice) (7% vs 1%, $p = 0.02$). Lastly, few or no responses related to other *capability* (skill, cognitive processes, and behavioural modification) and *motivation* (optimism, reinforcement, and roles) domains.

Supplementary table 5 provides further detail of the Theoretical Domain Framework categorisation of responses with illustrative quotes.

Discussion

In summary, many surveyed Australian clinicians reported changing their delirium treatment practice since 2016. Practice change was mostly increased use of non-pharmacological interventions and antipsychotic use remained common, especially in palliative care. Clinicians' desire to address distress and risks of harm for the patient, their family, staff, other care recipients and visitors were key motivators for antipsychotic use during delirium; particularly when they lacked resources, support, and information about other clinical approaches. Clinicians also reported that gaining knowledge, sufficient workplace resources, and enlightening professional and family interactions supported them to provide best-practice delirium care. The dissonance between palliative care clinicians' knowledge and practice regarding antipsychotic use for delirium appeared attributable to an implicit imperative of the specialty to respond to patient and family suffering during dying, a disinclination to generalise existing trial evidence to patients in the terminal stage, and uncertainty about what else to do.

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Even so, more (60%) palliative care clinicians reported they decreased their use of antipsychotics for delirium in the preceding three years, a finding supported by comparison with previous studies of clinicians' practice. For example, a 2008-published survey of Australian and New Zealand medical specialists reported 79%-97% would use an antipsychotic to manage delirium symptoms in people with advanced cancer.¹⁹ In a UK study published in 2019, 91% of surveyed palliative medicine specialists said they would prescribe an antipsychotic for distressing hallucinations unresponsive to non-pharmacological measures.²⁰ While exact comparisons are not possible due to different sample characteristics and question routes, present results (i.e. 79% of Australian palliative care clinicians' using antipsychotics for delirium in the preceding 12 months) suggests a slight move away from almost universal use. Clinical audits of delirium practice will be a useful method to objectively determine the specific indications and proportional use of antipsychotics per patient and over time, especially in health systems with a delirium standard.

A recent Cochrane review of drug therapy for delirium in terminally ill adults re-iterated the results of the Agar *et al* trial,⁵ while another cross-setting systematic review and meta-analysis reported low-moderate evidence that antipsychotics made no difference to sedation status, delirium duration, hospital length of stay or mortality when compared to placebo, insufficient evidence of their impact on delirium severity, and increased frequency of potentially harmful cardiac effects.²¹ However, in our survey clinicians did not prioritise these outcomes when deciding to use antipsychotics during delirium. Instead, they most often reported using antipsychotics to decrease patient distress and restrain unsafe behaviours, outcomes rarely reported in intervention trials. These were the exact qualifications outlined in the Delirium Clinical Care Standard¹⁰ and yet, these outcomes are rarely measured or reported in intervention trials. Similarly, a qualitative study that applied the Theoretical Domains Framework to understand antipsychotic prescribing for behavioural and psychological symptoms of dementia in nursing home residents in the UK found that staff witnessing the suffering of residents with dementia led to burn-out, frustration, poor morale, and influenced them to use antipsychotics.²² Around the same time, a narrative review articulated the need to better understand and address delirium-related distress in clinical practice.¹¹ Our results further flag that distress *and* the safety of many persons - patients, their family, staff, and others receiving care and visiting in the institution - are

clinically meaningful and therefore important outcomes to measure in future delirium intervention trials.

However, until evidence for these outcomes is obtained, we suggest that only very cautious use of antipsychotics to relieve delirium-related distress is warranted. Even more circumspection is required in palliative care because patients receiving *placebo* in the *Agar et al* study had the lowest composite scores of perceptual, behavioural and communication disturbances. Benefit from antipsychotics would have been signalled by a reduction in such symptoms, as well as reduced delirium severity and duration without toxicity, and in the absence of these outcomes it is questionable how they would address patients' delirium-related distress or unsafe behaviour.

Implications of results

Results indicate that clinicians' striving for related workplace and wider learning, sufficient human resources, and instrumental interdisciplinary relationships supports them to deliver humane and evidence-based delirium treatment. Under-utilised influences that may prove supportive if developed include physical and psychological skills and memory aids (*capability*) and focused roles, optimism, and reinforcement (*motivation*). Clinicians' varying beliefs about the consequences of using pharmacological intervention for delirium are important to respectfully acknowledge and debate in interdisciplinary team meetings and de-briefings. Delirium-related distress and safety issues should be explicitly and proactively acknowledged and addressed at the team and institutional levels, rather than leaving junior and night-working clinicians to deal with these in isolation and times of crisis. Routine attention to proven non-pharmacological delirium prevention strategies would decrease delirium incidence²³ and thereby reduce the consequent adversities. Patients and/or their proxies should be apprised of the evidence-base for antipsychotics for delirium to ensure their informed consent before administration.

The emotionally difficult aspects of delirium profoundly mattered to the clinicians in this survey and therefore should be a focus of future research. This finding was especially pertinent for palliative care clinicians during the last days of patients' lives; and rightly so, as the fear, confusion, and angst that delirium brings gravely threatens the equilibrium and calm that many dying patients would otherwise reach, carers' reintegration following their bereavement, and the well-being of many clinicians at the bedside.^{3, 12, 26} Findings further suggested that clinicians were not seeking to fully sedate patients with delirium. Sedation scales are often used as measures in delirium trials, yet do not precisely measure delirium-

related distress and harms. We therefore recommend explicit measurement of the latter outcomes in future studies, and for sedation to be generally considered an adverse effect of pharmacological intervention for delirium rather than an effectiveness endpoint.²⁵⁻²⁷ Trials of antipsychotics for delirium in patients in the last days of life would help to answer remaining questions about their efficacy and safety at this specific time. Development and testing of alternative therapies, such as those based on family and staff presence, are other avenues.²⁸⁻³⁰ Multi-faceted implementation initiatives that support standard delirium care are needed, and may incorporate auditing, benchmarking, and subsequent refinements in the use of antipsychotics.²⁴ The need for wider dissemination of delirium research to clinicians, including direct communication from lead researchers to clinical sites and at health policy and professional fora, is another key implication of this study.

Limitations

Self-report of practice risks recall, social desirability and volunteer biases, while several authors' involvement in the Agar *et al* study (MA, GC, BD, DR, LB, DCC, AH) and their stance that antipsychotics are ineffective in treating delirium risk confirmation bias.^{15, 31} Risks of bias were addressed by survey piloting, respondent anonymity, inclusion of open-ended items, and objective evaluation. Baseline differences between groups may have contributed to differences in outcomes. As outcome measurement per discipline was not a study objective and numbers of each group greatly ranged (n=25-342), we did not analyse differences between the discipline groups and this is a clear limitation. However, we contend that results are meaningful when viewed from an interdisciplinary standpoint, given the interdependence of medical, nursing and pharmacy practice and the finding that professional interaction was influential. Categorising clinicians from a diverse range of clinical specialties together in the 'other' group for the purposes of comparing palliative care clinicians was an inexact and palliative care-centric distinction that precluded examination of potential differences between other specialties and limits confidence in the comparative results. However, the structured approach to analysis using the Theoretical Domains Framework ultimately indicated that most key influences on clinicians' delirium treatment were relevant across settings. A final limitation is that this report primarily presents a quantitative categorisation of practice influencers by one assessor using this framework, not a higher-order (i.e., thematic) qualitative categorisation of practice influencers by one assessor using the Theoretical Domain Framework, not a higher-order (i.e. thematic) qualitative analysis by all investigators. Valuing all responses about influences,

not just the most frequently reported, would contribute to understanding clinicians' multiple stressors and supports when treating patients with delirium; we therefore plan to report the qualitative analysis elsewhere. A cautious view of the quantification of influences is reinforced by the survey containing items specific to distress and awareness of key studies, which may have contributed to the predominance of the emotion and knowledge domains. To part address these limitations, our Theoretical Domains Framework categorisation of data has been transparently presented with illustrative quotes.

Conclusion

Despite more Australian clinicians reporting delirium treatment practice change since 2016, change was predominantly non-pharmacological and antipsychotic use remains common, especially in palliative care. Clinicians' use of antipsychotics during delirium appears primarily motivated by their concerns about the distress and safety of patients, family and staff caregivers, and others nearby. Greater attention to delirium knowledge dissemination, advocacy for sufficient workplace resources, and appreciation of the value of instrumental interpersonal relationships will support more clinicians to provide evidence-based and humane delirium care. We recommend that future delirium treatment studies objectively confirm practice, aim to reduce antipsychotic use, and test alternative clinical approaches that explicitly target distress and safety outcomes.

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Table 1: Respondent characteristics

n (%)	All 475 (100)	Palliative care 142 (30)	Other [†] 333 (70)	p value (Palliative care vs Other)
Gender				
Female	396 (83)	110 (78)	286 (86)	0.357
Male	67 (14)	27 (19)	40 (12)	0.063
Did not answer	12 (3)	5 (4)	7 (2)	0.373
Age				
20-29 years	27 (6)	6 (4)	21 (6)	0.384
30-39 years	72 (15)	28 (20)	44 (13)	0.096
40-49 years	96 (20)	34 (24)	62 (19)	0.237
50-59 years	165 (35)	49 (35)	116 (35)	0.956
60 years or over	115 (24)	25 (18)	90 (27)	0.056
Discipline				
Nurse	371 (78)	75 (55)	296 (89)	<0.001
- Registered nurse	342 (72)	64 (45)	278 (84)	<0.001
- Nurse Practitioner	29 (6)	11 (8)	18 (5)	0.344
Medical practitioner	79 (17)	66 (47)	13 (4)	0.000
Pharmacist	25 (5)	1 (1)	24 (7)	0.005
Highest qualification				
Certificate/Diploma/Under-graduate degree	117 (25)	23 (16)	94 (28)	0.016
Post-graduate certificate/diploma	155 (33)	38 (27)	117 (35)	0.144
Masters	128 (27)	27 (19)	101 (30)	0.030
Doctorate	14 (3)	4 (3)	10 (3)	-
Fellowship of a Learned College	61 (13)	50 (35)	11 (3)	<0.001
Duration of practice				
≤ 5 years	61 (13)	8 (6)	53 (16)	0.004
6-10 years	57 (12)	22 (16)	35 (11)	0.151
11-19 years	97 (20)	46 (32)	51 (15)	<0.001
20-29 years	80 (17)	21 (15)	59 (18)	0.476
≥ 30 years	180 (38)	45 (32)	135 (41)	0.151
Setting *				
Hospital	305 (64)	95 (67)	210 (63)	0.633
- Public	276 (58)	89 (63)	187 (56)	0.393
- Private	45 (19)	18 (13)	27 (8)	0.139
Residential aged care	118 (25)	36 (25)	82 (25)	0.884
Community service	81 (17)	44 (31)	37 (11)	<0.001
Outpatient clinic	52 (11)	31 (22)	21 (6)	<0.001
General practice	21 (4)	3 (2)	18 (5)	0.118
Other (private rooms, service-wide, hospice, prison, school, telehealth)	26 (6)	13 (9)	13 (4)	0.025
Metropolitan practice setting	295 (62)	94 (66)	201 (60)	0.460
Full-time equivalent working hours > 0.5	383 (81)	120 (85)	263 (79)	0.539
Frequency of seeing a new patient with delirium				
Every day	95 (20)	28 (20)	67 (20)	0.929
Every week	193 (41)	71 (50)	122 (37)	0.036
Every month	116 (24)	30 (21)	86 (26)	0.343
Every three months	71 (15)	13 (9)	58 (17)	0.033

* More than one response possible † Specialities other than PC were: Geriatrics/Aged care n=146 (43.8%), Primary care n=48 (14.4%), Internal Medicine n=35 (10.5%), Psychiatry/mental health n=31 (9.3%), Perioperative n=30 (9%), Emergency n=23 (6.9%), Critical care n=18 (5.4%), Other n=57 (17.1%) (Administration, Aged care, Burns, Cardiology, Discharge Planning, Drug and Alcohol, Education, Management, Maternity, Mental Health, Neurology, Oncology, Orthopaedics, Paediatrics, Rehabilitation, Respiratory, Rural and Remote, Stoma Therapy)

Table 2: Current pharmacological practice

Items n (%)	All n=475	Palliative care n=142	Other n=333	p value (PC vs O)
Pharmacological practice - Q: In the last 12 months, did you ever use a medication to treat delirium? ** †				
No off-label medication use	182 (38)	20 (14)	162 (49)	<0.001
Antipsychotics	260 (55)	112 (79)	148 (44)	<0.001
Benzodiazepines	172 (36)	86 (61)	86 (26)	<0.001
Melatonin	52 (11)	22 (15)	30 (9)	0.051
Other (antidepressants, antipyretics, anxiolytics, clonidine, corticosteroids, dexmedetomidin, phenobarbitone)	9 (2)	6 (4)	4 (1)	-
Q: In the last 12 months, what proportion of your delirious patients did you use these medications?				
Completion rate n/d (%)	288/293 (98)	118/122 (97)	170/171 (99)	0.819
Less than one third				
- Any off-label medication	117 (41)	31 (26)	86 (51)	0.001
- Antipsychotics	101/255 (40)	29/108 (27)	72/147 (49)	0.006
Between one and two thirds				
- Any off-label medication	113/288 (39)	56/118 (48)	57/170 (34)	0.063
- Antipsychotics	100/255 (39)	48/108 (44)	52/147 (35)	0.253
More than two thirds				
- Any off-label medication	58/288 (20)	31/118 (26)	27/170 (16)	0.053
- Antipsychotics	54/255 (21)	31/108 (29)	23/147 (16)	0.025
Q: When you used antipsychotics for delirious patients in the last 12 months, what was your goal/s of care? †				
Completion rate	193 (74)	93 (83)	100 (68)	0.152
Decrease intensity of patient distress	153 (79)	84 (90)	69 (69)	0.096
Restrain behaviours that threaten safety of patient and/or others ^α	130 (67)	66 (71)	64 (64)	0.556
Decrease severity of particular feature/s of delirium ^β	74 (38)	41 (44)	33 (33)	0.214
Decrease delirium severity	68 (35)	36 (39)	32 (32)	0.433
Decrease delirium duration	41 (21)	21 (23)	20 (20)	0.698
Other ^γ	8 (4)	5 (5)	2 (2)	-

** Response rate not determinable † More than one response possible

^α **Behaviours:** Physical aggression (79.2%); climbing out of bed/falls/risk of falls (30.8%); wandering/intrusion/absconding or risk of absconding (20.8%); disruption to care (e.g. pulling out IDC, IV lines) (17.7%); verbal aggression (14.6); other behaviours (removal of clothes, toileting in open area) (9.2%)

^β **Features of delirium:** Behavioural disturbance (47.3%); increased psychomotor activity (41.9%); perceptual disturbance (29.7%); sleep disturbance (8.1%); decreased psychomotor activity (4.1%)

^γ **Other:** Family distress/coping; Relieve distress by optimising pain management; Prevent escalation of behaviour; After 2-3 days of agitation; Enable procedure/diagnostics

Table 3: Theoretical Domains Framework categorisation of all reported influencers on delirium treatment practice and practice change

Sources of Behaviour	Domains elements identified n (%)	All	Palliative care	Other	p value
Response rate n/d (%)		348/475 (73)	118/142 (83)	230/333 (69)	0.102
Motivation	Emotion: Patient distress, symptoms and unsafe behaviours; Influence of the patient being in the terminal phase (PC respondents only)	187 (54)	97 (82)	90 (39)	<0.001
	Beliefs about consequences: Medications considered effective for delirium; Medication considered ineffective for delirium and/or harmful; Not intervening thought harmful; Agar et al trial outcomes thought not to apply to imminently dying patients	32 (9)	12 (10)	20 (9)	0.67
	Social/professional role & identify (Reflective): Leadership in hospital-wide strategies	25 (7)	7 (6)	18 (8)	0.53
	Goals: Determining/acting on the patient's goals of care; Safety as a goal	20 (6)	17 (14)	3 (1)	<0.001
	Social/professional role & identify (Automatic): Practice differed in palliative care from other specialities; Customary practice; Nurses' uncertainty and deference to others	20 (6)	5 (4)	15 (7)	0.40
	Beliefs about capabilities: Capable nurses valued; Self-confidence; Perceived lack of others' competence	17 (5)	3 (3)	14 (6)	0.16
	Intention: Conscious efforts to increase use of non-pharmacological interventions and/or decrease use of medication	12 (3)	8 (7)	4 (1)	0.02
	Optimism (Automatic): Potential for rapid resolution of delirium	1 (0.3)	0	1 (0.4)	-
	Reinforcement	0	0	0	-
Optimism (Reflective)	0	0	0	-	
Capability	Knowledge: Awareness of key named studies, plus other studies, academic literature, guidelines, and "updates"; Training and education (including post-graduate studies in delirium, dementia, gerontology, primary health care), Undertaking research; "common sense" and "clinical knowledge"; Lack of knowledge/requests for knowledge	184 (53)	72 (51)	112 (49)	0.14
	Skills (Psychological): Development of interpersonal skills through clinical experience and reflection on practice; Missing opportunities for skill development	25 (7)	6 (5)	19 (8)	0.30
	Memory, attention and decision processes: Decision-making according to the different causes of delirium, circumstances, and patients; Tiredness, work burden and weariness with researchers' and advanced practice nurses' advice	3 (1)	0	3 (1)	-
	Behavioural	0	0	0	-
	Skills (Physical)	0	0	0	-
Opportunity	Physical: Resource limitations; Setting contribution to delirium; Environmental supports; Salient personal experiences	151 (43)	43 (36)	108 (47)	0.16
	Social: Learning from/with colleagues; Consultation with other clinicians and services; Teaching/leading colleagues; Feeling pressured or stymied by colleagues; Interdisciplinary approach (including family); Interactions with others through studies, conferences and state/national programs	72 (21)	31 (26)	41 (18)	0.10

Code: Over 50% respondents 20-49.9% respondents 0-19.9% respondents

Supplementary file 1: Master copy of online survey of **medical/nurse practitioner/registered nurse/pharmacist** practice in the treatment of delirium*

Landing page

UTS HREC REF NO. ETH18-2969 Clinical practice in the treatment of delirium

Thank you for considering this survey!

This online survey is about the treatment of delirium. You have been invited to participate because you are a **medical professional**/Nurse (wording applied to both **registered nurses** and **nurse practitioners**)/**pharmacist** who may provide clinical care for delirious patients. Your experience and insights, along with those of (other clinicians) in related surveys, will help us to understand current practice and what has influenced it.

The researchers of this study are (Blinded for review).

You are eligible to participate if you are a **medical professional**/ **registered nurse** or **nurse practitioner**/**pharmacist** working clinically in Australia.

Participation is voluntary: it is completely up to you whether or not you decide to take part. You can change your mind at any time and stop completing the survey.

The online survey includes questions about your demographics and clinical practice in delirium treatment. It will take around 10 minutes to complete.

We do not expect that completing the survey will cause any distress. However, if you experience any problems due to participating, you can let the researcher know and they will provide you with assistance.

The information you provide will be anonymous, and published and presented in a form that does not identify you.

All information obtained in the survey will be accessible only by relevant study staff, securely stored for five years, and then destroyed.

If you have concerns about this survey, please feel free to contact (Blinded for review) on (phone number) or (email address).

If you would like to talk to someone who is not connected with the research, you may contact the Research Ethics Officer on 02 9514 9772 or Research.Ethics@uts.edu.au and quote this number [UTS HREC REF NO. ETH18-2969]

Answering the survey questions indicates that you consent to participate. Thank you!

Section A: Demographic information

This part of the survey is about you and your workplace.

Item	Response options
1. What is your gender?	Male/Female
2. What is your age?	20-29 years/30-39 years/40-49 years/50-59 years/60 years or over
3. What is your highest qualification?	Certificate (Registered nurse)/Diploma (Registered nurse)/Undergraduate degree (Medical/Registered nurse/Pharmacist)/Postgraduate certificate/diploma (Medical/Registered nurse/Pharmacist)/Masters (All)/Doctorate (All)/Fellowship of a Learned College (Medical/Nurse Practitioner)
4. How long have you practised medicine /been a Nurse Practitioner /been a registered nurse / practiced pharmacy ?	5 or less years/6-10 years/11-19 years/20-29 years/30 years or more
5. What is your specialty? (Please tick all that apply)/ In what area of speciality do you practice? (Please tick all that apply) (NP and RN)/ What is your area of expertise (Please tick all that apply)	Geriatrics or Aged care/Psychiatry/Internal Medicine/Primary Care/Palliative Care/Other (State)
6. What is the setting of your clinical practice? (Please tick all that apply)	General practice/Inpatient public hospital/Inpatient private hospital/Private rooms/Residential aged care/Outpatient clinic/Other (State other)
7. What state or territory do you practice in most?	NT/QLD/NSW/ACT/VIC/SA/TAS/WA
8. Is the majority of your practice in a metropolitan setting?	Yes/No
9. What are your full-time equivalent (FTE) working hours?	0.1-0.5 FTE/0.6-1.0 FTE
10. What is the closest frequency that you encounter a new patient with delirium in your clinical work?	Every day/Every week/Every month/Every three months/Never ('Never' selection exited respondent from survey)

*Colour coding only for the purposes of this supplementary file

Section B: This part of the survey is about your recent practice in the treatment of delirium i.e. during the last 12 months.

Item	Response options
11. In the last 12 months, what are three key things you do to assess and initially treat a delirious patient?	Number 1 /Number 2/Number 3 (Text boxes)
12. In the last 12 months, did you ever prescribe/ prescribe and/or administer/administer/recommend a medication to treat delirium?	Yes/No ('No' response branched to Section C, Item 19)
13. What type?	Benzodiazepines (e.g. lorazepam, midazolam) RN/Antipsychotics (e.g. haloperidol, risperidone, quetiapine) RN/Melatonin/Other (Please specify other)
14. In the last 12 months, what proportion of your delirious patients did you prescribe/ prescribe and/or administer/administer/recommend these medications?	Less than one third/Between one and two thirds/More than two thirds
15. Medical/Nurse Practitioner: What would be your first choice of medication, starting dose and route of administration for a delirious 80- year old, 70kg man with multiple co-morbidities, no cause determined for the delirium, and disruptive behaviour? Registered nurse: What do you consider to be the most appropriate medication, starting dose and route of administration for a delirious 80-year old, 70kg man with multiple co-morbidities, no cause determined for the delirium, and disruptive behaviour? Pharmacist: What would be your recommendation of medication, starting dose and route of administration for a delirious 80-year old, 70kg man with multiple co-morbidities, no cause determined for the delirium, and disruptive behaviour?	Text box
16. Medical/Nurse Practitioner: If the patient did not respond to treatment, what would be your maximum daily dose of this medication by this route? Registered nurse: If the patient did not respond to treatment, what would you consider to be the maximum daily dose of this medication by this route? Pharmacist: If the patient did not respond to treatment, what would be your recommended maximum daily dose of this medication by this route?	Text box
17. Medical: Would you prescribe differently for another delirious male patient of similar age, weight and comorbidity with no disruptive behaviour? Nurse Practitioner: Would a different pharmacological treatment be appropriate for a delirious male patient of similar age, weight and comorbidity with no disruptive behaviour? Registered nurse: Do you think a different pharmacological treatment is appropriate for a delirious male patient of similar age, weight and comorbidity, delirious with no disruptive behaviour? Pharmacist: Would you recommend differently for another male delirious patient of similar age, weight and comorbidity and no disruptive behaviour?	Yes/Likely/Not sure/Unlikely/No
18. When you prescribed /prescribed or administered /administered/recommended antipsychotics for delirious patients in the last 12 months, what was your goal (or goals) of care? (Please tick all that apply) (This question only applied for respondents who selected 'Antipsychotics' in Item 13)	To decrease the overall severity of delirium/To decrease the duration of delirium/To decrease the severity of a particular feature or features of delirium (Please state the feature/s)/To decrease the intensity of the patient's distress/To restrain behaviour/s that threaten the safety of the patient or others (Please give examples of the behaviour/s)/Other (Please specify other)

Section C: The last part of the survey is about what has influenced your practice in delirium treatment in the last three years.

Item	Response options	
19. In the last three years, have you changed anything about the way you treat delirium? (Please tick the option that most applies to you)	- No, I have not changed the way I treat delirium	Branched to Item 20A
	- Yes, I have changed my non-pharmacological treatment of delirium	Please provide details of how your practice has changed, and branched to Item 20B
	- Yes, I have changed my pharmacological treatment of delirium	
20. A: Which of the following studies are you aware of?	<ul style="list-style-type: none"> - Schrijver EJM, de Graaf K, de Vries OJ, et al. Efficacy and safety of haloperidol for in-hospital delirium prevention and treatment: A systematic review of current evidence. <i>European Journal of Internal Medicine</i> 2016 - Neufeld KJ, Yue J, Robinson TN, et al. Antipsychotic Medication for Prevention and Treatment of Delirium in Hospitalized Adults: A Systematic Review and Meta-Analysis. <i>Journal of the American Geriatric Society</i> 2016 - Agar MR, Lawlor PG, Quinn S, et al. Efficacy of oral risperidone, haloperidol, or placebo for symptoms of delirium among patients in palliative care: A randomized clinical trial. <i>JAMA Internal Medicine</i> 2017 - Burry L, Mehta S, Perreault MM, et al. Antipsychotics for treatment of delirium in hospitalised non-ICU patients. <i>Cochrane Database of Systematic Reviews</i> 2018 (None chosen branched to Item 22A) 	
21. A: Which, if any, of these studies influence your current treatment of delirium?	Schrijver, 2016/Neufeld, 2016/Agar, 2017/Burry, 2018	
22. A: Does anything else (including other studies) influence your current practice in the treatment of delirium?	Yes (Please describe)/No (Branched to Item 23)	
20. B: Which of the following studies are you aware of?	<ul style="list-style-type: none"> - Schrijver EJM, de Graaf K, de Vries OJ, et al. Efficacy and safety of haloperidol for in-hospital delirium prevention and treatment: A systematic review of current evidence. <i>European Journal of Internal Medicine</i> 2016 - Neufeld KJ, Yue J, Robinson TN, et al. Antipsychotic Medication for Prevention and Treatment of Delirium in Hospitalized Adults: A Systematic Review and Meta-Analysis. <i>Journal of the American Geriatric Society</i> 2016 - Agar MR, Lawlor PG, Quinn S, et al. Efficacy of oral risperidone, haloperidol, or placebo for symptoms of delirium among patients in palliative care: A randomized clinical trial. <i>JAMA Internal Medicine</i> 2017 - Burry L, Mehta S, Perreault MM, et al. Antipsychotics for treatment of delirium in hospitalised non-ICU patients. <i>Cochrane Database of Systematic Reviews</i> 2018 (None chosen branched to Item 22B) 	
21. B: Which, if any, of these studies influenced you to change the way you treat delirium?	Schrijver, 2016/Neufeld, 2016/Agar, 2017/Burry, 2018	
22. B: Has anything else (including other studies) influenced you to change the way you treat delirium in the last three years?	Yes (Please describe)/No	
23. Do you have any other thoughts about delirium treatment or practice change not already covered in this survey?	Text box	

Thank you! You have now finished the survey. Your time and insights are much appreciated.

If you would like to receive a report of the survey results, please contact xxx so that a copy can be sent to you.

Supplementary Table 1: Awareness and influence of four named studies

n (%)	All	Palliative care	Other	p value (PC vs O)
Completion rate	382 (80)	118 (83)	264 (79)	0.671
Aware of:				
Agar et al 2017	123 (32)	74 (63)	49 (19)	<0.001
Schrijver et al 2016	75 (20)	27 (23)	48 (18)	0.338
Burry et al 2018	71 (19)	26 (22)	45 (17)	0.296
Neufeld et al 2016	70 (18)	16 (14)	54 (21)	0.146
Any	188 (49)	86 (73)	102 (39)	<0.001
Aware of and influenced by:				
Agar et al 2017	86/123 (70)	59/74 (80)	27/49 (55)	0.110
Neufeld et al 2016	39/70 (56)	8/16 (50)	31/54 (57)	0.727
Burry et al 2018	37/71 (52)	13/26 (50)	24/45 (53)	0.851
Schrijver et al 2016	36/75 (48)	11/27 (41)	25/48 (52)	0.496
Any	143/187 (77)	68/86 (79)	75/102 (74)	0.664

Supplementary Table 2: Practice change

Q: In the last three years, have you changed anything about the way you treat delirious patients? (Please tick the option that most applies to you) n (%)	All n=475	Palliative care n=142	Other n=333	P value (PC vs O)
Completion rate	382 (80)	118 (83)	264 (79)	0.671
Yes	226 (59)	86 (73)	139 (53)	0.017
- Non-pharmacological and pharmacological practice change	115 (30)	54 (46)	65 (25)	0.001
- Non-pharmacological practice change	73 (19)	19 (16)	57 (22)	0.266
- Pharmacological practice change	38 (10)	13 (11)	17 (6)	0.140
No	156 (41)	32 (27)	125 (47)	0.004
Please provide details of how your practice has changed				
Completion rate n/d (%)	223/225 (99)	85/86 (99)	138/139 (99)	0.974
Increased non-pharmacological intervention	119 (53)	42 (49)	77 (56)	0.526
Decreased pharmacological intervention	72 (32)	51 (60)	21 (15)	<0.001
Increased communication with patients and/or their family	49 (22)	11 (13)	38 (28)	0.024
Different pharmacological intervention	41 (18)	20 (24)	21 (15)	0.160
Increased screening and/or assessment	36 (16)	7 (8)	29 (21)	0.021
Increased focus on treating reversible causes	33 (15)	8 (9)	25 (18)	0.101
Improved teamwork	25 (11)	6 (7)	19 (14)	0.146
Greater influence on others' practice	22 (10)	6 (7)	16 (12)	0.295
Increased medication review	13 (6)	1 (1)	12 (9)	0.024
Increased overall awareness	10 (5)	2 (2)	8 (6)	0.238
Increased use of guidelines/protocols	6 (3)	2 (2)	4 (3)	0.809

Supplementary Table 3: Key initial actions

Items n (%)	All n=475	Palliative Care n=142	Other n=333	p value (PC vs O)
Key initial actions - Q: Over the last 12 months, what are three key things you did to assess and initially treat a delirious patient?				
Completion rate	465 (98)	140 (99)	325 (98)	0.920
Aspects of assessment	402 (87)	117 (84)	285 (88)	0.661
Cognitive/delirium screening/assessment +/-tool*	137 (30)	38 (27)	99 (31)	0.545
Non-pharmacological strategies	97 (21)	34 (24)	63 (19)	0.288
Communication with patient and/or family	96 (21)	34 (24)	62 (19)	0.257
Treatment of reversible causes	71 (15)	30 (21)	41 (13)	0.026
Teamwork/referral	66 (14)	16 (11)	50 (15)	0.299
Increased supervision/falls prevention/safety	40 (9)	17 (12)	33 (10)	0.549
Medication	27 (6)	14 (10)	13 (4)	0.014
Initiate delirium protocol/pathway/care plan	9 (2)	1 (1)	8 (3)	-
Manage symptoms	6 (1)	2 (1)	4 (1)	-

* Named tools/mnemonics were the: Confusion Assessment Method (CAM) n=31, 4AT n=24, Glasgow Coma Scale (GCS) n=10, Mini-Mental State Examination (MMSE) n=9, Delirium Risk Assessment Tool (DRAT) n=7, Nursing Delirium Screening Scale (NuDESC) n=6, Abbreviated Mental Test Score (AMTS)/ Abbreviated Mental Test 4 (AMT-4) n=4, Alcohol Withdrawal Scale (AWS), Psychogeriatric Assessment Scales (PAS), Six Item Screener (SIS), Confusion Assessment Method for the Intensive Care Unit (CAM-ICU), 3-minute diagnostic assessment for **CAM**-defined delirium (3D-CAM) (all n=2), and the Rowland Universal Dementia Assessment Scale (RUDAS), Kimberley Indigenous Cognitive Assessment (KICA-cog), Confused Hospitalised Older Persons (CHOPS), Brief Cognitive Screens for Older Adults (BOMC), Single Question in Delirium (SQiD), Mini-Cog®, Pain, Infection, Thirst-Hydration, Constipation, Hunger-Nutrition, Environment, Drugs (PITCHED), Cornell Assessment of Pediatric Delirium (all n=1)

Supplementary Table 4: Case study responses

Qs: What would be your first choice of medication, starting dose and route of administration for a delirious 80-year old, 70kg man with multiple co-morbidities, no cause determined for the delirium, and disruptive behaviour? * and If the patient did not respond to treatment, what would be your maximum daily dose of this medication by this route? n (%) (dose ranges in mg)	All	Palliative Care	Other	p value (PC vs O)
Completion rate n/d (%)	218/293 (75)	97/122 (80)	121/171 (71)	0.392
None	12 (6)	4 (4)	8 (7)	0.437
Any antipsychotic	152 (70)	77 (79)	75 (62)	0.126
- Haloperidol	93 (43)	55 (57) (0.25-25mg) **	38 (31) (0.25-30mg)	0.004
- Risperidone	51 (23)	12 (12) (0.25-2mg)	39 (32) (0.25-20mg)	0.003
- Olanzapine	20 (9)	10 (10) (2.5-20mg)	10 (8) (2.5-20mg)	0.620
- Quetiapine	15 (7)	9 (9) (6.25-100mg)	6 (5) (12.5-150mg)	0.227
- Droperidol	1 (1)	-	1 (1) (5mg)	-
- Levomepromazine	1 (1)	1 (1) (nd)	-	-
Any benzodiazepine	36 (17)	17 (18)	19 (16)	0.742
- Lorazepam	15 (7)	7 (7) (0.5-3mg)	8 (7) (0.5-2mg)	0.866
- Midazolam	9 (4)	8 (8) (2.5-60mg)	1 (1) (5mg)	-
- Diazepam	6 (3)	-	6 (5) (2.5-40mg)	-
- Oxazepam	4 (2)	1 (1) (nd)	3 (3) (7.5-15mg)	-
- Clonazepam	3 (1)	3 (3) (0.5-2mg)	-	-
- Alprazolam	1 (1)	-	1 (1) (1mg)	-
- Temazepam	1 (1)	-	1 (1) (10mg)	-
Melatonin	7 (3)	4 (4) (2-4mg)	3 (3) (2mg)	-
Other (paracetamol/analgesia, antibiotic, sodium valproate)	10 (5)	4 (4)	6 (5)	-
Qualified response (e.g. after non-pharmacological strategies, "only if forced", dependent on whether dying/not dying)	43 (20)	17 (18)	26 (22)	0.513
Unsure	13 (6)	3 (3)	10 (8)	0.120
Q: Would you choose differently for another delirious male patient of similar age, weight and comorbidity with no disruptive behaviour?				
Completion rate	216 (99)	96 (99)	120 (99)	0.988
Yes	87 (40)	42 (44)	45 (38)	0.472
Likely	36 (17)	18 (19)	18 (15)	0.502
Not sure	29 (13)	6 (6)	23 (19)	0.010
Unlikely	25 (12)	15 (16)	10 (8)	0.118
No	39 (18)	15 (16)	24 (20)	0.452

* Although question asked for first choice of medication, open response format allowed respondents to nominate more than one.

**One respondent stated: "In palliative care we might not have maximum doses."

Supplementary Table 5: Theoretical Domains Framework categorisation of survey responses with illustrative quotes

TDF domains, definitions and elements ^{1, 2}	Categorisation of survey responses with illustrative quotes
<p>1. C: Physical skills</p> <p>2. C: Psychological skills</p> <p>Ability or proficiency acquired through practice (Skill: development, competence, ability, interpersonal, practice, assessment (of))</p>	<p>No quotes on physical skills.</p> <p>Development of interpersonal skills through clinical experience and reflection on practice: "Caring for patients with delirium and reflecting on the care - what was effective and what was not." (PC) and "With more skills and awareness I am able to use these meds less and less" (Oth)</p> <p>Missing opportunities for skill development: "We also used to run a 'Dementia Experiential Workshop' which was very successful - but sadly no-one does this since Universities (and HETI!) have taken over training in NSW Health, no longer face to face anything." (Oth)</p>
<p>3. C: Knowledge: Awareness of the existence of something (Knowledge of condition, scientific rationale, procedures, and/or task environment)</p>	<p>Awareness of key named studies, plus other studies, academic literature, guidelines, and "updates"; training and education (including post-graduate studies in delirium, dementia, gerontology, primary health care); being involved in related research; "common sense" and "clinical knowledge":</p> <p>"After reading many articles on the subject in the nursing press, I now speak calmly, quietly, slowly and clearly (heavy (country of origin) accent!). Use closed, 'yes' or 'no' questions. Ensure I am speaking to the patient at eye level - not standing over them. Involve family where practical and safe to do so. Try to make the patient understand that I am listening to their worries and taking them seriously." (PC)</p> <p>"Greater comprehension of the impact of illness on older patients - through literature and educational sessions." (Oth)</p> <p>"It is thanks to my masters studies in advanced nursing majoring in aged care some 6 years ago and earlier readings of various journals, including dementia Australia resources, that I have been aware of the ineffectiveness of pharmacological measures for treating delirium long before the current media uproar over pharmacological usage. It is about education. If nurses and doctors are up to date with their best practice or evidenced based practice on delirium, this issue would not have come to a head today. This issue was already identified years ago in academia environment and among nurses." (Oth)</p> <p>"I have done a lot of research on dementia and delirium and diagnosing both conditions." (Oth)</p> <p>Lack of knowledge and requests for the generation and dissemination of more information:</p> <p>"I think most Pall Care physicians have modified their practice in light of recent research and review papers, but I and many of my colleagues feel uncertain about how best to manage severe agitated delirium, and whether antipsychotics may still have a role in this situation" (PC)</p> <p>"Would appreciate more education regarding short, medium and long term outcomes following an episode/episodes of delirium." (PC)</p> <p>"Yes nurses need to be provided with better evidence. Rationales and protocols for pharmacological and non pharmacological management of delirium." (Oth)</p>
<p>4. C: Memory, attention and decision processes: Ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives (Memory, attention,</p>	<p>Decision-making according to the different causes of delirium, circumstances, and patients: "One treatment method does not correspond to another patient, each regime needs to be an individualized approach." (Oth)</p> <p>Tiredness, work burden and weariness with researchers' and advanced practice nurses' opinions: "I think the authors of this kind of research should spend more time actually with staff and patients in the after hours time. Many NP, CNC and academics pontificate about distracting and other techniques. They preach how non pharmacological techniques are preferred but they aren't there at 4am after 6 hours of chaos when the other patients have witnessed and then suffered from the lack of care because all the staff have been distracted by one or two delirious patients. The majority of us become weary of being told we're doing it wrong when Psychogeriatric CNC or NP pop in for 10</p>

attention control, decision making, cognitive overload, tiredness)	<i>minutes at 10am the next morning, when the patient is compliant, to be told the evening/night staff are exaggerating or not really competent in their job."</i> (Oth)
5. C: Behavioural: Anything aimed at managing or changing objectively observed or measured actions (Self-monitoring, breaking habit, action planning)	No relevant quotes
6. M: Social/professional role & identity (Automatic) 7. M: Social/professional role & identity (Reflective) A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting (Social/professional/ organisational: identity, role, boundaries, confidence, leadership, commitment)	Practice differed in palliative care from other specialities: <i>"Because i have changed specialities during the past 3 years (from neurosurgery to currently in palliate care) it has definitely changed. Mainly with the use of benzo's for delirium. Essentially gone from not using them at all to using them mainly to treat delirium as an adjacent with non pharmacological management. This could be because the delirium in neurosurgery is often acute and temporary. However delirium in pallative (sic) care can see terminal agitation which only ends when they die. So the focus of care is very different. My non pharmacological treatment has not changed really."</i> (PC) Customary practice: <i>We frequently give quetiapine for persistent confusion or hallucinations (sic)."</i> (Oth) Leadership: <i>"Chairing Committee to develop hospital-wide strategies for delirium."</i> (Oth) Nurses' uncertainty and deference to others: <i>"I am not an expert in medications to treat delirium so I would defer to medical or pharmacy"</i> (Oth)
8. M: Optimism (Automatic) 9. M: Optimism (Reflective) The confidence that things will happen for the best or that desired goals will be attained (Optimism (including that which is unrealistic), pessimism, identity)	Potential for rapid resolution of delirium: <i>"By recognising that this may be a time limited episode that requires good management rather than pharmacological intervention"</i> (Oth)
10. M: Reinforcement: Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus (Rewards, incentives, punishment, consequents, reinforcement, contingencies, sanctions)	No relevant quotes
11. M: Emotion: A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally	Patient (and family) distress and unsafe behaviours: <i>"Disruptive and dangerous behaviour - striking staff or family, doing risky things - getting up when a falls risk etc. Behaviour that is out of character for the patient and very distressing to family - sexualised verbal abuse, verbal abuse etc. Disruptive frightening hallucinations."</i> (PC)

<p>significant matter or event (Fear, anxiety, affect, stress, depression, positive or negative affect, burn-out)</p>	<p><i>"Particularly if there was distressing delusions and hallucinations and if the person is acting on these psychotic features, wanting to leave, or aggressive to those around them"</i> (Oth)</p> <p>Influence of the patient being in the terminal phase (PC respondents only): <i>"I restrict use of benzodiazepines to preterminal/terminal delirium. I use antipsychotics more in terminal phase and rarely in first instance for non-terminal patients."</i> (PC)</p>
<p>12. M: Goals: Mental representations of outcomes or end states that an individual wants to achieve (Goals, goal priority, target setting, action planning, implementation intention)</p>	<p>Determining/acting on the patient's goals of care: <i>"Check for level or ceiling of care: resuscitation plan, Advance care plan, advance health directive - may not wish investigations or interventions"</i> (PC)</p> <p><i>"Check AHD (Advance Health Directive) to see if active management (eg hospital) is allowed"</i> (Oth)</p> <p>Safety as a goal: <i>"Aim is always to minimise medications. Aim always is to ensure staff and other patients and families are safe."</i> (PC)</p>
<p>13. M: Beliefs about capabilities: Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use (Self-confidence, perceived competence and/or behavioural control, self-efficacy, beliefs, self-esteem, empowerment, professional confidence)</p>	<p>Capable nurses valued: <i>"Experience / skill level of nursing staff"</i> (PC)</p> <p>Self-confidence: <i>"My own post-graduate studies and research pursuits, along with my longstanding experience working with people and families impacted by dementia. This has informed my practice in dementia and delirium care, which emphasises: *promotion holistic and person centred care which recognises the social networks and supports of the person; *recognition medications do not cure, may complicate the clinical picture and not improve quality of life; and *compassion and caring"</i> (Oth)</p> <p>Perceived lack of others' competence: <i>"Poor interventions by medical staff, particularly junior medical staff left unsupervised....There needs to be a general consensus on delirium, assessment, interventions & treatment; junior MOs are left unsupervised & at times, their diagnosis (or lack there of) can be ego driven rather than looking at the patient, they just assume what is going on with patient."</i> (Oth)</p> <p><i>"I find it very hard to have consistency with the treatment of patients with delirium. In my hospital our core patients are elderly and nursing staff continually treat the behaviour with drugs and don't investigate for underlying causes of the confusion, agitation and sometime aggression. Delirium screening is very scarce despite continual education, electronic forms on eMR. It's even scarce finding any well maintained bowel charts, input and output records. Preventative measures are non existent in most cases. It is very frustrating."</i> (Oth)</p> <p><i>"I also think that the general community has poor understanding of delirium and this also impacts the outcomes for people with delirium in a potentially negative way."</i> (Oth)</p>
<p>14. M: Beliefs about consequences: Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation (Beliefs, outcome expectancies and their characteristics, anticipated regret, consequents)</p>	<p>Medication considered effective for delirium: <i>"I think that oral Lorazepam 1mg is appropriate. If the patient is calmed down without having to administer injections, the outcomes can be expected to improve for both staff and patient."</i> (PC) and <i>"Using Haloperidol always is. It the answer"</i> (Oth)</p> <p>Medication considered ineffective for delirium and/or harmful: <i>"Own experience of lack of medication efficacy"</i> (PC)</p> <p><i>"Seeing over sedated patients"</i> (PC)</p> <p><i>"Previous experience of the damage antipsychotics can cause in delirium of treatable organic cause"</i> (Oth)</p> <p><i>"I have great concerns for the appropriate management of older people with delirium in the acute sector. I am a sessional academic at another university and have just finished marking student nurse papers on this subject. In the assessment the students outline an experience in managing delirium in older people. All the acute sector examples had extremely poor outcomes - with 2 critical incidents presented. Both patients died"</i> (Oth)</p>

	<p>Not intervening thought harmful: <i>"The lack of accurate Dx and treatment is harmful. Hoping a person will just get over it should not be the approach taken because of the fear associated with antipsychotic medication and the older person...Awareness of risk to dignity when we do nothing."</i> (PC)</p> <p>Agar et al trial outcomes thought not to apply to imminently dying patients: <i>"Delirium in end of life imminently dying patients is quite different to (sic) much of the literature. The Agar paper does not assist in this setting. I have been told by medical registrars that 'you cannot prescribe Haloperidol for delirious patients now' because of the Agar study. I do not believe that this is what this study tells us"</i> (PC)</p>
<p>15. M: Intentions: A conscious decision to perform a behaviour or a resolve to act in a certain way (Stability of intentions, stages of change model)</p>	<p>Conscious efforts to increase use of non-pharmacological interventions and/or decrease use of medication:</p> <p><i>"Try and use anti-psychotics less"</i> (PC) and</p> <p><i>"I always try the no pharmacological strategy first"</i> (Oth)</p>
<p>16. O: Social opportunity: Interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviour (Social/group: pressure, norms, conformity, comparisons, support, power, conflict, alienation, identity, modelling)</p>	<p>Learning from/with colleagues: <i>"Better general awareness of delirium on the ward has facilitated non-pharmacological treatments...Discussion with colleagues who are also more aware of advances in delirium management"</i> (PC)</p> <p>Consultation with other clinicians and services:</p> <p><i>"Working closely with cognition support service."</i> (PC)</p> <p><i>"Collaboration with other NPs (nurse practitioners) and Palliative Care Physicians"</i> (Oth)</p> <p>Teaching/leading colleagues: <i>"Seeing a patient who received more pharmacological treatment than non-pharmacological treatment for their delirium deteriorate and eventually die so I spoke to an inspirational geriatrician who showed me all the things I thought I knew about delirium were bollocks. I then went and created a learning package, quiz and assignment for my graduate and post graduate nurses which made me realise how little is known 'for sure' and how wrong we get it every day in acute hospital care settings!"</i> (Oth)</p> <p>Feeling pressured or stymied by colleagues: <i>"The other clinicians around me. It's hard to influence others who are convinced they know best, and to go against the grain."</i> (PC) and <i>"Pressure from nursing staff in aged care facilities."</i> (Oth)</p> <p>Interdisciplinary approach (including family):</p> <p><i>"Involving family, OT and physio in non pharmacological management"</i> (PC)</p> <p><i>"Compassion is really important and involving those closest to the patient helps."</i> (PC)</p> <p><i>"Utilise family and friends to help keep patient orientated and to endeavour to gain their trust"</i> (Oth)</p> <p>Interactions with others through studies, conferences and state/national programs:</p> <p><i>"Attendance at De(c)lared 2018 Australasian Delirium Society conference."</i> (PC)</p> <p><i>"Multiple discussions with colleagues, papers at Journal Clubs...Our unit has improved its screening for delirium, and has focussed much more on environmental triggers (both as a result of having participated in a research project on delirium). We use less antipsychotics (but still use them for very florid agitated delirium and/or intractable delirium) and are more likely to use low dose benzodiazepines as first line pharmacological agents"</i> (PC)</p> <p><i>"Involvement in a study with another researcher"</i> (PC)</p> <p><i>"ACI CHOPs pilots and the ACSQHC Delirium standards as well as the excellent work of Prof Sharon Inouye"</i> (Oth)</p>

<p>17. O: Physical opportunity: Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour (Environmental/organisational: stressors, resources, culture, climate, salient events or critical incidents, interactions with persons, barriers and facilitators)</p>	<p>Resource limitations:</p> <p>"Hospital resources (eg I can't implement all the non pharmacological interventions I would like due to limitations in resources)" (PC)</p> <p>"Most public hospital and all private hospital units run with minimum staffing levels and can never match idealised research unit levels of staffing to assist with reorientation and monitoring. Whatever damage the drugs do it seems less than the damage an uncontrolled patient may do" (PC)</p> <p>"Hospital wards are busy, and I think for a long time we have used medication to help us more so than the patient." (PC)</p> <p>"Significant pressure by RACF providers to minimise challenging behaviours - frequently wanting to transfer individuals into hospital. Therefore at times use of anti-psychotics reflects that pressure." (PC)</p> <p>"I am concerned that we treat the symptomology of delirium rather than looking at root cause and correcting this, and then educating clients about what has occurred and how to pick up their own changed physical and mental state earlier rather than at point of needing an ambulance and a hospital admission. This entails a continuity of care from a nurse or GP over time. The health system is becoming very knee jerk reactive and less able to develop a caring relationship with the clients." (Oth)</p> <p>"I am dismayed by the continuing response of the acute sector to reach out for antipsychotics and benzos despite the lack of evidence supporting use. There is an urgent need for a change of culture which responds to the person, recognises the changes brought on by ageing and the need for more integrated and less 'single-system' care. Clinicians need to be supported by systems to be proactive and not reactive." (Oth)</p> <p>"I work in a rural setting, and the local hospital is totally unsuited to the management and safety of people with delirium on BG (background) of cognitive impairment. MO's and other clinicians fiercely push for admission to our Older Person's Acute Unit" (Oth)</p> <p>"Would like to see more nurse practitioner input especially in large residential care organisations and remote access to them for rural and remote facilities" (Oth)</p> <p>Setting contribution to delirium: "Hospital environments promote rather than help delirium. Greater consideration of hospital environments that are less institutional, allow people to safely 'wander', and provide some form of meaningful activity to people who are agitated is needed. There is often a push from clinicians without aged care or palliative care experience to respond to agitated delirium with medications. If we are to reduce antipsychotic use for delirium, alternatives to safely manage behaviour are needed. The expertise of experienced nurses and AINs in behavioural management is greatly under-appreciated. These people are key to reducing medication use." (Oth)</p> <p>Environmental supports:</p> <p>"Support from our Liaison Psychiatry Team (providing nursing education and support for behavioural management strategies)...Well trained and experienced Aged Care Nurses who are happy to implement behavioural management strategies and also want to reduce antipsychotic use...I use less medications, play closer attention to aggravating factors and try and use behavioural management strategies more. The latter is only possible as there is better access to well trained Assistants-in-Nursing in the ward I currently work in than in previous sites. They initiate and implement behavioural management strategies and make a huge difference to the care of agitated patients, and I'm sure mean we use less antipsychotics." (Oth)</p> <p>"CARPA standard treatment manual used across remote Australia, focused on remote Indigenous population: www.remotephmanuals.com.au" (Oth)</p> <p>"Hospital policy and guidelines" (Oth)</p>
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	<p>"Watching how Dementia Behaviour specialist work - they always rule out delirium (sic) with a screen for organic disease first. Now it has become a hospital policy." (Oth)</p> <p>"The Australian Commission on Safety and Quality in Health Care (ACSQHC) Delirium Clinical Care Standard. ACSQHC A Better Way to Care: Safe and high quality care for patients with cognitive impairment (Actions for Clinicians and Managers) resources Version 2 of the ACSQHC National Health Service Standards - particularly Standard 5 Comprehensive Care and Standard 8 Recognising and Responding to Clinical Deterioration in Acute Health Care ACI Care of the Confused Hospitalised Older Persons (CHOPs) program. NICE Delirium prevention, diagnosis and management clinical guideline" (Oth)</p> <p>"Our workplace is very good at managing these patients with a strong focus on reassurance, adequate medication where necessary, avoiding over medication/ sedation and special care 1:1 when pt is in danger of self harm or harm to others." (Oth)</p> <p>"Introduction of cognitive impairment screening tool and policy in how to recognise and manage delirium." (Oth)</p> <p>"Australian medicines handbook - aged care companion...eTG - Pall care. SA health policies eg agitation and behavioural disturbance and delirium pathways exist" (Oth)</p> <p>Salient personal experiences: "Personal experience in that my mother who has Parkinson's Disease was hospitalised after a fall resulted in broken ribs. This resulted in a chest infection. She experienced a Delirium and was prescribed Risperidone and Haloperidol. They had a disastrous effect on her and did not mix well with the medications she was taking for Parkinson's Disease. The Risperidone and Haloperidol were subsequently ceased. The Delirium took almost 30 days to resolve. This made me very much more aware of Delirium and how it effected (sic) patients." (Oth)</p>
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Code: C: Capability **M:** Motivation **O:** Opportunity **Oth:** Other respondent **PC:** Palliative Care respondent

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