Critically Appraised Topic Portfolio:
Reducing Delirium in Patients with COVID-19

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Overview of Critically Appraised Topic Portfolio

The final portfolio contains five research articles from national and international journals. Study designs include three randomized controlled trials, one non-randomized controlled trial, and one quasi-experimental quantitative design. All studies relate directly to interventions within the OT scope of practice and implemented in the acute care setting. Due to limited research on the novel coronavirus, these findings apply to critically ill patients but are not specific to patients with COVID-19. We considered the application of this research evidence to individuals with COVID-19 by incorporating the clinical experience of our practitioner-mentor. Promising evidence can be used to draft new practice guidelines for decreasing delirium in critically ill patients within the acute care setting.

Reducing Delirium in Patients with COVID-19

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Evidence-Based Practice Question: What occupation-based interventions are effective in decreasing delirium in patients with COVID-19?

Clinical Scenario: According to our mentor, 90% of her patients have experienced delirium as a side effect of COVID-19. Patients of all ages are experiencing the effects of delirium due to COVID-19, with side effects consisting of mood shifts, brain fog, shifts in memory, slow cognitive processing, and lack of engagement. It is predicted that isolation, decreased socialization, and lack of participation in routines and leisure activities were factors contributing to delirium. Determining the most effective interventions for decreasing delirium will provide the best outcomes for the patients.

Search Methodology and Terms

PICO Question Categories	**Search Terms Used**
Population	Patients with COVID-19 experiencing delirium
Intervention	Occupation-based interventions
Comparison	N/A
Outcomes	Decreased delirium

Databases Searched	**Search Terms**	**Limits Used**
PubMed	(("COVID-19" [Supplementary Concept] OR "severe acute respiratory syndrome coronavirus 2" [Supplementary Concept]) OR ("COVID 19"[tw] OR "COVID-19"[tw] OR "COVID19"[tw] OR "COVID 2019"[tw] OR "COVID-2019"[tw] OR "COVID2019"[tw] OR "coronavirus"[tw] OR "corona virus"[tw] OR "Corona virinae"[tw] OR "coronavirinae"[tw] OR "severe acute respiratory syndrome coronavirus 2"[tw] OR "SARS-CoV-2"[tw] OR "SARSCoV2"[tw] OR "SARS CoV 2"[tw] OR "SARS coronavirus 2"[tw] OR "2019nCoV"[tw] OR "2019-nCoV"[tw] OR "2019 ncov"[tw] OR "nCoV-2019"[tw] OR "nCoV2019"[tw] OR "nCoV 2019"[tw] OR "betacoronavirus"[tw]) AND (interventions OR therapy OR strategy OR program) AND (delirium OR confusion))	English, publication date within 1 year
	((ICU patients) AND (music therapy) AND (delirium))	English, publication date within 1 year
	((ICU) AND (family visitation) AND (delirium))	English, publication date within 2 years
	((delirium) AND (interventions OR programs OR therapy))	English, publication date within 5 years, RCT, Clinical Trial
CINAHL	((coronavirus OR covid-19 OR COVID-19 OR SARS-CoV-2) AND (interventions OR therapy OR strategy OR program) AND (delirium OR confusion))	English, publication date within 6 years
	(delirium OR confusion OR sundowning) AND (interventions OR therapy OR strategy OR program)	English, publication date within 5 years, Academic Journals, Trials
BioMed Central	((COVID-19 OR SARS-CoV-2) AND (occupational interventions) AND (delirium OR confused))	N/A

Inclusion Criteria	**Exclusion Criteria**
• Articles published in English • Participants with delirium • Hospital setting	• Participants with dementia • Less rigorous (Level IV and V) research designs • Articles published over 6 years ago

Review Process: The clinical question was developed following our practitioner-mentor meeting after learning a large number of patients are experiencing delirium as a symptom of COVID-19. The novel coronavirus presents with limited research; therefore, our search terms were used in various combinations in order to yield relevant research to our clinical topic. We consulted a research and learning services librarian to determine an effective search and screening strategy. The inclusion and exclusion criteria were applied to our searches to ensure relevant and high-quality evidence was yielded. Database filters were used, and articles were screened by title and abstract. Refer to Appendix to view the modified PRISMA form illustrating article selection. 5 articles were critically appraised using the

critically appraised paper form from Hissong et al. (2015). In addition, the evaluation of study design form from Law & MacDermid (2014) was used to determine a quality score for each article. In order to ensure quality control, each critically appraised paper form was individually reviewed by the faculty advisor and later edited by our research team in response to feedback. Furthermore, a peer evaluation was conducted prior to finalizing our critically appraised topic.

Search Results by Level of Evidence

Level of Evidence	Study Design	Number of Articles Included
I	High-quality randomized controlled trial	3
II	Non-randomized controlled trial	1
III	Quasi-experimental quantitative	1

Main Findings	
Level I	Khan et al., (2020). Quality Score: 70% ● 120 minutes a day of slow-tempo music intervention and implementation of audiobooks non-significantly reduced delirium. Martinez et al., (2012). Quality Score: 88% ● A multicomponent intervention (family visitation/participation, clock and calendar present, familiar objects in the room, etc.) delivered by family members significantly reduced the incidence of delirium. Álvarez et al., (2017). Quality Score: 88% ● Early and intensive OT interventions (positioning to prevent edema and pressure sores, activities of daily living, family participation, cognitive stimulation) in combination with non-pharmacologic strategies (family education, clock and calendar present, avoidance of sensory deprivation, etc.) significantly reduced delirium. Severity of delirium did not significantly differ between experimental and control groups.
Level II	Mudge et al., (2013). Quality Score: 80% ● Multisensory diversion and relaxation strategies, reorientation, de-escalation of agitation, encouraging independence, nutrition and hydration, and patient/caregiver information significantly reduced delirium.
Level III	Chong et al., (2013). Quality Score: 64% ● Bright-light therapy for four hours a day as part of a multicomponent intervention program showed significant short-term improvement in delirium, functional status, and sleep.

Limitations	
Level I	Khan et al., (2020) ● Small sample size, intervention was discontinued after the patient transferred from the ICU, and data was not adjusted in regard to physiological stress from vasopressors and inotropic agents. Martinez et al., (2012) ● Family members were allowed to implement certain measures (incidence of delirium was lower than expected), simple data masking, and small number of patients per room. Álvarez et al., (2017) ● Conflict of interest (some researchers received fees through an award), increased delirium rates could be due to age over 80, and attrition (loss of 10 participants to follow-up due to transfer to another medical center, unexpected discharge, or passing away).
Level II	Mudge et al., (2013) ● Small sample size, not cost-effective.
Level III	Chong et al., (2013) ● No control group, groups not randomly selected, difficult to conclude whether improvements were directly due to bright light therapy, risk of observer bias.

Bottom Line and Recommendations: Multicomponent interventions including family education, clock and calendar, avoidance of sensory deprivation, familiar objects, reorientation of patients, and extended visitation times are effective interventions for decreasing delirium. However, multicomponent interventions in combination with OT interventions twice a day significantly reduced delirium compared to those who only received multicomponent interventions. Early and intensive OT interventions include positioning to prevent edema and pressure sores, cognitive stimulation activities (notebook, sequencing cards, card games, dominos, memory and visual perception games), activities of daily living to promote independent living, and family participation. In addition to multicomponent intervention strategies and OT interventions, promising evidence suggests having one hundred twenty minutes a day of music intervention and four hours of bright light therapy in the evening improves delirium and functional status. Due to the participants in the studies experiencing delirium without having COVID-19, we recommend that these interventions be implemented with caution monitoring the effectiveness.

References

Álvarez, E. A., Garrido, M. A., Tobar, E. A., Prieto, S. A., Vergara, S. O., Briceño, C.D., & González, F. J. (2017). Occupational therapy for delirium management in elderly patients without mechanical ventilation in an intensive care unit: A pilot randomized clinical trial. *Journal of Critical Care*, *37*(10), 85-90. https://doi.org.ezproxy.uthsc.edu/10.1016/j.jcrc.2016.09.002

Chong, M. S., Tan, K. T., Tay, L., Wong, Y. M., & Ancoli-Israel, S. (2013). Bright light therapy as part of a multicomponent management program improves sleep and functional outcomes in delirious older hospitalized adults. *Clinical Interventions In Aging*, *3*(8), 565–572. https://doi.org/10.2147/CIA.S44926

*Hissong A. N., Lape, J. E., & Bailey, D. M. (2015). Understanding the triad of evidence-based practice. *Bailey's research for the health professional* (3rd ed., pp.137–139). Philadelphia: F.A. Davis Company.

Khan, S. H., Xu, C., Purpura, R., Durrani, S., Lindroth, H., Wang, S., Gao, S., Heiderscheit, A., Chlan, L., Boustani, M., & Khan, B. A. (2020). Decreasing delirium through music: A randomized pilot trial. *American Journal of Critical Care, 29*(2), e31-e38. https://doi.org/10.4037/ajcc2020175

*Law, M. & MacDermid, J., (Eds.). (2014). Evaluation of quality of an intervention study: Form and guidelines. *Evidence-based rehabilitation: A guide to practice* (3rd ed., pp. 393-400). Thorofare, NJ: SLACK. Inc.

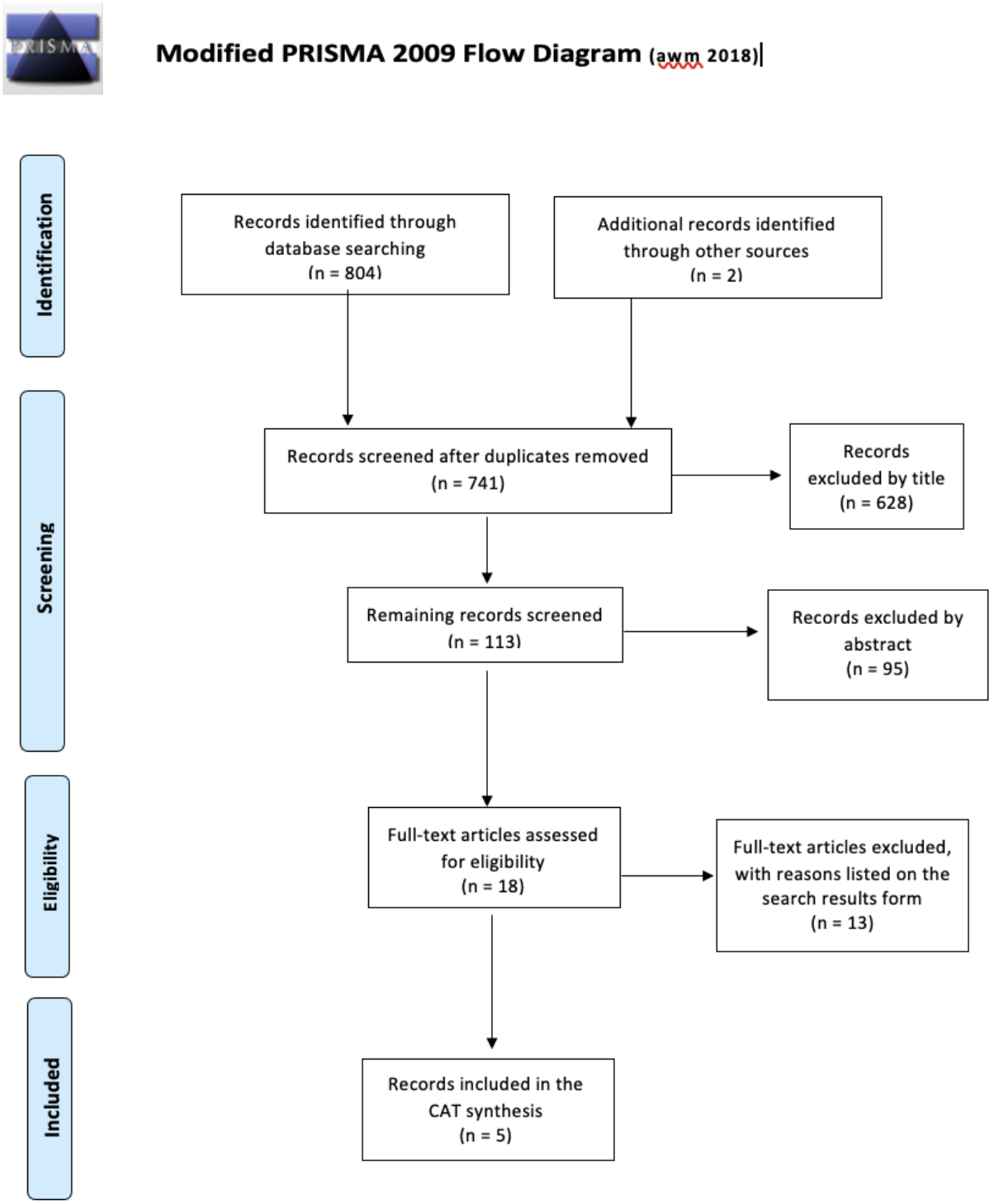
Martinez, F. T., Tobar, C., Beddings, C. I., Vallejo, G., & Fuentes, P. (2012). Preventing delirium in an acute hospital using a non-pharmacological intervention. *Age and Ageing*, *41*(5), 629–634. https://doi.org/10.1093/ageing/afs060

Mudge, A. M., Maussen, C., Duncan, J., & Denaro, C. P. (2013). Improving quality of delirium care in a general medical service with established interdisciplinary care: A controlled trial. *Internal medicine journal*, *43*(3), 270–277. https://doi.org/10.1111/j.1445-5994.2012.02840.x

Note: *Reference was not critically appraised

Appendix

Team Modified PRISMA Form



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit www.prisma-statement.org.

Reducing Delirium in Patients with COVID-19

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Faculty Advisor: Anita Mitchell, PhD, OTR, FAOTA
Practitioner-Mentor: Mary Matthies, OTR/L

PICO QUESTION

What occupation-based interventions are effective in decreasing delirium in patients with COVID-19?

BACKGROUND & RATIONALE

- Significant rise in patients with COVID-19 experiencing symptoms of delirium within the last year
- Symptoms: psychosis with mood shifts, brain fog, shifts in memory, slow cognitive processing, and lack of engagement
- Purpose of the project: search, appraise, and synthesize the evidence regarding delirium in patients with COVID-19

REVIEW PROCESS

Clinical question developed → Databases searched → Evidence appraised → Evidence synthesized and integrated → Reviewed by faculty and peers

SEARCH METHODOLOGY

Databases Searched	Search Terms	Inclusion Criteria	Exclusion Criteria
PubMed CINAHL BioMed Central	**P**: COVID-19, "severe acute respiratory syndrome coronavirus 2," corona virus, corona virinae, SARS-CoV-2, 2019-nCoV, "betacoronavirus," ICU, "ICU patients" **I**: interventions, therapy, strategy, program, family visitation, music therapy **O**: delirium, confusion	• Articles published in English • Participants with delirium • Hospital setting	• Participants with dementia • Less rigorous research designs • Articles published over six years ago

Note: Terms searched in various combinations

Records identified through search: 804 → Records screened: 741 → Records excluded by title: 628 → Records excluded by abstract: 95 → Full-text articles assessed for eligibility: 18 → Articles included in CAT synthesis: 5

MAIN FINDINGS

Level of Evidence	Citation	Intervention	Outcome Measures	Results
Level I	Khan et al. (2020) Quality Score: 70%	120 minutes a day of slow-tempo music Audiobooks	CAM	±
	Martinez et al. (2012) Quality Score: 88%	Multicomponent intervention delivered by family members: • Provision of a clock in the room • Extended visitation times • Presence of familiar objects in the room • Reorientation of patient	CAM	+
	Álvarez et al. (2017) Quality Score: 88%	Early and intensive OT interventions: • Positioning to prevent edema and pressure sores • Activities of daily living • Family participation • Cognitive stimulation Non-pharmacologic strategies: • Family education • Clock and calendar • Avoidance of sensory deprivation • Familiar objects • Reorientation of patients • Extended visitation times	CAM DRS	+ ±
Level II	Mudge et al. (2013) Quality Score: 80%	• Multisensory diversion and relaxation strategies • Reorientation • De-escalate agitation • Encourage independence • Nutrition and hydration • Patient/caregiver information	AMT CAM MMSE	+
Level III	Chong et al. (2013) Quality Score: 64%	Bright-light therapy (2000-3000 lux) for four hours daily as part of a multicomponent intervention	DRS CMMSE MBI	+

Note: OT = occupational therapy; + = significant improvement; ±= non-significant improvement; CAM = Confusion Assessment Method; DRS = Delirium Rating Scale; AMT = Abbreviated Mental Test; MMSE = Mini Mental State Exam; CMMSE = Chinese Mini Mental State Exam; MBI = Modified Barthel Index

LIMITATIONS

Small sample size	Data not adjusted to physiological stress	Simple data masking	Small number of patients per room	Conflict of interest
Attrition	Not cost-effective	No control group	Groups not randomly selected	Risk of observer bias

CLINICAL UTILITY

- **Applicable Interventions**
  - Multicomponent interventions
  - Early & intensive OT interventions
- **Modified Interventions**
  - Slow-tempo music
  - Family participation/visitation times
- **Acute Care Barriers**
  - Minimal time for OT interventions
  - Patient agitation, medical stability, & alertness
  - Patient to therapist ratio

CLINICAL BOTTOM LINES

Strong evidence suggests early and intensive OT intervention in combination with multicomponent intervention strategies decrease delirium → Promising evidence suggests music and bright-light therapy decrease delirium → Research is needed on patients with COVID-19 experiencing delirium

RECOMMENDATIONS

- All interventions should be implemented with caution monitoring the effectiveness for patients with COVID-19.
- Implementation of the interventions as frequently as possible.

TRACKER TOOL

SCAN ME

REFERENCES

SCAN ME

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Critically Appraised Paper #1 Álvarez, E. A., Garrido, M. A., Tobar, E. A., Prieto, S. A., Vergara, S. O., Briceño, C.D., & González, F. J. (2017). Occupational therapy for delirium management in elderly patients without mechanical ventilation in an intensive care unit: A pilot randomized clinical trial. *Journal of Critical Care*, *37*(10), 85-90. https://doi org.ezproxy.uthsc.edu/10.1016/j.jcrc.2016.09.002	
Purpose of the Study	The purpose of the study was to determine the impact of occupational therapy intervention on duration, incidence, and severity of delirium
Setting	Intensive Care Unit (ICU) at University of Chile Clinical Hospital
Participants or Sample	● 140 participants (70 participants in both groups), age 60 or older, 70 males, 70 females ● Reasons for hospital admission: sepsis, renal/hepatic failure, hemorrhage, acute respiratory distress syndrome, cardiac failure, decompensated chronic obstruction, pulmonary disease ● Non-ventilated ● Common comorbidities: GI disease, hypertension, cancer, diabetes, hypothyroidism, heart disease ● Convenience sample: recruited between April 2011 and December 2012 from Medical and Surgical Intensive Care Units. Included patients who fit criteria and signed informed consent forms
Study Design and Methodology	Pilot randomized clinical trial ● Participants were randomly assigned by a computer-generated system to the control group (standard nonpharmacologic strategies – 70 participants) or experimental group (standard nonpharmacologic strategies in combination with early and intensive OT interventions – 70 participants) ● Interventions began during the first 24 hours of admission ● Duration of delirium was evaluated twice a day for five consecutive days using the Confusion Assessment Method (CAM), severity determined using the Delirium Rating Scale
Level of Evidence	Level I

Outcomes and Main Findings	● Density of delirium was significantly lower in the experimental group, with a high statistical power of 82% ● Experimental group had significantly lower risk of developing delirium ● Severity of delirium did not differ significantly between groups ● Secondary outcomes: functional independence was significantly higher in experimental group (measured by FIM), grip strength was significantly higher in both hands in the experimental group
Intervention Highlighted Through the Research	Standard nonpharmacologic strategies in combination with early and intensive OT interventions. Interventions began during the first 24 hours of patient admission to ICU. ● OT intervention: twice a day (morning & evening), 40-minute sessions, five consecutive days ● Positioning to prevent edema and pressure sores (2x/d), cognitive stimulation activities to stimulate mental functions (notebook, sequencing cards, card games, dominos, memory and visual perception games. 2x/d), basic activities of daily living to promote independent living (1x/d – morning), family participation (1x/d)
Limitations	● Conflict of interest: some researchers received fees through an award ● Attrition – loss of 10 participants to follow-up due to transfer to another medical center, unexpected discharge, or passing away ● Increased delirium rates could be due to age over 80
This Study Was Identified as the "Best" Evidence and Selected for the Portfolio for the Following Reasons:	● This study is included because the interventions are specific to occupational therapy and had a positive effect on delirium ● The setting of the study applies to the research question ● This can be applied with caution to the population, because not all patients with COVID-19 experiencing delirium are ventilated ● Implications: due to COVID-19 restrictions, family participation will be virtual or eliminated
Quality Score	88%

Evaluation of Study Design

Evaluation Criteria	**Score**		
Study question	2	1	0

1. Was there relevant and sufficient background work cited that led to a clear research question?		X	
Study design			
2. Was a comparison group used?	X		
3. Was patient status at more than 1 time point considered?	X		
4. Was data collection performed prospectively?	X		
5. Were patients randomized to groups?	X		
6. Was allocation concealed?	X		
7. Were patients blinded to the extent possible?	X		
8. Were treatment providers blinded to the extent possible?		X	
9. Was an independent evaluator used to administer outcome measures?	X		
Subjects			
10. Did sampling procedures minimize sample/selection biases?	X		
11. Were inclusion/exclusion criteria defined?	X		
12. Was an appropriate enrollment obtained?		X	
13. Was appropriate retention/follow-up obtained?	X		
Intervention			
14. Was the intervention applied according to established principles?	X		
15. Were biases due to the treatment provider minimized (i.e., attention, training)?		X	
16. Was the intervention compared to an appropriate comparator?	X		
Outcomes			

17. Was an appropriate primary outcome defined?	X		
18. Were appropriate secondary outcomes considered?	X		
19. Was an appropriate follow-up period incorporated?		X	
Analysis			
20. Was an appropriate statistical test(s) performed to indicate differences related to the intervention?	X		
21. Was it established that the study had significant power to identify treatment effects?	X		
22. Was the size and clinical importance of the treatment group differences reported?	X		
23. Were missing data accounted for and considered in analyses?	X		
24. Were treatment benefits, adverse events and costs/implementation considerations addressed?		X	
Recommendations			
25. Were the conclusions/clinical recommendations supported by the study objectives, analysis and results?	X		
Total Quality Score (Sum of above) =	44		
Quality Score	88%		

Critically Appraised Paper #2 Chong, M. S., Tan, K. T., Tay, L., Wong, Y. M., & Ancoli-Israel, S. (2013). Bright light therapy as part of a multicomponent management program improves sleep and functional outcomes in delirious older hospitalized adults. *Clinical Interventions In Aging*, *8*, 565–572. https://doi.org/10.2147/CIA.S44926	
Purpose of the Study	This study aimed to examine whether evening bright light therapy as part of the Geriatric Monitoring Unit (GMU) improved sleep, cognitive, and functional outcomes in delirious older hospitalized adults. This study can be applied to our PICO question because bright light therapy is an intervention that could be utilized in occupational therapy interventions with COVID-19 clients. While the participants in this particular study did not have COVID-19, the participants still exhibit any of the delirium symptoms seen in clients recovering from COVID-19.
Setting	Specialized delirium management unit, the Geriatric Monitoring Unit, in Tan Tock Seng Hospital, Singapore.
Participants or Sample	228 delirious patients admitted to the GMU between December 2010 to August 2012. Hyperactive delirium (n = 117), mixed delirium (n = 69) and hypoactive delirium (n = 42). Mean age 84.2, predominantly female (56.4%), of Chinese ethnicity (88.2%). Inclusion criteria: Above 65 years of age, admitted to the geriatric medicine department and assessed to have delirium), established by the Confusion Assessment Method (CAM). Exclusion criteria: Medical illnesses that required special monitoring; assessed to be dangerously ill, in a coma, or had a terminal illness; uncommunicative or diagnosed with severe aphasia; demonstrated severely combative behavior; had contraindications to bright light therapy; verbal refusal of GMU admission; prematurely transferred out of the GMU.
Study Design and Methodology	Quasi-experimental quantitative research design. 228 delirious patients classified into a hyperactive, hypoactive, and mixed delirium subtype, based on activity patterns. Pretest/posttest design without control group.

Level of Evidence	Level III
Outcomes and Main Findings	There was a significant improvement in functional status (MBI) at discharge, especially in the hyperactive and mixed delirium subtype. All patients exhibited significant improvement in total sleep time ($p <$ .01), increased length of first sleep bout ($p <$ .01), decreased number of sleep bouts ($p <$ .01), and fewer number of awakenings ($p =$ .03).
Intervention Highlighted Through the Research	Use of bright light therapy as part of a multicomponent intervention program and its effect on functional status and sleep in delirious older hospitalized adults. Bright light therapy (2000-3000 lux) administered via lights installed in the ceiling, turned on from 6-10 pm daily. Eight specially-trained GMU nurses completed hourly patient sleep logs, including total sleep time, number of awakenings, number of sleep bouts, and the length of each sleep bout was computed from the 24-hour sleep log data on admission and discharge from the GMU. Sleep hygiene principles were also practiced. Researchers collected data on patient demographics, duration of delirium, the medical comorbidities and severity of illness, and the precipitating causes of delirium. Cognitive status was assessed using the Chinese Mini-Mental State Examination (CMMSE). Functional status was assessed using a modified Barthel Index (MBI). Both administered during initial and predischarge phases of admission.
Limitations	● No control group. ● Groups not randomly selected. ● Difficult to conclude whether improvements are directly due to bright light therapy due to multicomponent intervention programs. ● Risk of observer bias due to sleep parameters being collected via nurse observations through 24-hour sleep logs.
This Study Was Identified as the "Best" Evidence and Selected for the	Practitioner-mentor mentioned that delirium might be due to dim lighting that is often used in hospitalized patients' rooms which can cause disorientation and disrupt patients' circadian rhythms, increasing risk for delirium. I believe the use of blue-light therapy would be

Portfolio for the Following Reasons:	appropriate for OTs to use with COVID-19 patients who are experiencing delirium in the acute care setting.
Quality Score	64%

Evaluation of Study Design

Evaluation Criteria	**Score**		
Study question	2	1	0
1. Was there relevant and sufficient background work cited that led to a clear research question?	X		
Study design			
2. Was a comparison group used?		X	
3. Was patient status at more than 1 time point considered?	X		
4. Was data collection performed prospectively?	X		
5. Were patients randomized to groups?			X
6. Was allocation concealed?			X
7. Were patients blinded to the extent possible?		X	
8. Were treatment providers blinded to the extent possible?		X	
9. Was an independent evaluator used to administer outcome measures?			X
Subjects			
10. Did sampling procedures minimize sample/selection biases?		X	
11. Were inclusion/exclusion criteria defined?	X		
12. Was an appropriate enrollment obtained?		X	
13. Was appropriate retention/follow-up obtained?	X		
Intervention			

14. Was the intervention applied according to established principles?		X	
15. Were biases due to the treatment provider minimized (i.e., attention, training)?	X		
16. Was the intervention compared to an appropriate comparator?		X	
Outcomes			
17. Was an appropriate primary outcome defined?	X		
18. Were appropriate secondary outcomes considered?	X		
19. Was an appropriate follow-up period incorporated?			X
20. Was an appropriate statistical test(s) performed to indicate differences related to the intervention?	X		
21. Was it established that the study had significant power to identify treatment effects?		X	
22. Was the size and clinical importance of the treatment group differences reported?	X		
23. Were missing data accounted for and considered in analyses?		X	
24. Were treatment benefits, adverse events and costs/implementation considerations addressed?		X	
Recommendations			
25. Were the conclusions/clinical recommendations supported by the study objectives, analysis and results?	X		
Total Quality Score (Sum of above) =	32		
Quality Score	64%		

Critically Appraised Paper #3 Khan, S. H., Xu, C., Purpura, R., Durrani, S., Lindroth, H., Wang, S., Gao, S., Heiderscheit, A., Chlan, L., Boustani, M., & Khan, B. A. (2020). Decreasing delirium through music: A randomized pilot trial. *American Journal of Critical Care, 29*(2), e31-e38. https://doi.org/10.4037/ajcc2020175	
Purpose of the study	The purpose of the study was to determine the feasibility and acceptability of music intervention for patients in the ICU on a ventilator. The purpose relates to the PICO question by providing information on a nonpharmacological intervention that could decrease delirium.
Setting	Intensive Care Unit (ICU)
Participants or Sample	Researchers screened 1,589 patients for this study, but only 117 patients were eligible. Fifty-six patients consented to participate in the study, but fifty-two participants were ultimately randomized. Seventeen participants were randomized to slow-tempo music (STM), 17 were randomized to personalized music (PM), and 18 participants were randomized to attention control (AC). The mean age of the participants was 57.4 years. Forty percent of the participants were African American.
Study Design and Methodology	An RCT was used to randomize patients in STM, PM, or AC groups. Patients received the intervention for two, 1-hour sessions each day for 7 days. Patients listened to music or audiobooks through noise-cancelling headphones attached to mp3 players. Using the CAM-ICU, researchers checked for symptoms of delirium twice each day.
Level of Evidence	Level I
Outcomes and Main Findings	STM and PM are feasible and acceptable interventions for patients in the ICU. Audiobooks were not acceptable to patients. For patients in the STM and AC groups, anxiety and pain scores decreased. Findings suggest that having 120 minutes a day of music intervention, provides a trend toward improved delirium outcomes. In the AC group, twenty-seven percent of patients withdrew after receiving at least one intervention session. Thus, future studies should avoid using audiobooks.

Intervention Highlighted Through Research	Use of slow-tempo music to reduce delirium outcomes in ICU patients for 120 minutes a day.
Limitations	● Small sample size ● Intervention was discontinued after the patient transferred from the ICU. ● Data was not adjusted in regard to physiological stress from vasopressors and inotropic agents. ● The acceptability questionnaire was only completed by the patients that survived and those who could be reached by phone.
This Study Was Identified as the "Best" Evidence and Selected for the Portfolio for the Following Reasons:	● 120 minutes a day of music intervention may provide a trend toward decreased delirium. ● Administering STM intervention may be simpler than administering PM intervention. ● STM and PM are acceptable and feasible interventions for severely ill patients.
Quality Score	70%

Evaluation of Study Design

Evaluation Criteria	**Score**		
Study Question	2	1	0
1. Was there relevant and sufficient background work cited that led to a clear research question?		X	
Study Design			
2. Was a comparison group used?	X		
3. Was patient status at more than 1 time point considered?	X		
4. Was data collection performed prospectively?	X		
5. Were patients randomized to groups?	X		
6. Was allocation concealed?		X	
7. Were patients blinded to the extent possible?		X	

8. Were treatment providers blinded to the extent possible?	X		
9. Was an independent evaluator used to administer outcome measures?	X		
Subjects			
10. Did sampling procedures minimize sample/selection biases?	X		
11. Were inclusion/exclusion criteria defined?	X		
12. Was an appropriate enrollment obtained?			X
13. Was appropriate retention/follow-up obtained?			X
Intervention			
14. Was the intervention applied according to established principles?		X	
15. Were biases due to the treatment provider minimized (i.e., attention, training)?	X		
16. Was the intervention compared to an appropriate comparator?	X		
Outcomes			
17. Was an appropriate primary outcome defined?		X	
18. Were appropriate secondary outcomes considered?	X		
19. Was an appropriate follow-up period incorporated?		X	
Analysis			
20. Was an appropriate statistical test(s) performed to indicate differences related to the interventions?	X		
21. Was it established that the study had significant power to identify treatment effects?			X
22. Was the size and clinical importance of the treatment group differences reported?			X

23.Were missing data accounted for and considered in analysis?	X		
24. Were treatment benefits, adverse events and costs/implementation considerations addressed?	X		
Recommendations			
25. Were the conclusions/clinical recommendations supported by the study objectives, analysis and results?		X	
Total Quality Score (Sum of Above) =	35		
Quality Score	70%		

Critically Appraised Paper #4 Martinez, F. T., Tobar, C., Beddings, C. I., Vallejo, G., & Fuentes, P. (2012). Preventing delirium in an acute hospital using a non-pharmacological intervention. *Age and Ageing*, *41*(5), 629–634. https://doi.org/10.1093/ageing/afs060	
Purpose of the Study	The study was designed to assess the efficacy of multicomponent intervention in delirium prevention.
Setting	The internal medicine ward of the Hospital Naval Almirante Nef from Sept. 2009-June 2010.
Participants or Sample	● 287 patients underwent the randomization process (144 in treatment group & 143 in control group) ● The study sample consisted mainly of female patients (62.7%) with a mean age of 78.2 + or – 6.2 years. ● Common comorbidities were heart failure, chronic obstructive pulmonary disease, and any form of cancer.
Study Design and Methodology	● Single-blind randomized controlled clinical trial ● A total of 287 hospitalized patients at intermediate or high risk of developing delirium were randomized to receive a non-pharmacological intervention delivered by family members (144 patients) or standard management (143 patients)
Level of Evidence	Level 1
Outcomes and Main Findings	● Twenty-seven cases of incident delirium were identified during the observation period. Mixed delirium was the most common subtype, as it was found in 11 (41%) cases. Hypoactive delirium was observed in 10 (37%) cases, and the hyperactive subtype in 6 (22%) cases. ● In the group assigned to receive the multicomponent intervention, delirium developed in 8 (5.6%) cases, while the control group had 19 (13.3%) episodes. These differences were found to be statistically significant.

Intervention Highlighted through the Research	I. Education: the observers conducted brief interviews with each patient's family members, in which the main aspects regarding the clinical features and prognostic implications of acute confusional syndromes were explained. These interviews lasted no more than 10 min overall and were accompanied by a specially designed pamphlet. II. Provision of a clock (analogue or digital as required by the patient) and calendar in the room. III. Avoidance of sensory deprivation (glasses, denture and hearing aids must be available as needed). IV. Presence of familiar objects in the room (photographs, cushions and radio). V. Reorientation of patient provided by family members (current date and time, recent events). VI. Extended visitation times (5 h daily). ○ These non-pharmacological interventions were performed thoroughly by the patient's family members. ○ They were visited on a daily basis to assess the presence of delirium.
Limitations	● Family members of the patients in the control group were allowed to implement certain measures that could influence delirium development (daily visits, provision of orientation objects, sensory support equipment, etc.). The incidence of delirium was lower than expected, a fact that is most likely related to this phenomenon. This could have made our statistical power insufficient to detect differences between groups, but the protective effects of the intervention remained significant. ● Simple data masking ● The small number of patients per room
This study was identified as the "Best" evidence and selected for the	● I included this article because it is an intervention article that shows results of testing non-pharmacological interventions, which helps answer our PICO question. ● This study tested 6 different non-pharmacological interventions that did significantly reduce the incidence of

portfolio for the following reasons:	delirium in a group of elderly medical patients- which we can relate back to our population in our PICO question which is COVID-19 patients who experience delirium.
Quality Score	82%

Evaluation of Study Design

Evaluation Criteria	**Score**		
Study Question	2	1	0
1. Was there relevant and sufficient background work cited that led to a clear research question?	X		
Study Design			
2. Was a comparison group used?	X		
3. Was patient status at more than 1 time point considered?	X		
4. Was data collection performed prospectively?	X		
5. Were patients randomized to groups?	X		
6. Was allocation concealed?		X	
7. Were patients blinded to the extent possible?		X	
8. Were treatment providers blinded to the extent possible?		X	
9. Was an independent evaluator used to administer outcome measures?	X		
Subjects			
10. Did sampling procedures minimize sample/selection biases?	X		
11. Were inclusion/exclusion criteria defined?	X		
12. Was an appropriate enrollment obtained	X		
13. Was appropriate retention/follow-up obtained?			X
Intervention			

14. Was the intervention applied according to established principles?	X		
15. Were biases due to the treatment provider minimized (i.e., attention, training)?	X		
16. Was the intervention compared to an appropriate comparator?	X		
Outcomes			
17. Was an appropriate primary outcome defined?	X		
18. Were appropriate secondary outcomes considered?	X		
19. Was an appropriate follow-up period incorporated?	X		
Analysis			
20. Was an appropriate statistical test(s) performed to indicate differences related to the intervention?	X		
21. Was it established that the study had significant power to identify treatment effects?	X		
22. Was the size and clinical importance of the treatment group differences reported?	X		
23. Were missing data accounted for and considered in analyses?		X	
24. Were treatment benefits, adverse events and costs/ implementation considerations addressed?	X		
Recommendations			
25. Were the conclusions/clinical recommendations supported by the study objectives, analysis and results?	X		
Total Quality Score (Sum of above) =	44		
Quality Score	88%		

Critically Appraised Paper #5 Mudge, A. M., Maussen, C., Duncan, J., & Denaro, C. P. (2013). Improving quality of delirium care in a general medical service with established interdisciplinary care: A controlled trial. *Internal medicine journal*, *43*(3), 270–277. https://doi.org/10.1111/j.1445-5994.2012.02840.x	
Purpose of Study	The purpose of the study is to determine the effectiveness of delirium guidelines for reducing the incidence and duration of delirium in patients.
Setting	The Royal Brisbane and Women's Hospital (RBWH) general medical ward; a teaching hospital in Australia.
Participants or Sample	Participants were patients aged 65 years or older admitted to the intervention team or control teams. Patients could not participate in the study if they were palliative, unconscious, critically ill or had previously documented severe dementia, psychiatric or intellectual disability, or dysphasia.
Study Design and Methodology	The study is a controlled trial. The study intervention was implemented by a multidisciplinary team of clinicians and project staff. A controlled trial evaluation in patients 65 years or older with/at risk of delirium was done, compared with a control medical ward. Participants engaged in interventions that included risk screening, delirium detection, multidisciplinary education, medications to the ward, behavior and medication protocols, and the utilization of nursing assistants and volunteers. Primary outcome measures included incidence and duration of delirium; secondary outcome measures included length of stay, mortality, falls and discharge destination. Process measures consisted of ward moves, use of neuroleptics, allied health review and delirium bay use by patients.
Level of Evidence	Level II
Outcomes and Main Findings	Of the 206 medical patients participating in the study, 22% were delirious at admission and 44% were at risk for delirium. There was no change in status of patients. In regard to the delirious subgroup, there were significantly less intervention participants were discharged with persistent delirium (32% vs 71%, $p = 0.016$), trending with less inpatient mortality (0% vs 18.5%, $p = 0.07$) and falls (11% vs 22%, $p = 0.16$), with one drawback being a longer stay in the medical ward.

Intervention Highlighted Throughout the Research	Strategies were implemented and revised over the 1-year project period. A multidisciplinary team of clinicians and project staff was used to implement strategies. These included education and training (e.g., one-on-one training for nursing assistants and volunteers, ward-based strategies (e.g., nursing assistant trained in multisensory diversion and relaxation strategies supporting behavior management and nursing protocols 5 times per week and four-bed delirium bay with provision of table and chairs for activities, clock and orientation board, appropriate lighting), team strategies (e.g., all team members instructed to provide reorientation, de-escalate agitation, encourage independence and nutrition/hydration, and patient/carer information (e.g., families encouraged to bring familiar objects from home and stay with patient). Delirium screenings took place 5 times per week; anticipated length of stay by patients was 3 days or more.
Limitations	By implementing the clinical practice guidelines, there was a marked reduction in discharge patients with persistent delirium, but it resulted in longer hospital stays and no reduction in one-on-one nursing use, so it was costly. There was improvement in in-hospital mortality rates and falls, but must be interpreted with caution because of the small sample size.
This Study Was Identified as the "Best" Evidence and Selected for the Portfolio for the Following Reasons:	● Related to acute care interventions of patients with delirium, which is related to our clinical question. ● The intervention delivered can be delivered by an occupational therapist. ● The participants and study setting are similar to that of our practitioner-mentor. ● This is a Level II study.
Quality Score	80%

Evaluation of Study Design

Evaluation Criteria	**Score**		
Study Question	2	1	0
1. Was there relevant and sufficient background work cited that led to a clear research question?	X		
Study Design			
2. Was a comparison group used?	X		

3. Was patient status at more than 1 time point considered?	X		
4. Was data collection performed prospectively?	X		
5. Were patients randomized to groups?			X
6. Was allocation concealed?			N/A
7. Were patients blinded to the extent possible?		X	
8. Were treatment providers blinded to the extent possible?		X	
9. Was an independent evaluator used to administer outcome measures?		X	
Subjects			
10. Did sampling procedures minimize sample/selection biases?	X		
11. Were inclusion/exclusion criteria defined?	X		
12. Was an appropriate enrollment obtained		X	
13. Was appropriate retention/follow-up obtained?		X	
Intervention			
14. Was the intervention applied according to established principles?	X		
15. Were biases due to the treatment provider minimized (i.e., attention, training)?	X		
16. Was the intervention compared to an appropriate comparator?	X		
Outcomes			
17. Was an appropriate primary outcome defined?	X		
18. Were appropriate secondary outcomes considered?	X		
19. Was an appropriate follow-up period incorporated?		X	
Analysis			
20. Was an appropriate statistical test(s) performed to indicate differences related to the intervention?	X		
21. Was it established that the study had significant power to identify treatment effects?	X		
22. Was the size and clinical importance of the treatment group differences reported?	X		

23. Were missing data accounted for and considered in analyses?	X		
24. Were treatment benefits, adverse events and costs/implementation considerations addressed?	X		
Recommendations			
25. Were the conclusions/clinical recommendations supported by the study objectives, analysis and results?	X		
Total Quality Score (Sum of above) =	40		
Quality Score	80%		

Recommendations for Implementation

Recommendations

- All interventions should be implemented with caution monitoring the effectiveness for patients with COVID-19.
- Implementation of the interventions as frequently as possible.

Tracker Tool

We created a Delirium Symptoms Tracker for an occupational therapist (OT) to use each session with a client. Using this tracker allows the OT to document each client's delirium symptoms such as brain fog, mood shifts, poor engagement, and slow processing throughout the client's length of stay in the hospital. Furthermore, the OT can track the severity of these symptoms by rating each symptom from 0-5, with 5 being the greatest level of severity.

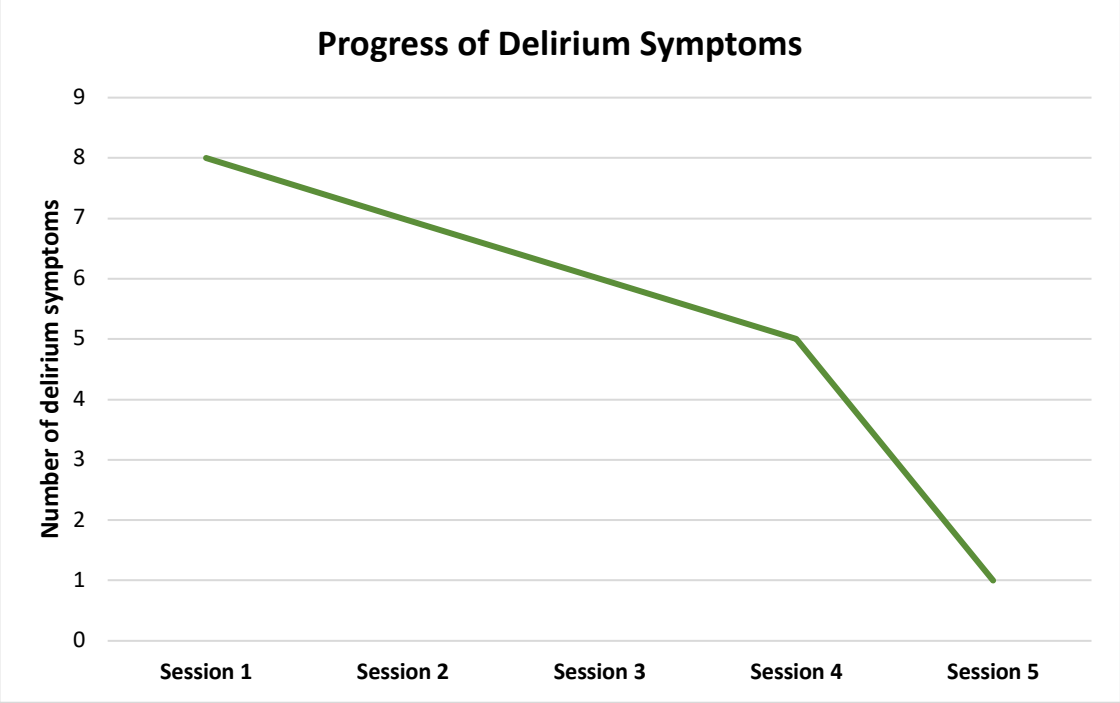
Information from each session on the Delirium Symptoms Tracker can be inserted into a line graph to track the increase or decrease of delirium symptoms throughout a client's stay. Also, the information can be inserted into a separate line graph to track the increase or decrease of severity of delirium symptoms.

By utilizing this tracker, we believe that an OT would be able to accurately measure the effectiveness of interventions in reducing symptoms of delirium. See Delirium Symptoms Tracker below.

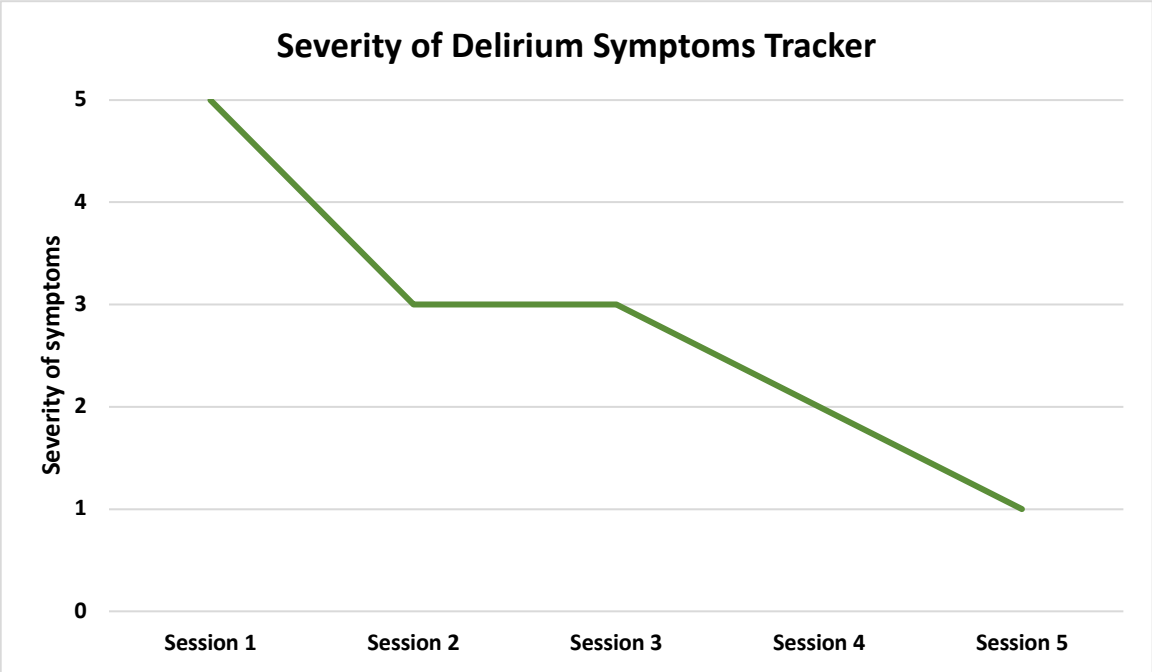
Delirium Symptoms Tracker for therapist to use each session with client:

Client's name:					
Rate severity of symptoms 0-5, with 5 being greatest level of severity					
Date	**Brain fog**	**Mood shifts**	**Poor engagement**	**Slow processing**	**Other (please specify)**

Progress of Delirium Line Graph for therapist to monitor progress over client's length of stay:



Severity of Delirium Symptoms line graph for therapist to monitor progress over client's length of stay:



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Note: *Reference was not critically appraised