Management of pediatric delirium

Delirium in children is relatively common (between 4. 5-28% in critically ill children) but not widely understood by medical professionals. The manifestation of the symptoms and the progression of the disease are well known in adults. It presents with acute onset altered sleep-wake cycle, disorientation, perceptual disturbances and altered mood and affect. Features specifically reported in pediatric delirium include developmental regression, purposeless behaviors, altered or labile affect, inconsolability, and autonomic instability. Delirium can be categorized into subtypes according the motor activation level including hyperactive (agitation and restlessness), hypoactive (apathy, decrease responsiveness) and mixed (includes both hyperactive and hypoactive symptoms). The etiologies of delirium are multifactorial and often present as physiological consequences of an acute medical condition, medical complication or substance intoxication/withdrawal. The most common cause of severe delirium is a critical illness Other most common reasons include infections, drug withdrawals or intoxications. Deliriogenic medications include but not limited to anticholinergics, opioids, sedatives, toxins and steroids. Medications are most common cause of reversible delirium.

The primary aim of the treatment of delirium is identifying and treating the underlying cause as well as avoiding possible precipitant factors effectively. The best approach for identifying delirium is diagnosis by a child and adolescent psychiatrist according the Diagnostic and Statistical Manual of Mental Disorders (Fifth Edition) criteria but it could be challenging to assess someone preverbal/nonverbal and developmentally delayed in the clinical

setting. There are also reliable, validated and clinically suitable rating scales are available for pediatric population (1).

Treatment of Pediatric Delirium

Treatment of delirium may be pharmacological or non-pharmacological basis.

Non-pharmacological treatments include identifying and addressing the underlying etiology, minimizing iatrogenic factors such as deliriogenic medications including benzodiazepines, opioids and other sedative agents. Supportive care in delirium include adequate nutrition, early mobilization and deep venous thrombosis prophylaxis. Behavioral modifications can include presence of constant caregiver, having familiar environment, normalizing sleep-wake cycle. Health care providers can reduce too much noise by adjusting alarm volumes on medical equipment, as well as limiting conversation around the room. Strategies to orient the older child include using calendars, clocks, family photos, favorite objects (e. g., stuffed animals) and talking to the child. Multicomponent interventions are more effective rather than single intervention.

Pharmacologic strategies may be necessary to control agitation, sleep-wake cycle abnormality, and establish safety environment if the child continues to display behaviors after nonpharmacologic interventions. Currently, there is no Federal Drug Agency (FDA) approved medication to treat delirium. Antipsychotic agents have been regarded as the primary treatment and should be administered at the lowest dosages possible. In clinical practice, atypical antipsychotics prefer to typical ones due to side effects profile even

studies show that both typical and atypical antipsychotics decreases delirium scores effectively. Haloperidol can be used as intravenously form which helps for rapid symptom control, but it also can cause significant QT prolongation. Atypical antipsychotics, such as risperidone, olanzapine, quetiapine, among others, can be equally useful in the treatment with fewer side effects. Melatonin may also use to combat sleep disturbance related to delirium.

NON PHARMACOLOGICAL INTERVENTIONS

Removing/ minimizing precipitant factors	-Reduce, substitute or taper deliriogenic medications such as opiates, benzodiazepines -Remove unnecessary invasive devices/tubes/catherization -Promote mobility and avoid physical restraints. -Prevent electrolyte disturbance, hypoxia, hemodynamic instability or infection -Optimize of analgesia and sedation -Avoid overstimulating the patient
Support and orientation	– Use frequent orientation cues through visible and verbal reminders.

	– Provide familiar objects and reassuring companionship. – Provide frequent reassurance through tactile and verbal reorientation – Avoid frequent staff changes
Minimize sleep deprivation	– Promote natural circadian rhythm – Optimize noise and light exposure – Use ear plug and eye mask

PHARMACOLOGICAL INTERVENTION

MEDICATION	Dose Range	Administration	Comments
Haloperidol	(IV) Loading dose [3] 0. 05 mg in 30 minutes (Age 0-1) (3. 5-10 kg)	PO/IV/IM/ Oral solution	-IV form is advantage for quick response – higher risk of EPS – In 2007, FDA issued a black box warning for IV haloperidol

0. 15 mg in 30 minutes (Age 1-3) (10-15 kg)		
0. 3-0. 5 mg in 30 minutes (Age 3-18) (> 15kg)		due the risk of QT prolongation
(IV) Maintenance dose (divided into 2-4 times daily)		
0. 01-0. 05 mg/kg/d		

	ay (Age 0-1) (3. 5-10 kg)	0. 025 mg/kg/d ay (Age 1-3) (10-15 kg)
		0. 05 mg/kg/d ay (Age 3-18) (> 15kg)
PO (Loadin g dose)		0. 02 mg/kg (<45kg)
		0. 5-1 mg/kg (> 45 kg)

(PO)

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mg/day(

<45 kg)

6

mg/day

(> 45

kg)

Risperidone	PO (Initial dose) [4] 0. 2-0. 5 mg once at bedtime (> age5) (PO) Maintenance dose (divided into 2-4 times daily) 0. 2-2. 5 mg/day (> age5) PO Maximum dose:	PO/ODT/ Oral solution	– Lack of anticholinergic effects is advantage

	1mg/ day (<20 kg) 2. 5 mg/day(<20-45 kg) 3mg/ day (> 45 kg)		
Olanzapine	PO Usual dose: 2. 5-20 mg mg per day (age 13-17) maximum dosage: 20	PO/IM/ODT	Comes in orally disintegrated tablet and IM form

	mg/day		
Quetiapine	PO Usual dose: 25-100 mg per day Maximum dosage: 175 mg/day	PO	lower risk for EPS and safe for delirium in critically ill patient
Melatonin	0. 5 mg to 10 mg per day	PO	

PO: Per Oral ; IV: Intravenous ; IM: Intramuscular ;

ODT: Oral disintegrating tablet

References

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4- Tahir, T. A., Eeles, E., Karapareddy, V., Muthuvelu, P., Chapple, S., Phillips, B., ... & Bisson, J. I. (2010). A randomized controlled trial of quetiapine versus placebo in the treatment of delirium. *Journal of psychosomatic research* , *69* (5), 485-490.