Geriatric Emergencies

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Overview

- What medications convert the older person to the older patient
- What causes falls in the older patient with a focus on medications
- What causes delirium and focus on antipsychotic utilization
  - Delirium prophylaxis
  - Delirium Treatment
- What have we accomplished with dosing of antipsychotics in our older patients

- ADE-Adverse Drug Event, ADL-activities of daily living, BDZ-benzodiazepine, DOACs-Direct Oral Anticoagulants, ED-Emergency Department , IADL-Instumental Activities of daily living, NTI-Narrow Therapeutic Index, PBA-pseudobulbar affect, PIM-potentially inappropriate medication

Medication use leading to visits for ADE in the older patient

- ADE cause significant morbidity and mortality and large economic costs ($30 billion/yr).
- While physicians recognize that medications in older adults require special consideration, nongeriatricians are usually unfamiliar with Beers criteria.
  - Beers criteria prescribing rates are utilized in National Healthcare Quality Report.
  - CMMS incorporated Beers criteria federal safety regulations for long-term-care facilities in 1999.

Budnitz D. Medication use leading to emergency department visits for adverse drug events in older adults. Ann Intern Med 2007 147:755

American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults

*By the 2019 American Geriatrics Society Beers Criteria® Update Expert Panel**

- Dr Mark Beers first published in 1991
- AGS became stewards in 2011 Updates every 3 years
  - For 2019-17,627 references reviewed from 2015-2018; 377 articles were abstracted into evidence tables, including 67 systematic reviews and/or meta-analyses, 29 controlled clinical trials, and 281 observational studies
- Lists PIMs (to AVOID) by organ system/category/rationale/recommendation and strength of that recommendation/quality of evidence. eg;
  - Anticholinergics-confusion, dry mouth, constipation/ strong recommendation to avoid and moderate evidence (RCT with limitations/well designed controlled trials)
  - Benzodiazepines-congnition impairment, delirium, falls, fractures and motor vehicle crashes. Maybe ok for seizures, alcohol withdrawal, severe GAD. Same recommendations as anticholinergics
- PIM by disease
  - Syncope-Acetylcholinersterase inhibitors, alpha-1 blockers, Tricyclic antidepressants (TCA), antipsychotics (chlorpromazine, olanzapine)
    - Orthostatic hypotension, bradycardia
    - High level of evidence, strong recommendation to avoid TCA and antipsychotics, weak strength to avoid alpha-1 blockers

American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults

*By the 2019 American Geriatrics Society Beers Criteria® Update Expert Panel**

- PIMS to be used with caution
  - Dextromethorphan/quinidine-limited efficacy in dementia (not PBA), increase risk of falls. Strong recommendation with moderate evidence and Use with caution
- Drug Drug interaction
  - Alpha-1 blocker and loop diuretics-increase risk of urinary incontinence, Avoid with moderate evidence and strong recommendation
- Renal disease modification/cautions-duloxetine, CrCl<30, increased GI side effects (nausea, diarrhea). Weak recommendation to avoid with moderate evidence
- Drugs with anticholinergic properties-Amitriptyline, prochlorperazine and the rest

Google-beers criteria 2019 pdf

Medication use leading to ED visits for ADE in the older patient

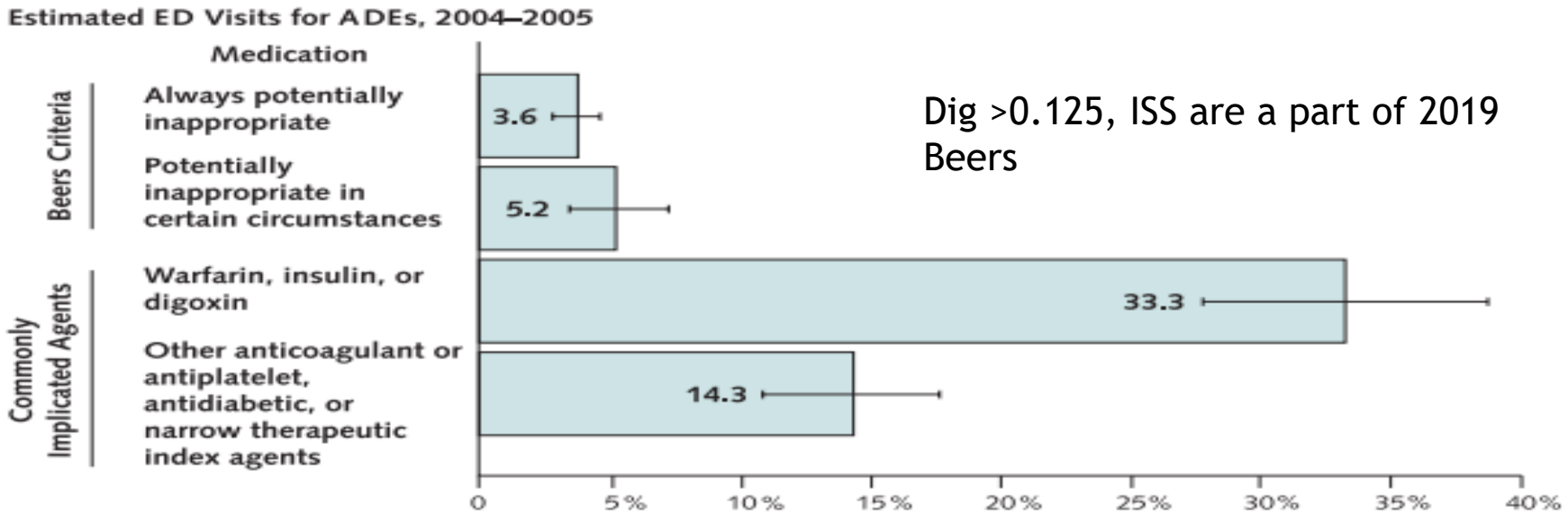
- Using national ADE (hospital based) database (58 hospitals) from 2 years (2004-2005)-ADE for >=65 yo reviewed
  - Allergic reactions,Adverse effects,Unitentional overdose,Secondary effects (eg falls/choking)
- 4492 adverse drugs events cases reported and estimated 177,504 ED visits for adverse drug events yearly
- 3.6% (2.8 to 4.5 CI) involved Beers criteria medications
- 33.3% (27.8-38.7) 3 medications-warfarin, insulin, digoxin
  - These 3 medications were 35x risk of “always PIM”
  - Estimated Risk for Insulin, warfarin, Digoxin was 206/100k prescriptions v. 5.6/100k for beers
- 3 classes (anticoagulants/antiplatelets, antidiabetic agents, NTI (digoxin,phenytoin) accounted for 47.5% of ED visits

Budnitz D. Medication use leading to emergency department visits for adverse drug events in older adults. Ann Intern Med 2007 147:755

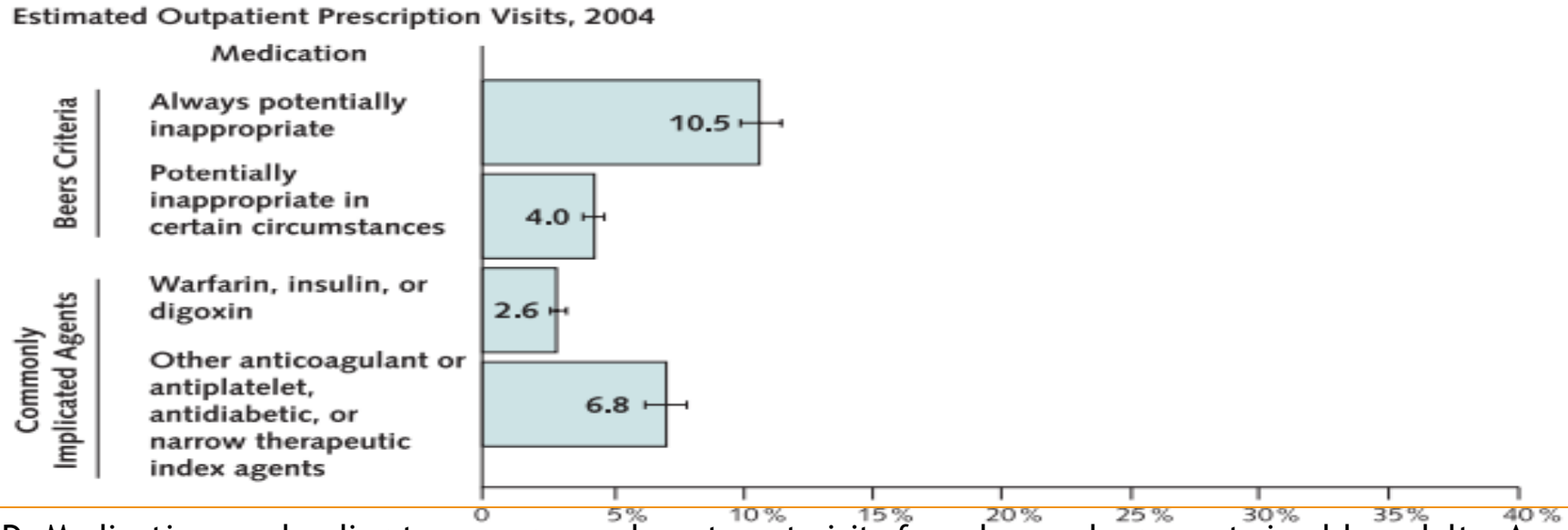
Most commonly implicated medications‡	cases	National Estimate
Warfarin	854	17.3 (12.7–21.9)
Insulin	616	13.0 (9.4–16.6)
Aspirin	232	5.7 (3.3–8.2)
Clopidogrel	173	4.7 (1.5–7.9)§
Digoxin	130	3.2 (1.6–4.7)
Metformin	103	2.3 (1.4–3.2)
Glyburide	98	2.2 (0.9–3.5)
Acetaminophen–hydrocodone	76	1.7 (1.0–2.5)
Phenytoin	78	1.5 (0.8–2.3)
Glipizide	57	1.5 (0.8–2.1)
Levofloxacin	63	1.4 (1.1–1.8)
Lisinopril	62	1.4 (0.8–2.0)
Trimethoprim–sulfamethoxazole	52	1.3 (0.9–1.7)
Furosemide	48	1.2 (0.6–1.8)

Aspirin/clopidogrel not included in “Top 3” as not as severe adverse effect and not as modifiable risk as Warfarin, Insulin, Digoxin

Budnitz D. Medication use leading to emergency department visits for adverse drug events in older adults. Ann Intern Med 2007 147:755



Dig >0.125, ISS are a part of 2019 Beers



Budnitz D. Medication use leading to emergency department visits for adverse drug events in older adults. Ann Intern Med 2007 147:755

Hospitalization risk from medications in medicare patients

- Cross-sectional analysis of 132 home health agencies in the US
- N=87,780, 79.8 yo
- 2012 Beers criteria Utilized
- At Baseline
  - 57,612 using 0 PIM, 30,168 (34.4%) using >=1 PIM, 5969 (6.8%) >=2 PIM
- Limitations
  - Not able to assess by indication or disease-not able to collect that data
  - Hospitalization was counted no matter the admitting diagnosis
    - (DID NOT HAVE TO BE DRUG RELATED)

Lohman MC. Hospitalization risk & potentially inappropriate medications (PIM) among medicare patients. J Gen Inter Med 2017 32;1301

PIM Utilization

Benzodiazepine (BDZ)-alprazolam, lorazepam, oxazepam, clonazepam, diazepam

NSAID-ASA>325mg/day, diclofenac, meloxicam, naproxen, nabumetone

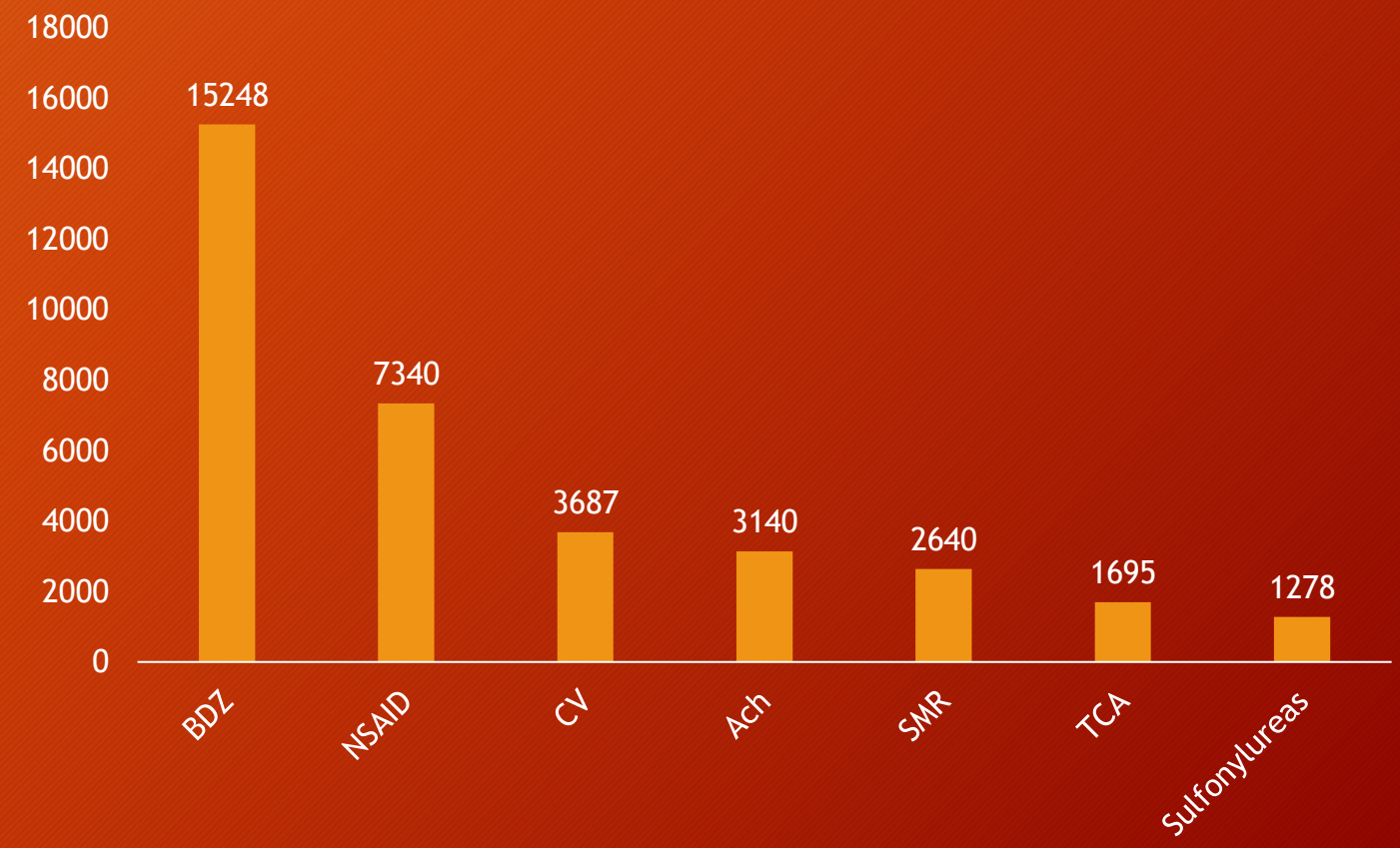
Cardiovascular (CV)-guanabenz, guanfacine, methyldopa, Dig>0.125

Anticholinergics (Ach)-brompheniramine, chlorpheniramine, diphenhydramine, promethazine, benztropine, belladonna alkaloids, clidinium

TCA-amitriptyline, doxepin (>6mg), imipramine

Skeletal muscle relaxants (SMR)-carisoprodol, cyclobenzaprine, methocarbamol, metaxalone

Sulfonylureas-glyburide, chlorpropamide



Lohman MC. Hospitalization risk & potentially inappropriate medications (PIM) among medicare patients. J Gen Inter Med 2017 32;1301

Hospitalization risk from medications in medicare patients

- PIM use increased 30-day hospitalization risk from (excluded NSAID)
  - >=1 PIM 13% greater risk, 1.13 (1.09,1.17) of being hospitalized than 0 PIM
  - >=2 PIM 21% greater risk, 1.21 (1.12,1.3) “ “
- Anticholinergic PIM 1.13 (1.03,1.23)
- Cardiovascular (CV) PIM 1.2 (1.11,1.29)
- Benzodiazepine PIM 1.17 (1.12,1.22)
- NSAID PIM 0.76 (0.71,0.81)-CV benefit?, used by healthier patients for minor pain

Lohman MC. Hospitalization risk & potentially inappropriate medications (PIM) among medicare patients. J Gen Inter Med 2017 32;1301

Discussion/Summary

- 2007 study
  - Warfarin, insulin and digoxin are outpatient medications that often convert the older person to an inpatient
  - Anticoagulation landscape now favoring DOACs over warfarin and somewhat lower adverse effects. (All cause readmissions decreased 0.93 (p=0.003), hospitalization with bleed 0.89 (p=0.009)) JAMA Neurology 2019
  - Limitations-Didn't look at adverse events at PCP, urgent care, Gradual adverse effects not as likely to present at ED
- 2017 study
  - The more PIMs the more likely to be hospitalized.
    - However, more PIMs increase chance of sicker patient
  - Limitation-Hospitalization not necessarily related to the medication

Will my patient fall?

- 1/3 of community dwelling older adults fall yearly
- 62% of non-fatal injuries in the ED were fall related
- 5 to 10% of falls cause serious injuries
  - Major head trauma, major lacerations, fracture
- Falls predict placement in a skilled nursing facility
- Multi-factorial interventions are effective, reduce fall risk by 12/100 patient months (or 30-40%)

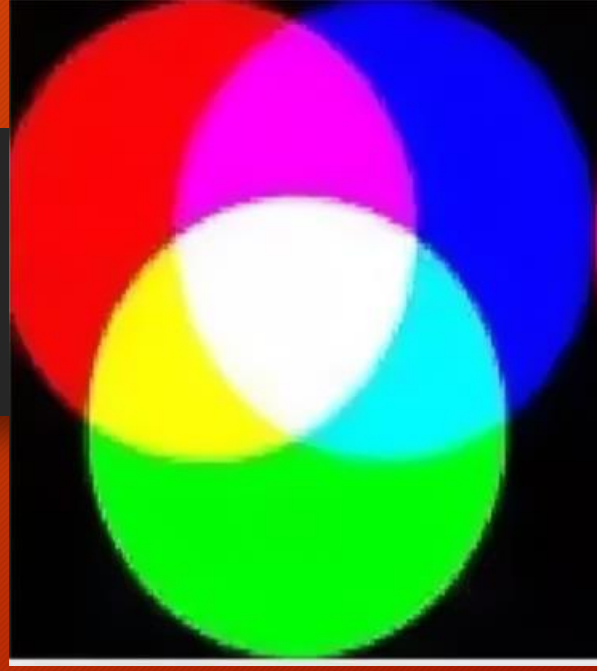
Ganz DA. Will my patient fall? JAMA 2007 297;77

Multi-factorial interventions

- Assessment of fall risk
  - Medication review-CNS medications (psychotropics, antidepressants, Benzodiazepines, Barbiturates, hydroxyzine, antipsychotics), # of medications
  - ADL and IADL assessment
  - Orthostatic blood pressure-Decrease in SBP/DBP of 20/10 after 1 minute of standing
  - Vision assessment
  - Gait and balance evaluation
  - Cognitive evaluation
  - Environmental hazard assessment

Ganz DA. Will my patient fall? JAMA 2007 297;77

Multivariate Review



- 18 studies reviewed that provided at least one of the risk factor domains
- Falling in the past year predicts another fall (Likelihood ratio range 2.3-2.8)
- Most Consistent predictor
  - Clinically detected abnormalities of gait or balance (1.7-2.4)
  - Visual impairment, medication variables, decreased activities of daily living, orthostatic hypotension, and impaired cognition were not consistent predictors across studies reviewed.

Ganz DA. Will my patient fall? JAMA 2007 297;77

Medication Related Falls

- 11 studies reporting medication assessment
- Cambell et al (1 or more falls in 12 months)
  - >=4 medications 1.9 (1.4-2.5 LR)
  - Taking psychotropic medications 1.7 (1.3-2.2LR)
- Tinetti et al. (1 or more falls in 12 months)
  - Benzodiazepine, phenothiazine or antidepressant 27 (3.6-207 LR)
- Luukinen et al. (2 or more falls in 12 months)
  - Benzodiazepines or antidepressants 1.8 (1.4-2.2 LR)

$$\text{LR} = \frac{\text{probability of finding in patients with disease}}{\text{probability of same finding in patients without disease}}$$

- LR >1 argue for the disease of interest; bigger the better
- LRs >0 and <1 argue against the diagnosis of interest
- the closer the LR is to 0, the less likely the disease.
- LRs = 1 lack diagnostic value.

Ganz DA. Will my patient fall? JAMA 2007 297;77

Heterogeneity (as it pertains to meta-analysis)

- Heterogeneity-Determining similarity between studies
  - I^2-(Inconsistency) = 100%x(Q-df)/Q
    - 0-100% Lower % is ideal (25% (low), 50% (moderate), 75% (high)
  - Cochrans Q – statistical test that is used to determine whether the proportion of “successes” is equal across three or more groups

Higgins JPT. Measuring inconsistency in meta-analysis. BMJ 2003 327;557

Fall Risk Increasing Drugs: systematic review

	Antipsychotics			Antidepressants			Benzodiazepines		
	No.	OR (95% CI)	I^2	No.	OR (95% CI)	I^2	No.	OR (95% CI)	I^2
All studies	16*	1.54 (1.28–1.85)	67%	22	1.57 (1.431.74)	76%	14	1.42 (1.22–1.65)	67 %
Outcome									
Any fall	11	1.43 (1.15–1.77)	54%	14	1.35 (1.28–1.42)	0%	12	1.38 (1.17–1.63)	66%
Recurrent fall	5*	1.70 (1.21–2.38)	69%	6	1.90 (1.42–2.54)	52%	3	1.45 (1.20–1.76)	0%
Injurious fall	1	1.66 (0.17–16.21)	N/A	5*	1.72 (1.51–1.96)	72%	1*	1.70 (1.03–2.81)	67%
Population									
Community	4	2.30 (1.24–4.26)	0%	5	1.48 (1.24–1.77)	63%	6*	1.40 (1.18–1.66)	36%
Long term care	6	1.18 (0.97–1.43)	88%	11	1.46 (1.26–1.69)	33%	3	1.11 (0.84–1.47)	0%
Hospital	4	1.57 (1.01–2.43)	67%	2	1.57 (1.43–1.74)	76%	4	1.69 (1.06–2.68)	84%
Other	2*	1.82 (1.10–3.00)	86%	4*	1.75 (1.54–1.99)	73%	1	1.93 (1.24–1.65)	N/A

	Anti-Parkinson		Antiepileptics		Analgesics		Opioids		NSAIDs	
	n	OR (95% CI), I^2	n	OR (95% CI), I^2	n	OR (95% CI), I^2	n	OR (95% CI), I^2	n	OR (95% CI), I^2
Unadjusted studies	13	1.52 (0.95-2.43), 77%	16	1.95 (1.65-2.31), 27%	13*	1.16 (0.85-1.60), 70%	14*	1.51 (1.15-1.91), 97%	17*	1.31 (1.11-1.55), 85%
Population										
Community-dwelling	2	4.45 (1.51-13.06), 36%	4	2.55 (1.84-3.52), 4%	3	1.15 (0.41-3.23), 80%	2	1.15 (0.66-2.00), 71%	2	2.02 (0.78-5.24), 67%
Long-term care	2	1.21 (0.32-4.59), 78%	0		7	1.09 (0.72-1.64), 72%	3	1.19 (0.77-1.84), 46%	6	1.39 (0.83-2.34), 55%
In-hospital	6	0.81 (0.33-1.98), 71%	7	1.53 (1.14-2.04), 0%	1	2.17 (0.93-5.07), N/A	6	1.30 (0.96-1.75), 49%	5	1.17 (0.68-1.99), 73%
Other	3	2.83 (2.47-3.23), 0%	4	2.00 (1.48-2.71), 57%	2	1.12 (0.71-1.78), 0%	3*	2.25 (1.37-3.70), 99%	5*	1.27 (1.00-1.61), 94%

- SSRI 2.02 (1.85-2.2) tricyclic antidepressants 1.41 (1.07-1.86)

Seppala LJ. Fall-risk increasing drugs: A systematic review and meta-analysis: Psychotropics JAMDA 2018 19:11

Is anticholinergic burden a factor in falls?

- Retrospective (n=132, 97% male, 78.7yo, VA clinics) cohort
  - Older, more cognitive impairment than prospective group
  - 40% falls at baseline
- Prospective (n=117 male patients, 71.5 yo, VA Clinics)
  - 12% falls at baseline
- Peripheral effects
  - Dry Mouth, Dry Eyes, Constipation
- Central Effects
  - Falls, Dizziness, Confusion

Rudolph JL. The anticholinergic risk scale and anticholinergic adverse effects in older persons. Arch Intern Med 2008 168;508

Falls and anticholinergic burden Results

- Retrospective group
  - Central Effects (includes falls)
    - 1.5 RR (1.3-1.8)
  - Peripheral Effects
    - 1.6 RR (1.2-2.2)
- Prospective group
  - Central Effects
    - 1.3 RR (0.8-2.1)
  - Peripheral Effects
    - 2.1 RR (1.6-2.8)

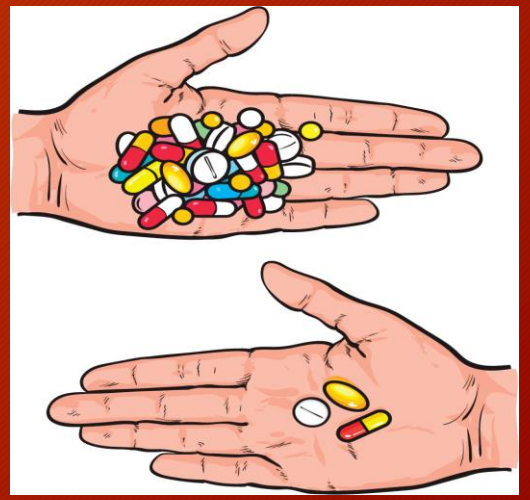
Rudolph JL. The anticholinergic risk scale and anticholinergic adverse effects in older persons. Arch Intern Med 2008 168;508

Summary

- Falls are multifactorial
- Some studies show that medications are important factor in falls
  - Psychotropics, Benzodiazepines, anticholinergics
  - Logical contributor-sedation, confusion, orthostatic hypotension
- Why don’t more studies find medications as a factor?
  - Perhaps patients are auto-selected as tolerant to those medications that are potentially harmful
    - Patient takes zolpidem once and not tolerable due to excess sedation and confusion and never takes another dose
- Medications are Potentially modifiable factor (or are they?)

Fall risk reduction through deprescribing

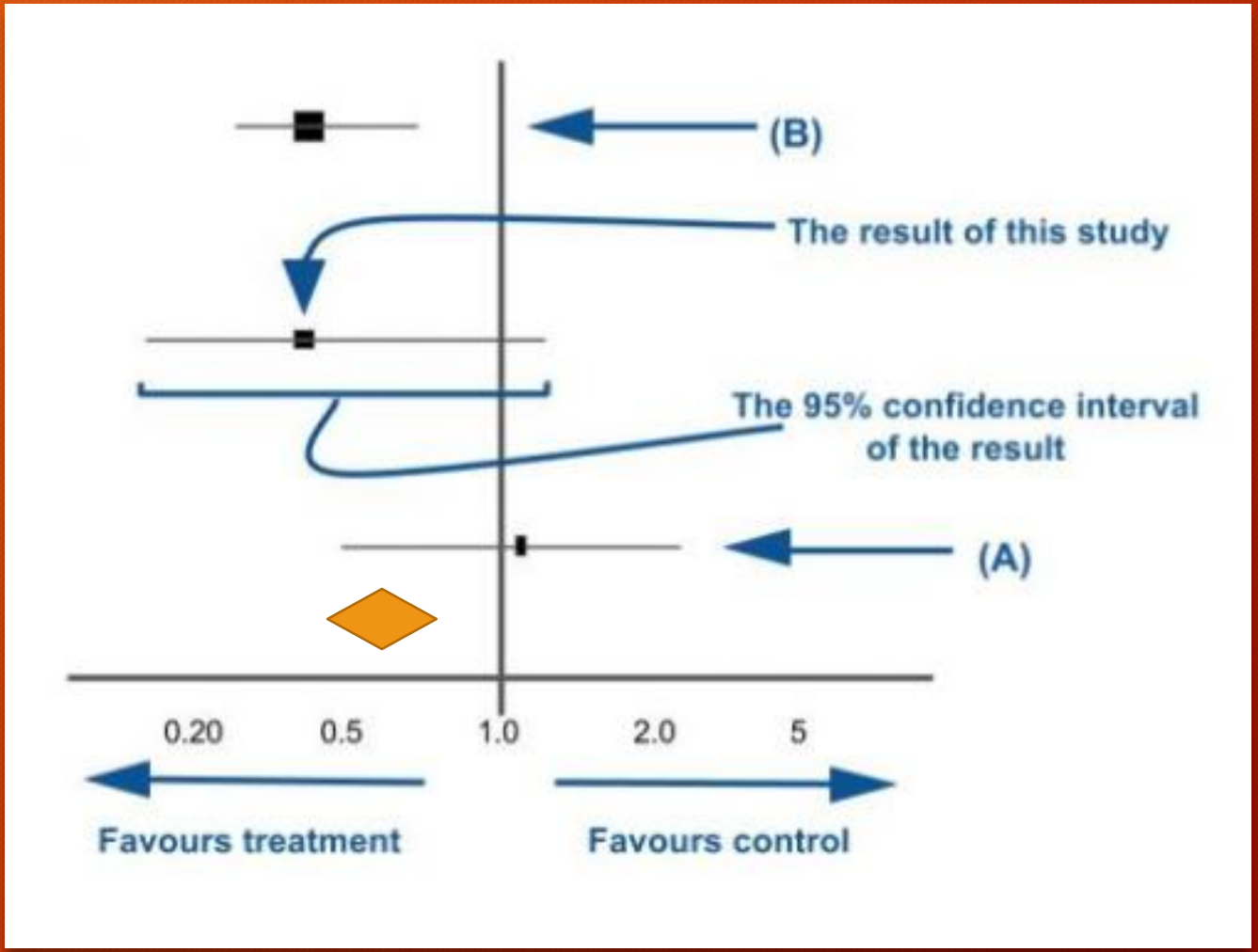
- Deprescribing fall-risk increasing drugs (FRIDs) is common practice
  - Including antihypertensives, antiarrhythmics, anticholinergics, anti-histamines, sedatives, antipsychotics, antidepressants, opioids, NSAIDs
- Meta-analysis of 5 RCT, 3 individual randomized, 2 cluster randomized (by health center or nursing home)
- 1305 patients, 70% female, 79% had falls history



Lee J. Deprescribing fall-risk increasing drugs (FRIDs) for the prevention of falls and fall-related complications: a systematic review and meta-analysis. BMJ Open 2021;11

Forest Plot

- Takes multiple studies, with a similar variable and statistic (OR, RR, ARR) and lines them up.
- B-line of null effect (“trunk”)
- A-one study added to the plot (“branch”). Box is point estimate and branches are the CI. Box size is sample size
- The diamond (“fruit”) is the summary of all point estimates and CI. The point estimate are the upper and lower parts of the diamond



https://s4be.cochrane.org/blog/2016/07/11/tutorial-read-forest-plot/

Fall risk reduction through deprescribing

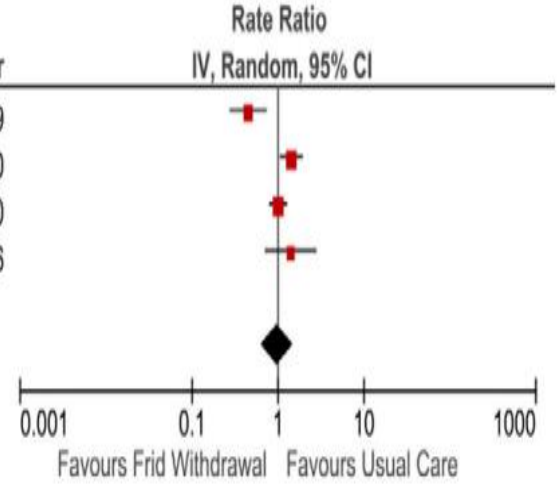
- No difference in falls with FRIDs
- Limitations-No Baseline # and types of FRIDs, No Baseline # of medications, No Baseline comorbidities, Completed discontinuation of >=1 FRID was **10-40%,** lack of blinding, heterogeneity (I^2 >75%)

1.1 Falls Rate

Study or Subgroup	log[Rate Ratio]	SE	FRID Withdrawal Total	Usual Care Total	Weight	Rate Ratio IV, Random, 95% CI	Year
Campbell 1999	-0.8023	0.2434	48	45	23.4%	0.45 [0.28, 0.72]	1999
Patterson 2010	0.3549	0.1465	173	161	28.4%	1.43 [1.07, 1.90]	2010
Blalock 2010	0.003	0.1117	93	93	29.9%	1.00 [0.81, 1.25]	2010
Mott 2016	0.3379	0.3416	39	41	18.4%	1.40 [0.72, 2.74]	2016
Total (95% CI)			353	340	100.0%	0.98 [0.63, 1.51]	

Heterogeneity: $Tau^2 = 0.15$; $Chi^2 = 17.47$, df = 3 (P = 0.0006); $I^2 = 83\%$

Test for overall effect: Z = 0.11 (P = 0.92)



- Lee J. Deprescribing fall-risk increasing drugs (FRIDs) for the prevention of falls and fall-related complications: a systematic review and meta-analysis. BMJ Open 2021;11

Psychotropic medication withdrawal/exercise effect on falls

- >=65 yo in New Zealand, 4 groups, 44 weeks duration
- Medication withdrawal
  - YES-exercise program (n=24, 76+-7.3 yo)
    - 6.5 meds, BDZ (67%), Antidepressant (33%), Tranquilizer (17%), falls (54%)
  - NO-exercise (n=24, 75+-5.5 yo),
    - 5.0 meds, BDZ (58%), Antidepressant (46%), Tranquilizer (8%), falls (46%)
- Original medication
  - YES-Exercise program (n=21, 73+-6.3 yo)
    - 5.7 meds, BDZ (48%), Antidepressant (67%), Tranquilizer (10%), falls (10%)
  - NO-exercise program (n=24, 75+-5.6yo)
    - 5.6 meds, BDZ (33%), Antidepressant (71%), Tranquilizer (4%), falls (33%)

Campbell AJ. Psychotropic medication withdrawal and a home-based exercise program to prevent falls: JAGS 1999 47;850

Psychotropic medication withdrawal/exercise effect on falls

- Psychotropic (BDZ, hypnotic(non-bdz sleep inducer), antidepressant, major tranquilizer(barbiturates/antipsychotics)) medication withdrawal
  - Original psychotropics were ground up and put into gelatin capsule
  - Active Medication Reduction
    - After 2 weeks-80% of original dose ,After 5 weeks-60% of original dose,After 8 weeks-40% of original dose, After 11 weeks-20% of original dose,After 14 weeks-0% of original dose
- Stopped taking study med. – 45% of medication withdrawal group, 25% of original medication
- Rate of falls
  - Medication withdrawal group (0.52/year) versus Original (1.16/year) (RR of 0.34 (95% CI 0.16-0.74)
  - Exercise group (0.71/year) versus no exercise (0.97/year) (RR of 0.26 (95% CI 0.45-0.97)

Campbell AJ. Psychotropic medication withdrawal and a home-based exercise program to prevent falls: JAGS 1999 47;850

Summary

- There is some evidence that falls can be decreased IF medications are withdrawn
  - However, that is easier to describe than it is to execute successfully (even when slow titration and placebo utilized)
- How to avoid beginning PIM medications that could be at risk?

Delirium

- Reversible, non-specific syndrome of cognitive impairment
  - acute brain dysfunction
  - Acute change in mental status
- ICU patients at high risk
  - 40-60% occurrence

How is Delirium Categorised?

1.6% of cases, "ICU psychosis", agitation, restlessness, "picking", emotional lability

54.1% % of cases

43.5% of cases, "encephalopathy", often unrecognised, withdrawal, flat affect, apathy, lethargy, decreased responsiveness, may be misdiagnosed as depression

Ferguson A. Delirium in the ICU presentation

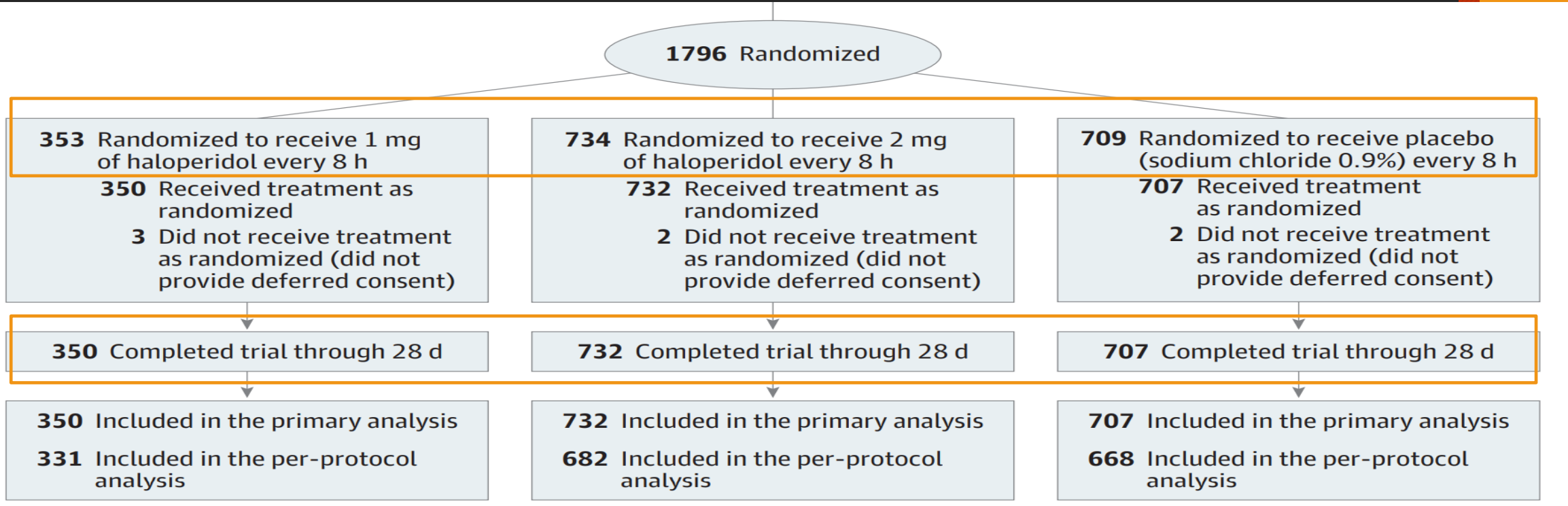
Delirium Prophylaxis with Haloperidol

- Study Type: Randomized, DB PCB controlled
- Patients Studied
  - 15882 ICU patients >=2 LOS days assessed
  - 14086 excluded-5662 (acute neuro), 1207 (already had delirium), 1036 (PD, dementia or alcohol abuse), 706 (taking antipsychotic), 673 (4%) (Prolong QTc or V Tach
  - 1796 randomized, mean age 66.6 yrs
  - Netherlands-(nonpharm intervention* standard)

*early mobilization, improving circadian rhythm (sleep improvement protocol), noise reduction strategy, sedation protocol with less sedation (RASS 0/-1), awakening trial protocol, reducing use of benzodiazepines, hearing and visual aids

Boogaard M Effect of haloperidol on survival among critically ill adults with a high risk of delirium. JAMA 2018;319:680-691

Delirium Prophylaxis

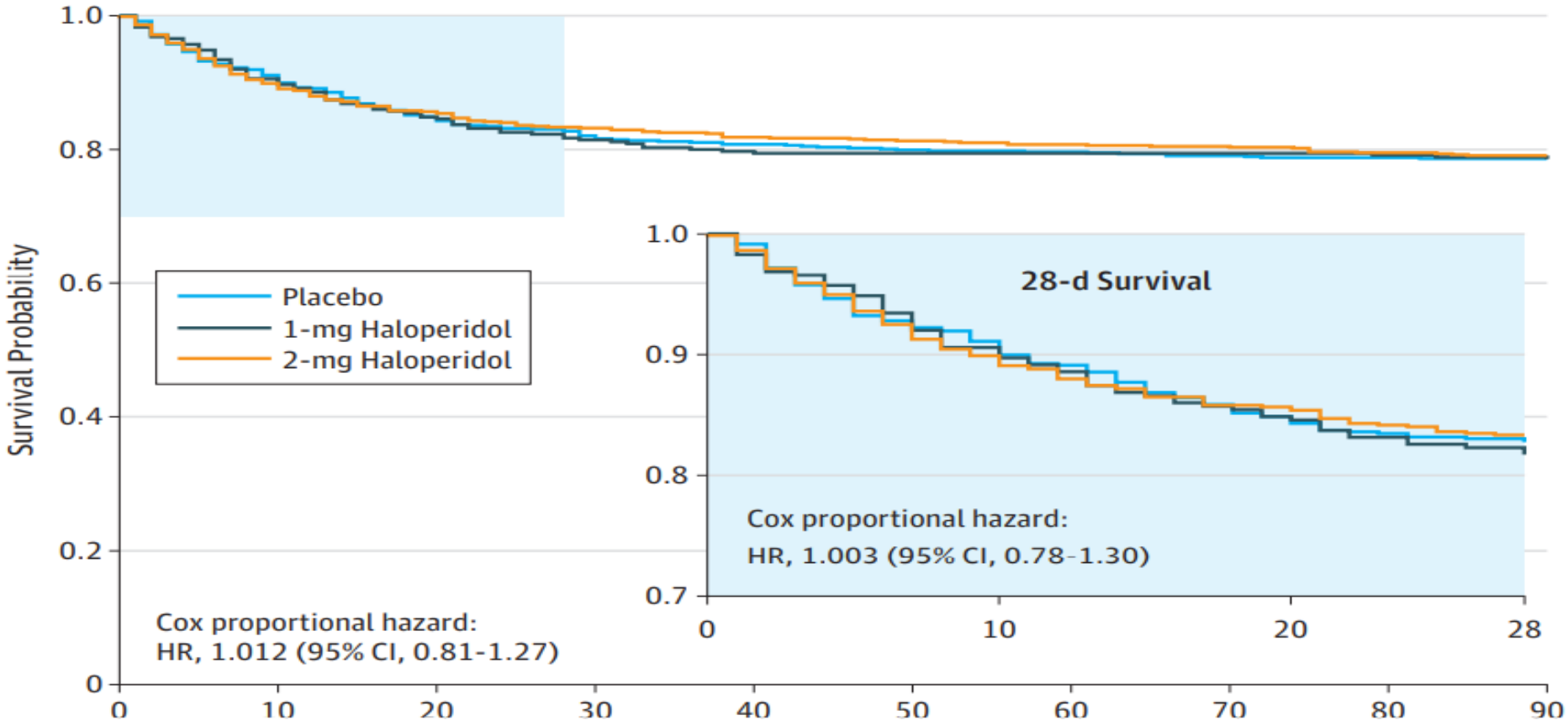


Haloperidol dose reduced 50%->79yo, <50kg, Bili>2.9
Haloperidol continued for 28 days, ICU discharge, or delirium occurred

Boogaard M Effect of haloperidol on survival among critically ill adults with a high risk of delirium. JAMA 2018;319:680-691

Delirium Prophylaxis

Figure 2. Survival Analysis at 28 and 90 Days



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Delirium Prophylaxis

Third column is difference between the medians

28-Day end points	2mg H	PCB	2mg H v.PCB	1mg H
Incidence of delirium, No. (%)	244 (33.3)	233 (33.0)	0.4 (−4.6 to 5.4)	139 (39.7)
No. of delirium- and coma-free, median (IQR), d[b]	26 (17 to 28)	26 (19 to 28)	0.0 (0 to 0)[a]	26 (17 to 28)
No. of delirium-free, median (IQR), d[b]	28 (22 to 28)	28 (23 to 28)	0.0 (0 to 0)[a]	28 (21 to 28)
No. of coma-free, median (IQR), d[b]	27 (22 to 28)	27 (23 to 28)	0.0 (0 to 0)[a]	27 (21 to 28)
No. of days to occurrence of delirium, median (IQR)[b]	3 (2 to 6)	3 (2 to 6)	0.0 (0 to 0)[a]	4 (2 to 6)
Duration of mechanical ventilation, median (IQR), d	2 (0 to 6)	2 (0 to 5)	0.0 (0 to 0)[a]	2 (0.3 to 7)
Length of stay, median (IQR), d				
ICU	5 (2 to 9)	4 (2 to 9)	0 (−0.0 to 1.0)[a]	4 (2 to 9)
Survivors	4 (2 to 4)	4 (2 to 8)	0 (0 to 1.0)[a]	4 (2 to 9)
Nonsurvivors	17 (10 to 32)	16 (10 to 30)	0 (−1.0 to 1.0)[a]	18 (9 to 34)
Hospital	15 (9 to 28)	15 (9 to 26)	1.0 (0 to 2.0)[a]	16 (9 to 31)
Survivors	6 (2 to 9)	5 (2 to 10)	1.0 (0 to 2.0)[a]	7 (2 to 11)
Nonsurvivors	9 (5 to 15)	10 (4 to 17)		11 (6 to 22)
Incidence, No. (%)				
ICU readmission, No. (%)	65 (8.9)	68 (9.6)	0.7 (−3.4 to 2.4)	36 (10.3)
Physical restraints, No. (%)	191 (27.0)	169 (24.8)	2.2 (−2.4 to 6.8)	102 (30.0)
Unplanned removal of tubes or catheters, No. (%)	81 (11.1)	73 (10.3)	0.7 (−2.5 to 4.1)	42 (12.0)
Reintubation, No. (%)	71 (9.7)	62 (8.8)	0.9 (−0.2 to 4.1)	32 (9.1)
No. of days treated with open-label haloperidol, median (IQR)	2.0 (1.0 to 5.0)	2.0 (1.0 to 5.0)	0 (0 to 0)[a]	2.0 (1.0 to 5.0)
Open-label haloperidol dose, median (IQR), mg/d	3.0 (2.0 to 4.6)	3.0 (3.0-4.6)	0 (−0.4 to 0.3)[a]	3.0 (2.0 to 4.3)

Boogaard M Effect of haloperidol on survival among critically ill adults with a high risk of delirium. JAMA 2018;319:680-691

Delirium Treatment
Haloperidol v. Ziprasidone v. PCB

- Study Type: Randomized, DB PCB controlled
- Patients Studied
  - 21k assessed
  - 1183 patients with acute respiratory failure/shock enrolled
  - 566 developed delirium
    - 11% hyper
    - **89% hypoactive**
  - 184 PCB, 192 haloperidol, 190 Ziprasidone

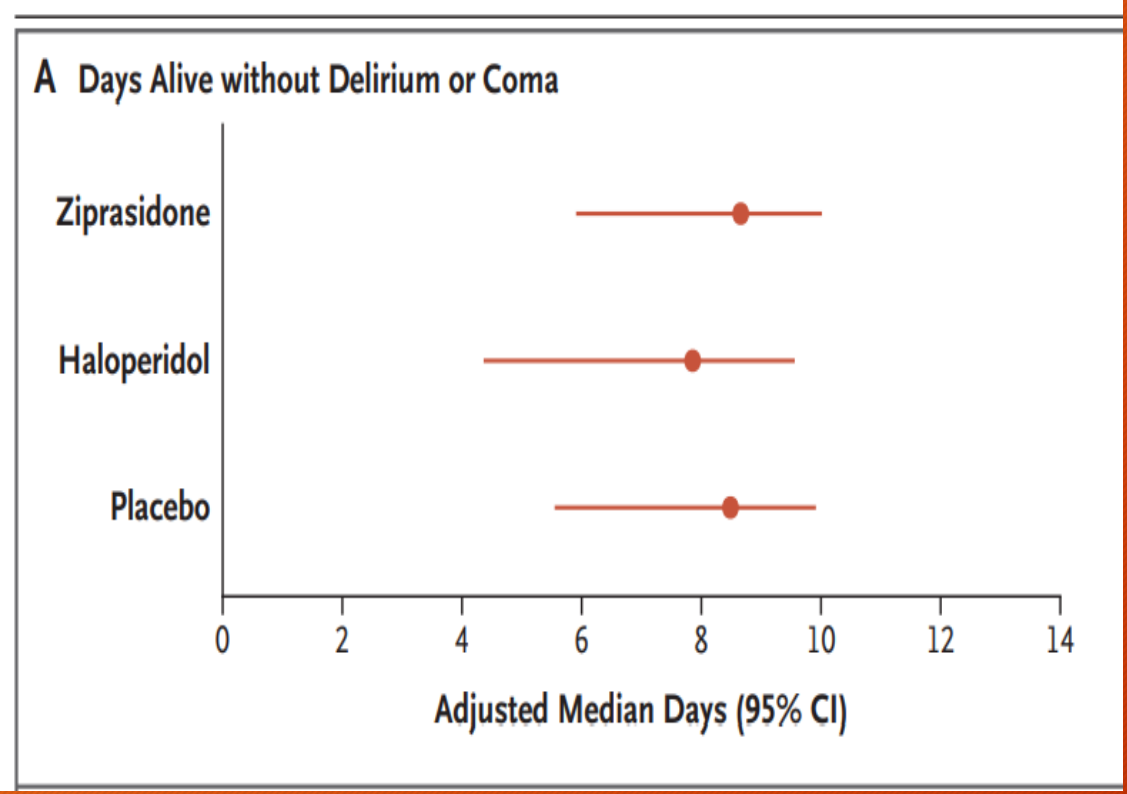
Girard TD. Haloperidol and Ziprasidone for treatment of delirium in critical illness NEJM 2018;379:2506-16

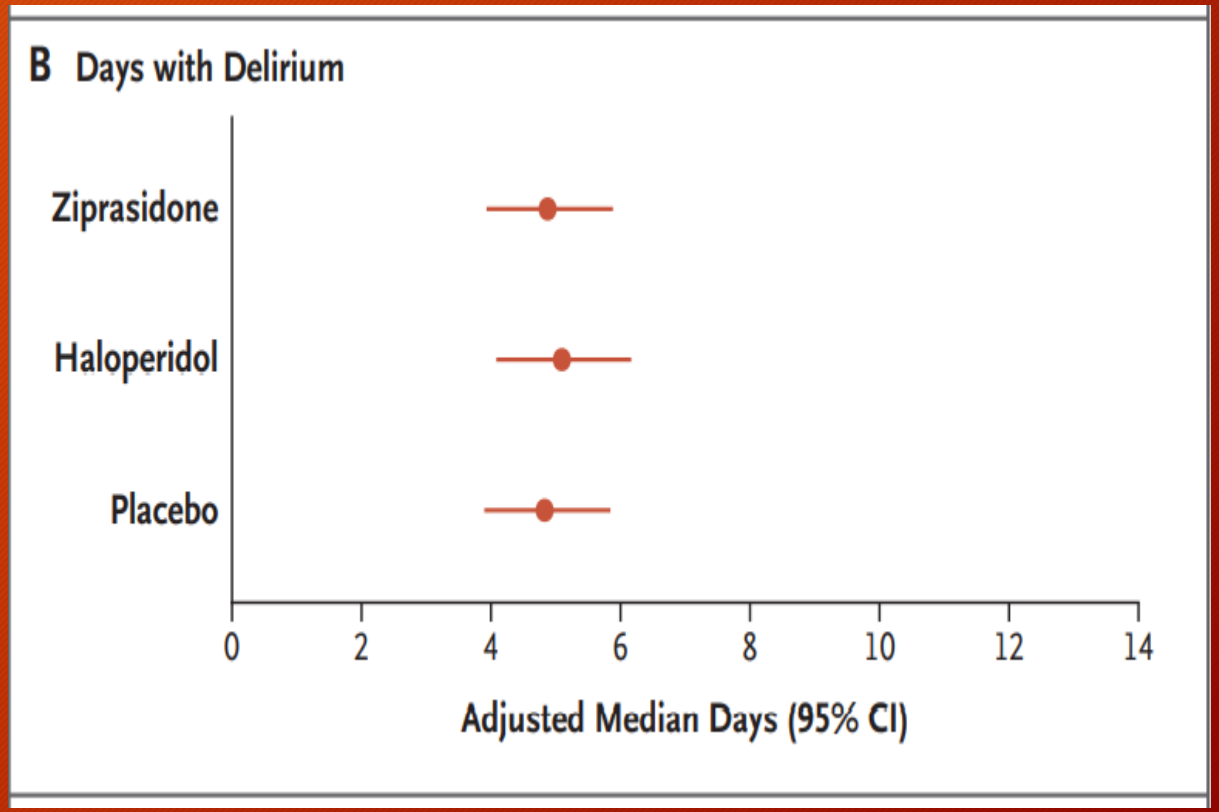
Delirium Treatment
Haloperidol v. Ziprasidone v. PCB

- Treatments:
  - Haloperidol IV start dose <70 2.5mg >70 1.25mg and give q12h.
  - Ziprasidone IV start dose <70 5mg, >70 2.5mg and give q12h
  - Dose doubled if delirium continued up to 10mg, 20mg daily MAX (haloperidol) or 20mg, 40mg daily MAX (ziprasidone)
  - Dose halved if no delirium (per CAM-ICU) x 2 and D/C if no delirium x4 or Safety issue
- Outcomes:# days alive without delirium/coma during 2 weeks of intervention; 30d/90d survival, freedom from mechanical ventilation, discharge
- Results:

Girard TD. Haloperidol and Ziprasidone for treatment of delirium in critical illness NEJM 2018;379:2506-16

Delirium Treatment
Haloperidol v. Ziprasidone v. PCB





Girard TD. Haloperidol and Ziprasidone for treatment of delirium in critical illness NEJM 2018;379:2506-16

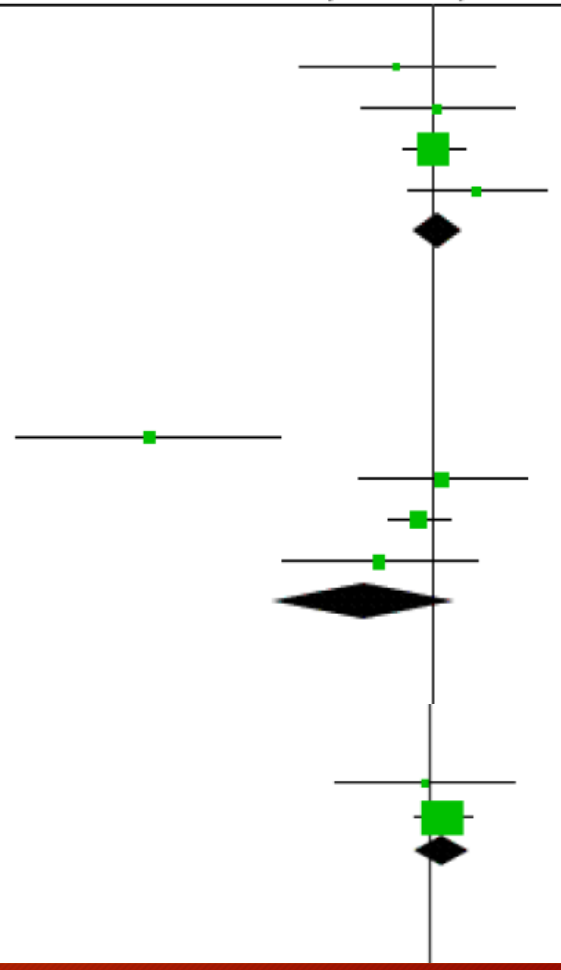
Delirium Treatment
Cochrane Analysis

- 10 authors, 2 pharmacists
- 121 pages
- 7674 citations, 14 trials with n=1844 met inclusion criteria
- RCT's evaluating pharmacological interventions for treatment of delirium in critically ill adults (ICU stay)

Burry L. Pharmacologic intervention for the treatment of delirium. Cochrane Database. Issue 9, 2019

Duration of Delirium

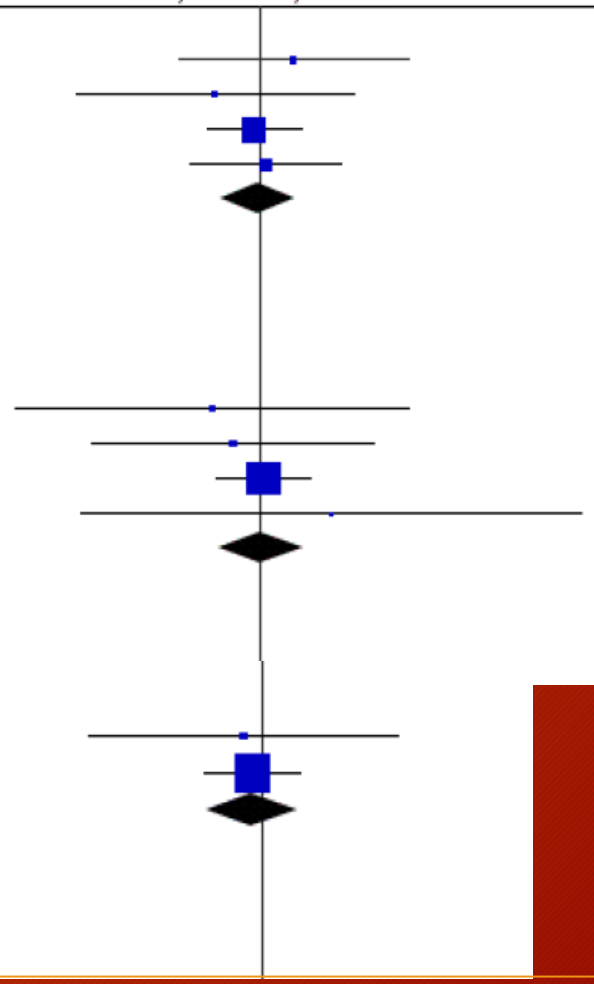
Study or Subgroup	Intervention Drug Mean	SD	Total	Placebo/Comparator Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
1.1.1 Typical AP vs placebo								
Al-Qadheeb 2016	0.786557	0.348542	12	0.946776	0.551065	8	6.8%	-0.16 [-0.59, 0.27]
Girard 2010a	1.1737	0.765033	35	1.152512	0.683787	36	11.0%	0.02 [-0.32, 0.36]
Girard 2018	1.434712	0.654136	192	1.433195	0.684853	184	68.4%	0.00 [-0.13, 0.14]
Page 2013	1.353901	0.872582	71	1.157984	0.950214	70	13.8%	0.20 [-0.11, 0.50]
Subtotal (95% CI)			**310**			**298**	**100.0%**	**0.02 [-0.09, 0.13]**
Heterogeneity: Tau² = 0.00; Chi² = 2.06, df = 3 (P = 0.56); I² = 0%								
Test for overall effect: Z = 0.34 (P = 0.73)								
1.1.2 Atypical AP vs placebo								
Devlin 2010	0.114652	1.014737	18	1.369147	0.750244	18	19.4%	-1.25 [-1.84, -0.67]
Girard 2010a	1.193458	0.833051	30	1.152512	0.683787	36	25.5%	0.04 [-0.33, 0.41]
Girard 2018	1.375082	0.622148	190	1.433195	0.684853	184	31.4%	-0.06 [-0.19, 0.07]
Hakim 2012	0.93939	0.564308	7	1.175399	0.239057	17	23.7%	-0.24 [-0.67, 0.20]
Subtotal (95% CI)			**245**			**255**	**100.0%**	**-0.31 [-0.71, 0.10]**
Heterogeneity: Tau² = 0.13; Chi² = 16.35, df = 3 (P = 0.0010); I² = 82%								
Test for overall effect: Z = 1.49 (P = 0.14)								
1.1.6 Typical AP vs atypical AP								
Girard 2010a	1.1737	0.765033	35	1.193458	0.833051	30	9.7%	-0.02 [-0.41, 0.37]
Girard 2018	1.434712	0.654136	192	1.375082	0.622148	190	90.3%	0.06 [-0.07, 0.19]
Subtotal (95% CI)			**227**			**220**	**100.0%**	**0.05 [-0.07, 0.17]**
Heterogeneity: Tau² = 0.00; Chi² = 0.14, df = 1 (P = 0.71); I² = 0%								
Test for overall effect: Z = 0.84 (P = 0.40)								



Burry L. Pharmacologic intervention for the treatment of delirium in critically ill adults. Cochrane Database. Issue 9, 2019

Mortality

Study or Subgroup	Intervention Drug Events	Total	Placebo/Comparator Events	Total	Weight	Odds Ratio M-H, Random, 95% CI
7.1.1 Typical AP vs placebo						
Al-Qadheeb 2016	9	34	7	34	9.9%	1.39 [0.45, 4.29]
Girard 2010a	4	35	6	36	6.8%	0.65 [0.17, 2.52]
Girard 2018	50	192	50	184	60.2%	0.94 [0.60, 1.49]
Page 2013	20	71	19	70	23.1%	1.05 [0.50, 2.20]
Subtotal (95% CI)		**332**		**324**	**100.0%**	**0.98 [0.69, 1.40]**
Total events	83		82			
Heterogeneity: Tau² = 0.00; Chi² = 0.79, df = 3 (P = 0.85); I² = 0%						
Test for overall effect: Z = 0.11 (P = 0.91)						
7.1.2 Atypical AP vs placebo						
Devlin 2010	2	18	3	18	4.6%	0.63 [0.09, 4.28]
Girard 2010a	4	30	6	36	9.1%	0.77 [0.20, 3.03]
Girard 2018	53	190	50	184	83.3%	1.04 [0.66, 1.63]
Hakim 2012	2	51	1	50	2.9%	2.00 [0.18, 22.78]
Subtotal (95% CI)		**289**		**288**	**100.0%**	**1.00 [0.66, 1.52]**
Total events	61		60			
Heterogeneity: Tau² = 0.00; Chi² = 0.71, df = 3 (P = 0.87); I² = 0%						
Test for overall effect: Z = 0.02 (P = 0.98)						
7.1.6 Typical AP vs atypical AP						
Girard 2010a	4	35	4	30	8.5%	0.84 [0.19, 3.69]
Girard 2018	50	192	53	190	91.5%	0.91 [0.58, 1.43]
Subtotal (95% CI)		**227**		**220**	**100.0%**	**0.90 [0.59, 1.39]**
Total events	54		57			
Heterogeneity: Tau² = 0.00; Chi² = 0.01, df = 1 (P = 0.92); I² = 0%						
Test for overall effect: Z = 0.46 (P = 0.65)						



Burry L. Pharmacologic intervention for the treatment of delirium in critically ill adults. Cochrane Database. Issue 9, 2019

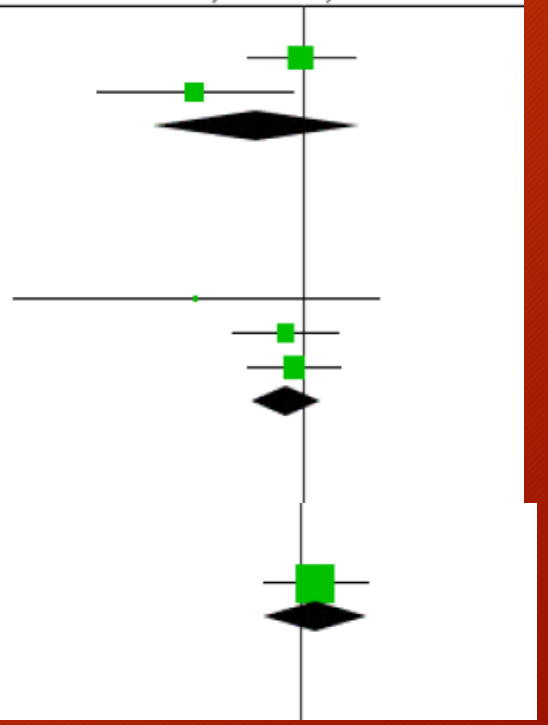
QTc Prolongation

Comparisons	Illustrative comparative risks* (95% CI)		Relative effect OR (95% CI)	Absolute effect (auto calculation using GRADEpro GDT)	Number of participants (studies)	Quality of the evidence (GRADE)
	Assumed risk	Corresponding risk				
	Placebo/Comparator	Intervention drug				
Typical antipsychotic vs placebo	62 per 1000	78 per 1000	1.26 (0.68 to 2.34) $I^2 = 0\%$	15 more per 1000 (from 19 fewer to 72 more)	656 (4 studies)	⊕⊕⊕⊕ High
Atypical antipsychotic vs placebo	90 per 1000	118 per 1000	1.28 (0.45 to 3.66) $I^2 = 56\%$	22 more per 1000 (from 48 fewer to 176 more)	577 (4 studies)	⊕⊕⊕⊖ Moderate[a]

Burry L. Pharmacologic intervention for the treatment of delirium in critically ill adults. Cochrane Database. Issue 9, 2019

Length of Hospital Stay

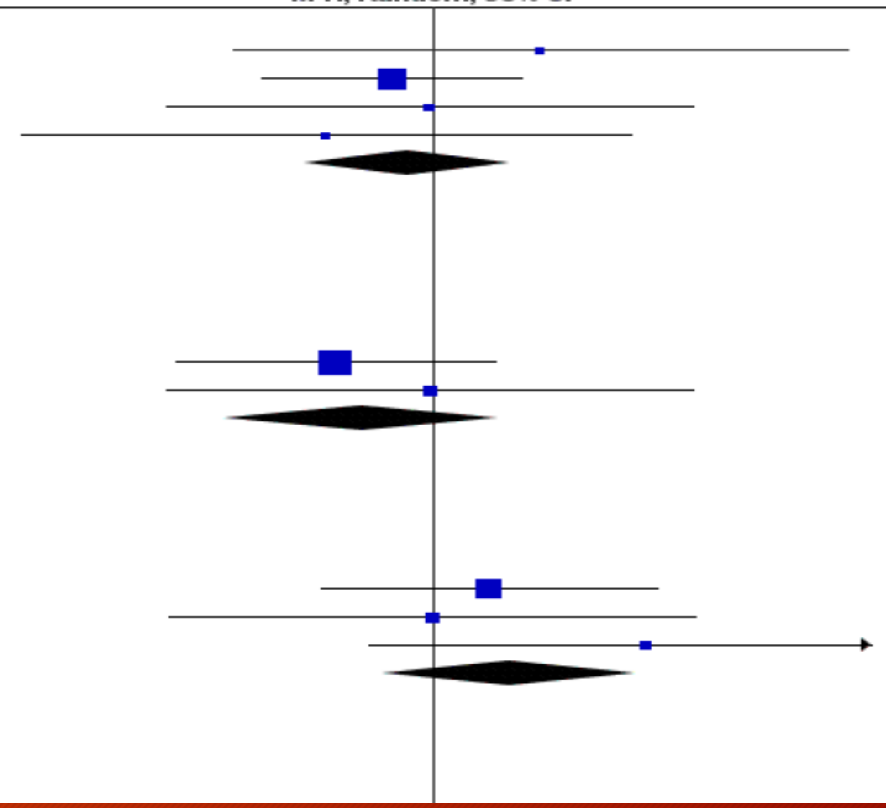
Study or Subgroup	Intervention Drug Mean	SD	Total	Placebo/Comparator Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
6.1.1 Typical AP vs placebo								
Girard 2018	2.449205	0.653273	192	2.455607	0.678189	184	57.6%	-0.01 [-0.14, 0.13]
Page 2013	2.817905	0.636427	52	3.093458	0.636206	51	42.4%	-0.28 [-0.52, -0.03]
Subtotal (95% CI)			**244**			**235**	**100.0%**	**-0.12 [-0.38, 0.14]**
Heterogeneity: Tau² = 0.03; Chi² = 3.54, df = 1 (P = 0.06); I² = 72%								
Test for overall effect: Z = 0.91 (P = 0.36)								
6.1.2 Atypical AP vs placebo								
Devlin 2010	2.882889	0.689937	18	3.156496	0.730315	18	3.5%	-0.27 [-0.74, 0.19]
Girard 2018	2.41059	0.639327	190	2.455607	0.678189	184	42.6%	-0.05 [-0.18, 0.09]
Hakim 2012	1.76043	0.250316	51	1.784395	0.350518	50	53.8%	-0.02 [-0.14, 0.10]
Subtotal (95% CI)			**259**			**252**	**100.0%**	**-0.04 [-0.13, 0.05]**
Heterogeneity: Tau² = 0.00; Chi² = 1.05, df = 2 (P = 0.59); I² = 0%								
Test for overall effect: Z = 0.94 (P = 0.35)								
6.1.6 Typical AP vs atypical AP								
Girard 2018	2.449205	0.653273	192	2.41059	0.639327	190	100.0%	0.04 [-0.09, 0.17]
Subtotal (95% CI)			**192**			**190**	**100.0%**	**0.04 [-0.09, 0.17]**
Heterogeneity: Not applicable								
Test for overall effect: Z = 0.58 (P = 0.56)								



Burry L. Pharmacologic intervention for the treatment of delirium in critically ill adults. Cochrane Database. Issue 9, 2019

Extrapyramidal Symptoms

Study or Subgroup	Intervention Drug Events	Total	Placebo/Comparator Events	Total	Weight	Odds Ratio M-H, Random, 95% CI
11.1.1 Typical AP vs placebo						
Al-Qadheeb 2016	1	34	0	34	11.1%	3.09 [0.12, 78.55]
Girard 2010a	4	35	6	36	62.7%	0.65 [0.17, 2.52]
Girard 2018	1	192	1	184	15.0%	0.96 [0.06, 15.43]
Page 2013	0	71	1	70	11.2%	0.32 [0.01, 8.09]
Subtotal (95% CI)		**332**		**324**	**100.0%**	**0.75 [0.26, 2.21]**
Total events	6		8			
Heterogeneity: Tau² = 0.00; Chi² = 1.07, df = 3 (P = 0.78); I² = 0%						
Test for overall effect: Z = 0.51 (P = 0.61)						
11.1.2 Atypical AP vs placebo						
Devlin 2010	0	18	0	18		Not estimable
Girard 2010a	2	30	6	36	73.2%	0.36 [0.07, 1.92]
Girard 2018	1	190	1	184	26.8%	0.97 [0.06, 15.60]
Subtotal (95% CI)		**238**		**238**	**100.0%**	**0.47 [0.11, 1.97]**
Total events	3		7			
Heterogeneity: Tau² = 0.00; Chi² = 0.36, df = 1 (P = 0.55); I² = 0%						
Test for overall effect: Z = 1.04 (P = 0.30)						
11.1.3 Typical AP vs atypical AP						
Girard 2010a	4	35	2	30	56.3%	1.81 [0.31, 10.63]
Girard 2018	1	192	1	190	22.9%	0.99 [0.06, 15.94]
Skrobik 2004	6	45	0	28	20.8%	9.38 [0.51, 173.30]
Subtotal (95% CI)		**272**		**248**	**100.0%**	**2.22 [0.59, 8.38]**
Total events	11		3			
Heterogeneity: Tau² = 0.00; Chi² = 1.41, df = 2 (P = 0.49); I² = 0%						
Test for overall effect: Z = 1.17 (P = 0.24)						



Burry L. Pharmacologic intervention for the treatment of delirium in critically ill adults. Cochrane Database. Issue 9, 2019

Summary of Prophylaxis and Treatment of Delirium with antipsychotics

- Prophylaxis of delirium with haloperidol is not effective
- For treatment of delirium
  - Antipsychotics (haloperidol/ziprasidone) were not better than placebo in patients with acute respiratory failure and delirium (hypo or hyper)
    - Days alive with delirium
    - Days alive without delirium or coma
- Patients with hyperactive delirium (in Girard study) were not analyzed due to small sample size
- Antipsychotics have adverse effects (EPS, QTc prolongation)

Girard TD. Haloperidol and Ziprasidone for treatment of delirium in critical illness NEJM 2018;379:2506-16

Boogaard M Effect of haloperidol on survival among critically ill adults with a high risk of delirium. JAMA 2018;319:680-691

Burry L. Pharmacologic intervention for the treatment of delirium in critically ill adults. Cochrane Database. Issue 9, 2019

Use of Haloperidol in Emergencies at CC

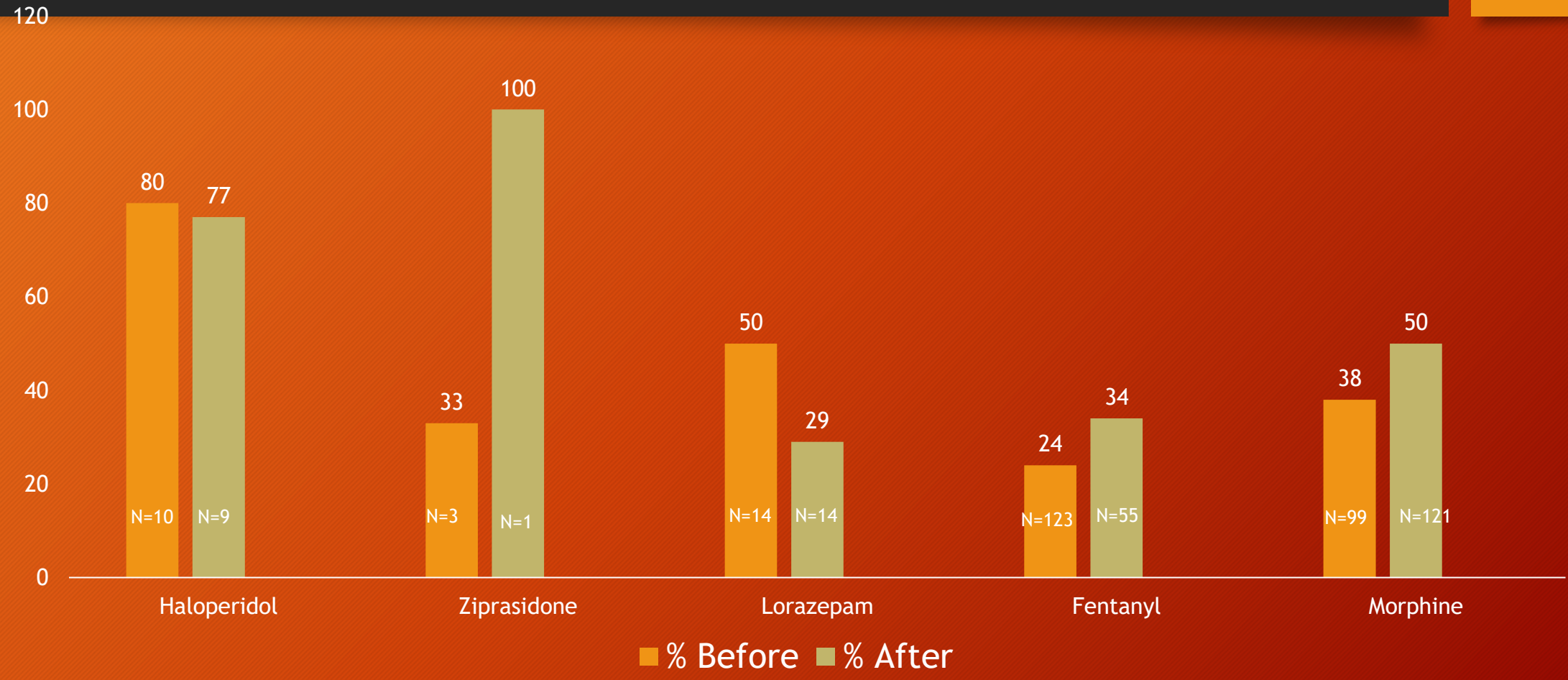
- GEM X initiative to use a more appropriate dose of haloperidol (0.5mg injectable in the antipsychotic naive older patient)
  - Initially failed
- How to improve on a quality improvement project
- Evidence for use of haloperidol 0.5mg as an effective dose

GEM X
Geriatic Emergency Medicine maXimum dose protocol

- Protocol Established (October 2020) for pharmacist review of high doses administered in the ED for 5 potentially harmful medications in Older Adults (>=65 yo)
  - Haloperidol Inj (>0.5mg), Ziprasidone Inj (>5mg), Lorazepam inj (>0.5mg), Fentanyl (>25mcg), Morphine inj (>2mg)
- Rollout included
  - Development of a written protocol that was distributed to all pharmacists
  - Communication with ED providers through email establishing maximum doses and that pharmacist would be contacting them when high doses ordered
  - Inservice to nursing staff about GEM X
- Initial Review showed little change in prescribing, so restarted with emphasis on Haloperidol and Ziprasidone in January and Lorazepam in April 2021.

VanDerKloet K, Noviasky J. GEM-X procedure 2020-2021

Percentage of Doses above the Recommended Dose Before and After Protocol (Jan 2021)



What next?

- Restrospective evaluation (by myself) of each order conducted monthly
  - Pharmacist contacted IF No contact was made when appropriate
  - Overall “scores” published with anonymity
- Geriatrician spoke directly with ED Staff Meeting about use of haloperidol at January staff meeting
- Presentation Developed for ED clinicians on appropriateness of haloperidol injection at 0.5mg
- Chart review of haloperidol dosing in our older inpatients
- EPIC “fix”

Haloperidol Administration in the CC ED

Variable	Baseline-Jan to Jun 2020 (6 months)	Post Implementation February to May 2021 (4 months)	Per Month Change
Number Patients (per month)	12 (2)	6 (1.5)	25% reduction
Number Doses (per month)	16 (2.7)	8 (2)	26% reduction
Number Doses >0.5mg (per month)	15 (2.5)	4 (1)	60% reduction
Number Doses >0.5mg in **NAÏVE Patients**	12 (2)	0 (0)	100% reduction

Why do I have to use 0.5mg haloperidol?

General Principles of Medication Administration and Dosing in the older patient

Higher concentrations of water soluble and free (unbound) drugs

Longer half-life for lipophilic drugs

Slower phase I metabolism

Impaired excretion

Increased susceptibility to adverse effects

General Principles of Medication Administration and Dosing in the older patient

- **Start with a low dose and increase gradually**
  - **Start LOW, go SLOW**
- Start one medication at a time
- Monitor for response
- Monitor and anticipate adverse effects

APA practice guidelines for use of antipsychotics in Dementia Patients (2016)

- **Only use when agitation and psychosis symptoms are severe,** are dangerous and/or cause significant distress to the patient.
- Response to non-drug interventions not effective
- Assess risks and benefits and discuss with the patient and the patient's surrogate decision maker, with input from the family.
- Treatment should be initiated at a low dose and eased up to the minimum effective dose.

https://www.psychiatry.org/newsroom/news-releases/apa-releases-new-practice-guidelines-on-the-use-of-antipsychotics-in-patients-with-dementia

Delirium in Older Persons-Review Article*

The NEW ENGLAND JOURNAL of MEDICINE

Table 4. Pharmacologic Treatment of Delirium.

Class and Drug	Dose	Adverse Effects	Comments
Antipsychotic			
Haloperidol	0.5–1.0 mg twice daily orally, with additional doses every 4 hr as needed (peak effect, 4–6 hr) 0.5–1.0 mg intramuscularly; observe after 30–60 min and repeat if needed (peak effect, 20–40 min)	Extrapyramidal symptoms, especially if dose is >3 mg per day Prolonged corrected QT interval on electrocardiogram Avoid in patients with withdrawal syndrome, hepatic insufficiency, neuroleptic malignant syndrome	Usually agent of choice Effectiveness demonstrated in randomized, controlled trials[20,37] Avoid intravenous use because of short duration of action
Atypical antipsychotic			
Risperidone	0.5 mg twice daily	Extrapyramidal effects equivalent to or slightly less than those with haloperidol Prolonged corrected QT interval on electrocardiogram	Tested only in small uncontrolled studies Associated with increased mortality rate among older patients with dementia
Olanzapine	2.5–5.0 mg once daily		
Quetiapine	25 mg twice daily		
Benzodiazepine			
Lorazepam	0.5–1.0 mg orally, with additional doses every 4 hr as needed*	Paradoxical excitation, respiratory depression, oversedation	Second-line agent Associated with prolongation and worsening of delirium symptoms demonstrated in clinical trial[37] Reserve for use in patients undergoing sedative and alcohol withdrawal, those with Parkinson's disease, and those with neuroleptic malignant syndrome

*part of course curriculum in Blackboard "Geriatric course for the emergency department"

Inouye. N Engl J Med 2006;354:1157-65

Managing Delirium and Agitation in the Older Emergency Department Patient: The ADEPT Tool

Table 4. Summary of low-, intermediate-, and high-risk interventions, as well as risks or contraindications of certain medications, and interventions to avoid.

Intervention Risk Category	Intervention Details
Low-risk interventions or activities: for all patients	Treat underlying conditions and symptoms, restart home medications if possible. Follow prevention steps. Transfer to hospital-style bed or chair/recliner instead of gurney, which limits mobility/independence and may increase falls risk. Verbal de-escalation if actively agitated.
Medium-risk interventions: for moderate agitation or patient at risk of harming self or staff	Step 1: PO medications. If the patient is prescribed an antipsychotic at home, administer this. Other options include the following: Risperidone ≤1 mg. Caution in frail or volume-depleted patients; may cause orthostatic hypotension. Olanzapine 2.5–5 mg. Contraindications/risks: Caution in intoxicated or volume-depleted patients; may cause orthostatic hypotension or sedation. Quetiapine 25–50 mg at night. May cause orthostatic hypotension and somnolence. Haloperidol 1–2 mg PO. May have more extrapyramidal adverse effects than the atypical antipsychotics. Step 2: IM or IV medications if patients are not cooperative with PO medications or are at risk of harming themselves or staff: Ziprasidone10–20 mg IM. Caution in uncontrolled heart failure or cardiac disease, intoxicated patients, or volume-depleted/orthostatic patients. Olanzapine 2.5–5 mg IM. Caution in intoxicated or volume-depleted patients; may cause orthostatic hypotension or sedation. Haloperidol 0.5–1 mg IM. Higher risk for extrapyramidal adverse effects than the atypical antipsychotics. Higher risk with IV, so IM is preferred. Can redose if needed, but avoid doses of 5–10 mg haloperidol because it may cause prolonged effects/sedation, EPS, or other adverse effects. Use caution or avoid IV haloperidol because of adverse effects.

Shenvi et al. Annals of Emer Med 2020; 75:136-145

Haloperidol Overdosing in the Treatment of Agitated Hospitalized Older People with Delirium

- Review of haloperidol 0.5mg versus 1mg in treating acute agitation in hospitalized older patients
- Outcome-sedation and agitation and length of stay
- N=56 (75% female), ~83yo
- 35.7% received 0.5mg (the recommended dose at this institution), 26.8% received 1mg, 37.5% receive >=1mg

Zirker et al. Drugs in Aging 2013;639-644

Haloperidol Overdosing in the Treatment of Agitated Hospitalized Older People with Delirium-RESULTS

	Group	
	Low dose	High dose
Hospital stay (days)	8.7 (±4.4)	14.3 (±14.6)
Days of agitation	3.6 (±1.7)	6.1 (±7.4)
Days restrained	1.6 (±2.9)	3.5 (±7.1)
Complications (oversedation)	3 (10.3 %)	11 (40.7 %)**
24 h haloperidol dose (mg)	0.8 (±0.2)	3.3 (±3.1)***
Initial haloperidol dose (mg)	0.7 (±0.3)	2.2 (±1.1)***

Zirker et al. Drugs in Aging 2013;639-644

Conclusions

- Higher than recommended initial doses of haloperidol were frequently used in the treatment of delirium with acute agitation
- No evidence to suggest that higher dosages were more effective in decreasing the duration of agitation or the length of hospital stay.
- Low dose haloperidol appears to be as effective as and safer than higher doses in the treatment of acute agitation in this older population.

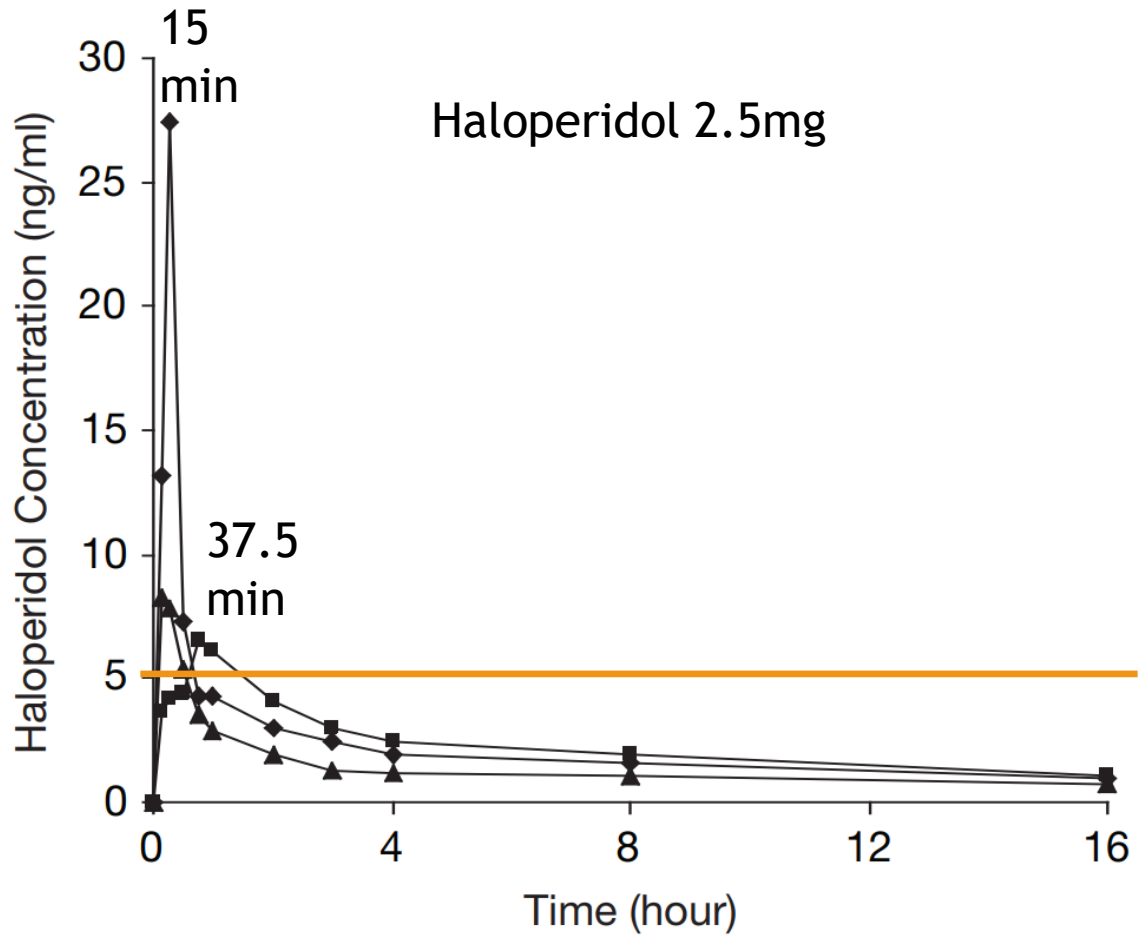
Zirker et al. Drugs in Aging 2013;639-644

Haloperidol dosing assessment in the older patient. Upstate Chart review

- Antipsychotic naive (at admission) patients >=65 yo receiving haloperidol injectable at 3 different doses
  - 87 patients reviewed, 30 excluded (28-antipsychotic PTA, 2-alcohol withdrawal order set)
  - Low dose <=0.5mg (n=15), age ~84 +/-9 years
  - Medium dose >0.5mg & <=1mg (n=23), age ~80 +/-8 years
  - High Dose >1mg (n=19), age ~83 +/- 10 years
- Did patient require additional antipsychotic after haloperidol dose within 4 hours?

Haloperidol Injectable PK/PD

- Tmax; IV-15min, IM-37.5 min
- T1/2 17h-20h
- Pharmacodynamics (dose dependent)
  - Peak sedation 30 minutes (lexi)
  - Duration 2hrs IM, 3-24hrs IV (lexi)
  - Agitation/aggression/psychosis dosing
    - repeat dose every ≥15 minutes until acute symptoms are controlled (lexi)



5-15ng/ml "therapeutic" for schizophrenia

Miller JL. Comparison of intranasal administration of haloperidol with intravenous and intramuscular administration. Pharmacotherapy 2008;28:875 N=4, 24-37 yo, 63-82kg

Baseline Demographics

Characteristic	Low dose (n = 15)	Medium dose (n = 23)	High dose (n = 19)	P-Value
Age (years); mean (SD)	84.3 (+/-8.5)	80.1 (+/-8.2)	82.9 (+/-9.8)	0.073
Female Gender, n (%)	6 (40)	13 (56.5)	9 (47.4)	0.90
Weight (kg) (SD)	72.07 (+/-14.0)	77.2 (+/-18.8)	71.8 (+/- 18.0)	0.81
BMI, mean (SD)	25.5 (+/- 4.0)	28.7 (+/- 6.8)	28.6 (+/- 8.4)	0.40
Creatinine Clearance, mean (SD)	62.9 (+/- 32.0)	43.9 (+/- 19.3)	49.8 (+/-19.8)	0.29
Psychiatric past medical history (yes) (%)	6 (40)	10 (43.5)	8 (42.1)	0.77
On benzodiazepine prior to admission (yes) (%)	2 (13.3)	3 (13)	2 (10.5)	0.70

Going to add; delirium screen, LACE (readmission risk), EWS (early warning score-change in status), BIMS (similar to MMSE)

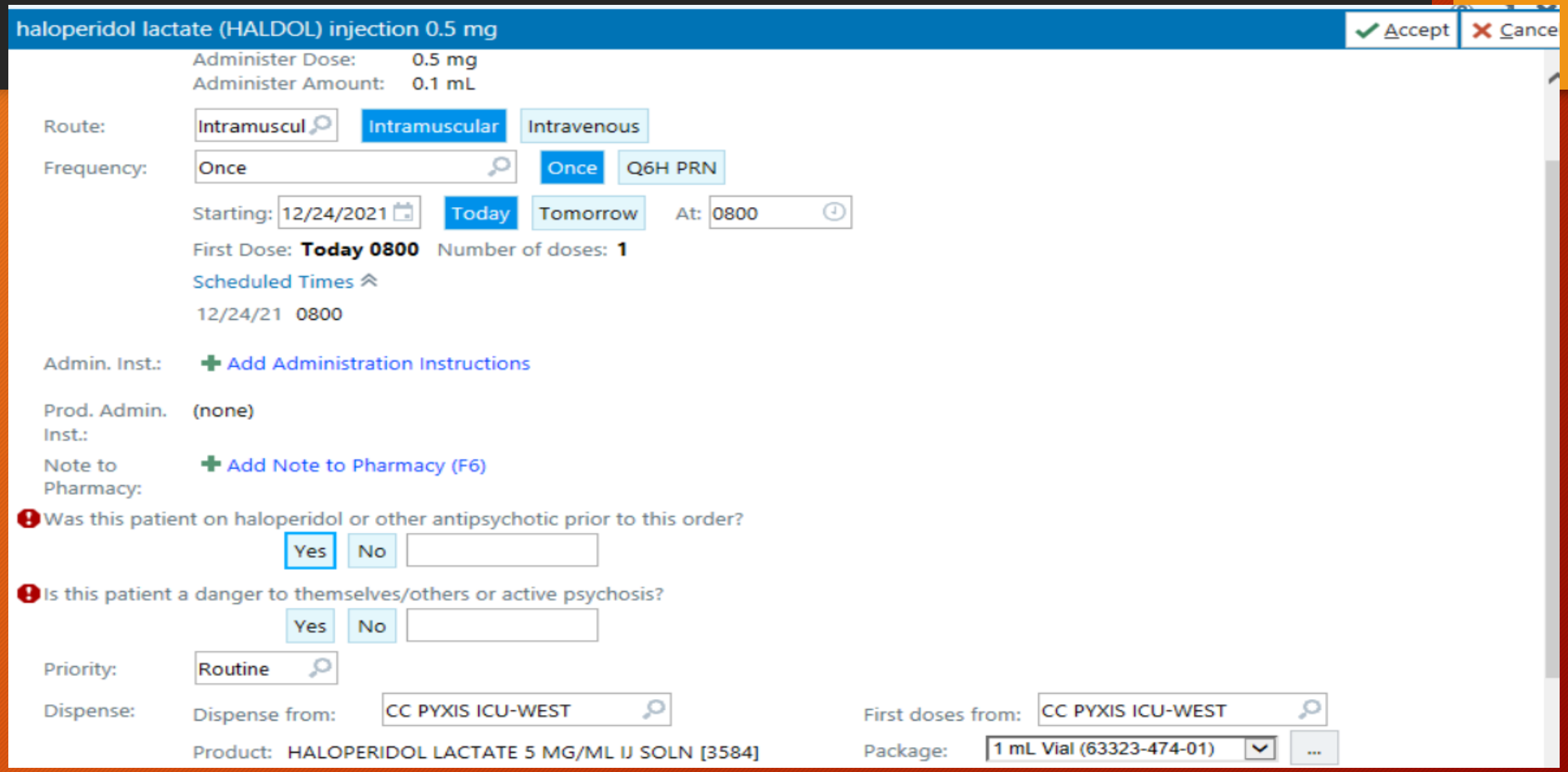
Results

Characteristic	Low dose (n=15)	Medium dose (n=23)	High dose (n = 19)	P-Value
Required additional haloperidol dose <4 hours post initial haloperidol dose	0 (0)	1 (4.3)	1 (5.3)	0.94
Required additional antipsychotic, other than haloperidol, < 4 hours post initial haloperidol dose	1 (6.7)	6 (26.1)	5 (26.3)	0.83
Required additional benzodiazepine <4 hours post initial haloperidol dose	1 (6.7)	0 (0)	3 (15.8)	0.04
Length of stay	7.1 (+/- 6.8)	8.2 (+/- 5.6)	13.1 (+/- 18.6)	0.01
Restraints utilized	1 (6.7)	5 (21.7)	4 (21.1)	0.04

Conclusions

- Our results are similar to Zirker
- Higher than recommended initial doses of haloperidol were frequently used in the treatment of delirium with acute agitation
- No evidence to suggest that higher dosages were more effective in decreasing agitation (restraint use) or the length of hospital stay.
- Low dose haloperidol appears to be as effective as higher doses in the treatment of acute agitation in this older population.

EPIC "Fixes"


haloperidol lactate (HALDOL) injection 0.5 mg
Accept
Cance
Administer Dose: 0.5 mg
Administer Amount: 0.1 mL
Route: Intramuscul
Intramuscular
Intravenous
Frequency: Once
Once
Q6H PRN
Starting: 12/24/2021
Today
Tomorrow
At: 0800
First Dose: Today 0800
Number of doses: 1
Scheduled Times
12/24/21 0800
Admin. Inst.:
Add Administration Instructions
Prod. Admin. Inst.:
(none)
Note to Pharmacy:
Add Note to Pharmacy (F6)
Was this patient on haloperidol or other antipsychotic prior to this order?
Yes
No
Is this patient a danger to themselves/others or active psychosis?
Yes
No
Priority:
Routine
Dispense:
Dispense from:
CC PYXIS ICU-WEST
First doses from:
CC PYXIS ICU-WEST
Product: HALOPERIDOL LACTATE 5 MG/ML IJ SOLN [3584]
Package:
1 mL Vial (63323-474-01)
...

Conclusion

- Medications are problematic and cause admissions to ED and falls in the older patient
- Reducing medications in the older patient is challenging
- Delirium prophylaxis with antipsychotics is not warranted
- Delirium treatment with antipsychotics has little evidence to support
- Haloperidol dosing by clinicians in our older patient can be guided towards lower dosing with education and practice reminders