

UNIVERSITY HOSPITAL BRNO
FACULTY OF MEDICINE
MASARYK UNIVERSITY



DEPARTMENT OF **PAEDIATRIC**
ANAESTHESIOLOGY
AND INTENSIVE CARE MEDICINE

Najdeme delirium na PICU?

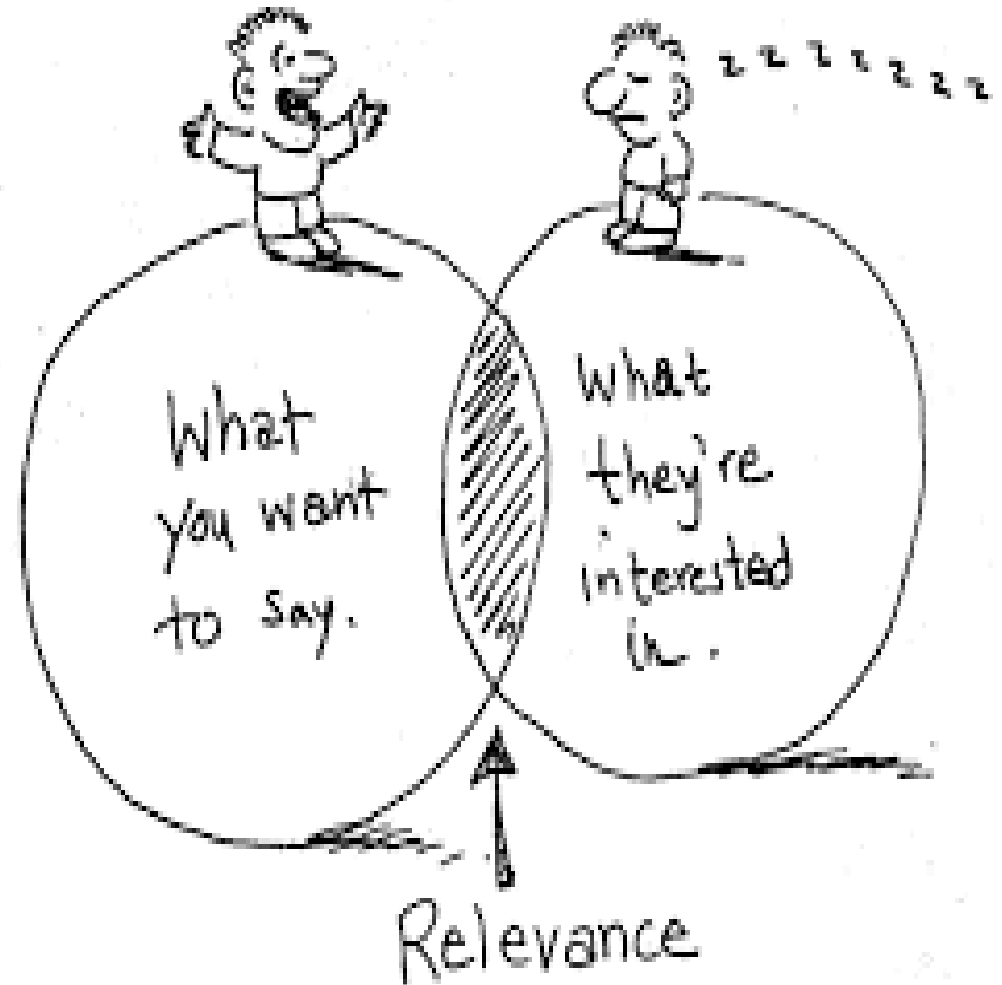
Jozef Klučka

F FAKULTNÍ
NEMOCNICE
BRNO

M U N I
M E D

Obsah

- Úvod
- Výskyt
- Definice
- Doporučení
 - Monitorace sedace
 - Monitorace deliria
- Senzitivita a specificita screeningu
- Rizikové faktory
- Prevence
- Terapie
- Závěr



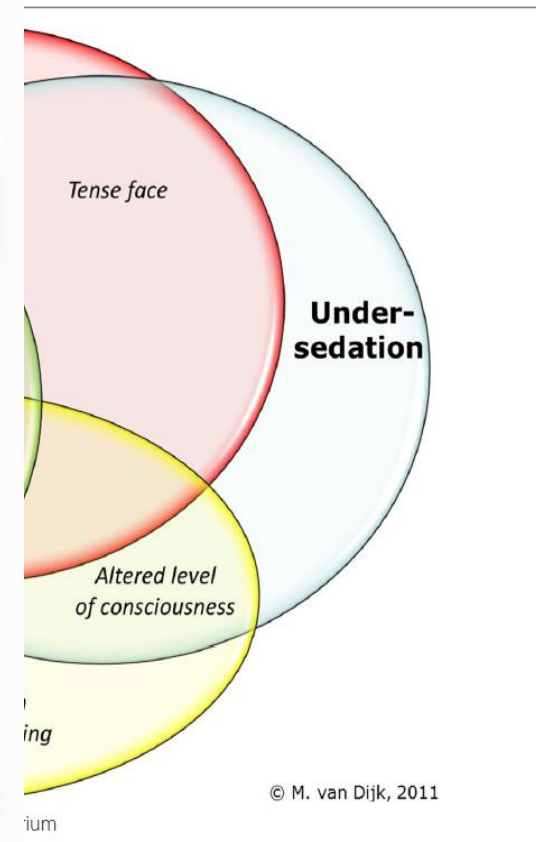
Najdeme delirium na PICU?

- 4-69,4% ??? (Risk factors for delirium in an Australian
- paediatric intensive care unit
- R. Paterson)
- **Museli bychom na něj myslet**



Delirium u pediatrických pacientů

- Zhodnotit analgezií
- Syndrom z odnětí
- Nedostatečná hladina s
- **Delirium**
 - Změna, fluktuace sta
 - Porucha pozornosti
 - Kvantitativní změna v
 - Kognitivní porucha



Delirium PICU

- Hyperaktivní, hypoaktivní, nebo kombinace
- Rovnaké symptomy jako u dospělých, ale těžší diagnostika u menších dětí
- I u dětí < 1 rok věku
- Asociované se ↑ morbiditou a mortalitou



Máme doporučení?

Table 4 Sedation: summary of recommended assessment tools for critically ill children

	COMFORT scale [25, 45, 98]	COMFORT behaviour scale [14, 31, 32, 42, 99]	State Behavioural Scale (SBS) [46]
Age range	0–16 years	0–16 years	6 weeks–6 years
Variables assessed	Distress Heart rate Mean arterial pressure Alertness Calmness Respiratory drive Movement Muscle tone Facial expression	Distress Alertness Calmness/agitation	Respiratory drive Coughing Best response to stimuli Responsiveness to care provider Tolerance to care Sedation/analgesia Sedation after consoled
Score range (cut-off point)	8–40 <17 over 17–26 over >26 unclear		Joint scale; state behaviour on a scale of 3 to +2 awake and calm
Reliability data	+		
Forms of validity established	Face, concurrent	responsiveness	validity, construct
Clinical utility		Feasibility and utility established at bedside	Feasibility and utility established at bedside
Grade	A	A	B

Recommendation

- Use standardized sedation assessment tools with proven validity, reliability and clinical utility; the COMFORT behaviour scale (grade of recommendation = A).
- Together with the vital signs, the level of sedation must be assessed and documented every 4–8 h or as indicated by the sedation score or the child's clinical condition (grade of recommendation = D).

See supplementary material for detailed data regarding psychometric properties



Richmond Agitation Sedation Scale (RASS) *

Score	Term	Description	
+4	Combative	Overtly combative, violent, immediate danger to staff	
+3	Very agitated	Pulls or removes tube(s) or catheter(s); aggressive	
+2	Agitated	Frequent non-purposeful movement, fights ventilator	
+1	Restless	Anxious but movements not aggressive vigorous	
0	Alert and calm		
-1	Drowsy	Not fully alert, but has sustained awakening (eye-opening/eye contact) to <i>voice</i> (≥ 10 seconds)	} Verbal Stimulation
-2	Light sedation	Briefly awakens with eye contact to <i>voice</i> (<10 seconds)	
-3	Moderate sedation	Movement or eye opening to <i>voice</i> (but no eye contact)	
-4	Deep sedation	No response to voice, but movement or eye opening to <i>physical</i> stimulation	} Physical Stimulation
-5	Unarousable	No response to <i>voice or physical</i> stimulation	

RESEARCH

Open Access

Diagnostic accuracy of delirium diagnosis in pediatric intensive care: a systematic review

Table 3 Descriptive results of the included studies

Index test	Age range	Comorbidities	Admission (top four)	Prevalence of delirium			
				Overall	Hyperactive	Hypoactive	Mixed
PAED [9,16]	1 to 17 yr	No data	Respiratory, neurologic, circulatory, surgical	18/154 (12%)	4/154 (3%)	4/154 (3%)	4/154 (3%)
p-CAM-ICU [10]	≥5 yr developmentally	No data	Congenital surgery (12%), trauma injury (9%)	0/68 (0%)	0/68 (0%)	0/68 (0%)	0/68 (0%)
CAP-D [11]	3 mo to 21 yr	Developmental delay in 12 (24%)	Oncology (16%), neurologic (16%), infectious (16%)	2/50 (4%)	6/50 (12%)	6/50 (12%)	6/50 (12%)
CAP-D(R) [17]	0 to 21 yr	Developmental delay in 22 (20%)	Postoperative respiratory (45%), infectious (54%), neurosurgical (27%)	51/248 (20.6%)	0/248 (0%)	0/248 (0%)	0/248 (0%)
Clinical suspicion [12-15]	3 mo to 17 yr	No data	Respiratory (30%), neurologic (40%), circulatory (20%), surgical (7.5%)	40/877 (5%)	14/877 (2%)	9/877 (1%)	17/877 (2%)



^aCAP-D, Cornell Assessment of Pediatric Delirium; CAP-D(R), Cornell Assessment of Pediatric Delirium, Revised; PAED, Pediatric Anesthesia Emergence Delirium Scale; p-CAM-ICU, Pediatric Confusion Assessment Method for the Intensive Care Unit; PICU, Pediatric intensive care unit; PIM, Pediatric Index of Mortality; PRISM, Pediatric Risk of Mortality.

Diagnostika deliria PICU

Table 5 IWS and delirium: summary of recommended assessment tools for critically ill children

	Withdrawal Assessment Tool version-1 (WAT-1) [57, 58]	Sophia Observation with-drawal Symptoms-scale (SOS) [59, 60]	Paediatric Confusion Assessment Method-Intensive Care Unit (pCAM-ICU) [66]	Cornell Assessment Paediatric-Delirium (CAP-D) [65, 71]	Sophia Observation with-drawal Symptoms-Paediatric Delirium scale (SOS-PD) [72, 73]
Age range	Children 0–16 years	Children 0–16 years	5–16 years	0–21 years	0–16 years
Variables assessed	Loose/watery stools Vomiting/retching/gagging Temperature > 37.8 °C State* Trem Swea Uncc mc Yawr Start Musc Time (SB	Tachycardia Tachypnoea Fever (≥38.5 °C) Sweating	Four features: 1. Acute change or fluctuation course of mental status 2. Inattention	Eye contact with caregiver Purposeful actions Awareness of surrounding Communicate needs	Agitation (restless), anxiety, eye contact, grimacing impaired attention Speech Tremors Muscle tone Purposeful actions Sleeplessness Hallucinations Disorientation Sweating Acute change/fluctuation Parents
Score range (cut off point)	0–12 ≥3				0–15 (4)
Reliability data	+				±
Forms of validity established	Cont ne:				Face (criterion pilot)
Clinical utility	Feasi lished at bedside	at bedside			Feasibility
Grade	A	A	B	A	C

Recommendation

- Use **CAP-D** as an instrument to assess paediatric delirium (grade of recommendation = A).
- Together with the vital signs, delirium must be assessed and documented **every 8–12 h** (at least once per shift), 24–48 h after admission or as indicated by the delirium score of clinical condition of the child (grade of recommendation = D).

See supplementary material for detailed data regarding psychometric properties

^a Delirium diagnosis using the Pediatric Confusion Assessment Method for the Intensive Care Unit requires positive features 1 and 2 with either positive feature 3 or 4

Diagnostika efektivita

RESEARCH

Open Access

recommended. Nevertheless, use of a screening tool to detect delirium in the PICU should be a priority of future research, given the likely high prevalence and adverse consequences of the diagnosis. In particular, direct comparisons of the most promising tools, the p-CAM-ICU and CAP-D(R), should be performed. Future research should

sis in
view

clusive results^b

Effectiveness

<140/154, <91%

65/68, 96%

50/56, 89%

<204/248
assessments, <82%

Tab
Stuc

PAEI

p-CA

CAP-

CAP-D(R)

Clinical suspicion
[12-15]

No

N/A

N/A

40/61, 66%
(53% to 76%)

N/A

N/A

N/A

N/A

N/A

^aCAP-D, Cornell Assessment of Pediatric Delirium; CAP-D(R), Cornell Assessment of Pediatric Delirium, Revised; N/A, Data not collected and thus could not be calculated; NPV, Negative predictive value; PAED, Pediatric Anesthesia Emergence Delirium Scale; p-CAM-ICU, Pediatric Confusion Assessment Method for the Intensive Care Unit; PPV, Positive predictive value. ^bValid inconclusive results are those where the index or reference test is neither clearly positive nor clearly negative (that is, an intermediate result, and the result is excluded from the study after enrollment). Yield is the percentage of patients who had the index test who are included in the sensitivity and specificity calculations; Effectiveness is index test correct classification divided by total index tests done [8]. The PAED scores have a "<" sign because imputed values due to missing data were used for up to 16% of each item in the PAED score. The CAP-D(R) values have a "<" sign because whether all assessments were included in the study was not stated. ^cWe did not consider this study sufficiently powered to evaluate the Delirium Rating Scale (DRS) 88 or the DRS-Revised, because there was too much missing data. The yields were 103/154 (67%) and 73/154 (47%), respectively, even before considering imputed values due to missing data used for >50% of some items in these scores. It is important to note that the performance of the PAED was not as good in the study by Silver *et al.* [11]: sensitivity =7/14 (50%) (95% CI 27% to 73%), specificity =36/36 (100%) (95% CI 92% to 100%), PPV =7/7 (100%) (95% CI 68% to 100%), NPV =36/43 (84%) (95% CI =70% to 92%), positive likelihood ratio =50, negative likelihood ratio =0.5. ^dOnly the p-CAM-ICU and CAP-D(R) determined interrater reliability between two raters using the κ-statistic: 0.96 (95% CI 0.74 to 1.0) in 146 paired assessments and 0.94 (no 95% CI reported) in 70 paired assessments, respectively. Only the CAP-D(R) determined the interrater reliability of the gold standard: κ =0.96 (95% CI 0.79 to 1.00) in 38 paired psychiatric evaluations.

Pediatric CAM-ICU (pCAM-ICU): DELIRIUM = Presence of FEATURES 1 + 2 + either 3 or 4

FEATURE 1: Acute Change or Fluctuating Course of Mental Status

1. Is there an acute change from mental status baseline? (Y or N)
 2. Has the patient's mental status fluctuated during the past 24 hours? (Y or N)
- If "YES" to EITHER question then Feature 1 is PRESENT → move on to FEATURE 2



**STOP
DELIRIUM
ABSENT**

FEATURE 2: Inattention

Say: "Squeeze my hand when I say 'A'. Let's practice: A, B. Squeeze only on A."

Read this letter sequence: **A B A D B A D A A Y**

- Did the patient make 3 or MORE ERRORS? (Error = No squeeze with 'A' or Squeeze with other letters)
- If "YES" then Feature 2 is PRESENT → move on to FEATURE 3



FEATURE 3: Altered Level of Consciousness (LOC)

- Does the patient currently have an altered LOC? (i.e. not alert and calm)
- If "YES" then STOP → DELIRIUM PRESENT
- If "NO" then Feature 3 is NOT present → move on to FEATURE 4



**DELIRIUM
PRESENT**

FEATURE 4: Disorganized Thinking

Say: "I am going to ask you some questions." (Tell patient to answer yes/no by voice, head nod, etc.)

- | | | | |
|----------------|---------------------------------------|----------------------|--------------------------------------|
| Questions: | 1. Is sugar sweet? | Alternate questions: | - Is a rock hard? |
| (1 point each) | 2. Is ice cream hot? | | - Do rabbits fly? |
| | 3. Do birds fly? | | - Is ice cream cold? |
| | 4. Is an ant bigger than an elephant? | | - Is a giraffe smaller than a mouse? |

Command: 5. Two-step command: Say, "Hold up this many fingers." Demonstrate by holding up 2 fingers. (1 point) Then say, "Now do that with the other hand." Do NOT demonstrate this part of the command.

- Did the patient make 2 or MORE ERRORS? (Error = Answer question incorrectly, doesn't follow command, etc.)
- If "YES" then → DELIRIUM PRESENT



**DELIRIUM
ABSENT**



Rizikové faktory

72% pediatrických pacientů na UPV sedovaných opioid + benzodiazepiny

Dospělí pacienti → propofol, dexmedetomidin

- Ketamin
- Inotropika
- Opioidy
- Umělá plicní ventilace
- Poruchy psychomotorického vývoje v anamnéze
- Imobilizace
- Poruchy spánku



Doporučení

recommendation) that nonbenzodiazepine sedatives (either propofol or dexmedetomidine) are preferable to benzodiazepine sedatives (either midazolam or lorazepam) in critically ill, mechanically ventilated adults because of improved short-term outcomes such as ICU LOS, duration of mechanical

Proč by to mělo být jiné u pediatrických pacientů???

Propofol infusion syndrome – be aware of !!!

Dexmedetomidin !!!

90-day mortality, cognitive and physical functioning, institutionalization, and psychologic dysfunction.

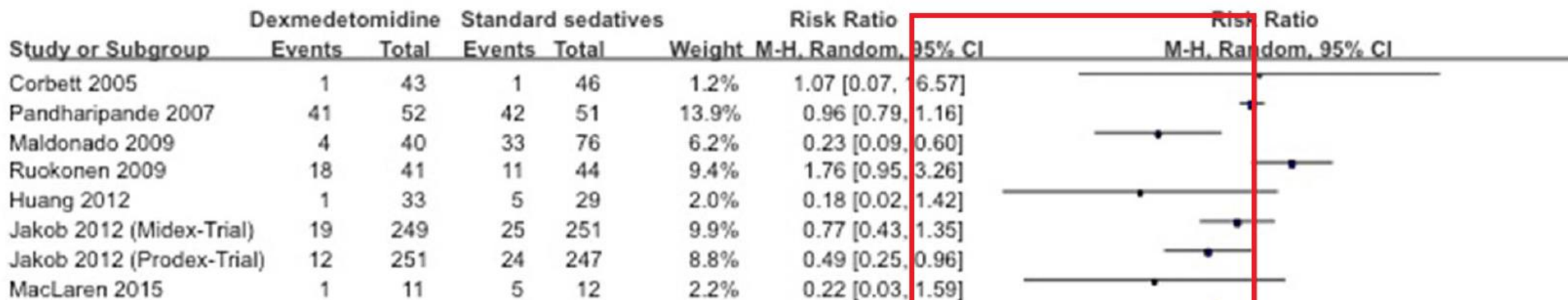
Prevence

- **Není doporučena farmakologická prevence**
- **Doporučena multikomponentní nefarmakologická strategie**
 - **Redukce modifikujících a rizikových faktorů deliria**
 - Optimalizace spánku
 - Mobilizace
 - Časná mobilizace
 - Redukce sedace
 - Komunikace
 - Zapojení rodičů

Table Environmental and pharmacological interventions for the treatment of delirium

Symptoms/Risk factors	Interventions
Sleep-wake cycle disturbance	Natural or bright lighting during the day Dim lighting or lights off at night Decrease noise level at night Melatonin Antipsychotics
Agitation	Reassurance by family members Assurance of adequate pain management Antipsychotics
Inattention	Family involvement Establishing and adhering to daily routine
Confusion	Frequent and repeated reorientation Use of calendar, clocks, pictures, and toys from home
Frequent nursing care	Cluster nursing interventions
Use of restraints	Removal of restraints One-on-one safety observation
Use of mechanical ventilation	Dexmedetomidine Constant discussion about extubation





Conclusion: Findings suggest that dexmedetomidine reduces incidence and duration of ICU delirium. Furthermore, our systematic searches show that there is limited evidence if a delirium shall be treated with dexmedetomidine.

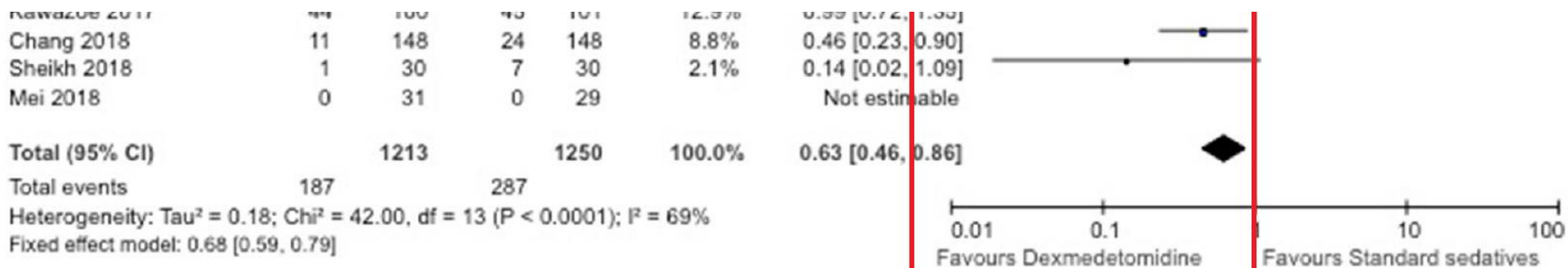


Fig. 3 Forest plot for incidence of delirium in standard sedative-controlled RCTs



Závěr

Jan N. M. Schieveld, MD, PhD
Department of Psychiatry and Neuropsychology
Maastricht University Medical Center+; and
European Graduate School For Neuroscience (EURON)
South Limburg Mental Health Research and Teaching
Network (SEARCH)
Maastricht, The Netherlands; and
Mutsaersstichting
Venlo, The Netherlands

demographic and treatment-related risk factors for the development of PD. A secondary objective was the establishment of the practicality of multi-institutional bedside screening for delirium. For the purpose of this study, the authors chose the Cornell Assessment of Pediatric Delirium (CAPD) as the delirium screening tool, because they stated that it is the only tool that has been validated across the entire pediatric age range and for application in children with developmental delay, and it can successfully discriminate between delirium and other causes of altered mental

- Delirium na PICU je velký problém (poddiagnostikovaný)
- PICU zaostává v implementaci multimodální prevence a terapie deliria versus ICU
- Chybí doporučení k terapii



Závěr

- Cílem sedace je pacient bez dyskomfortu s dostatečnou analgezií
- Spontánně ventilující (SPONT, nebo PSV)
- Jak to dosáhnout?
- Hodnotit hladinu sedace
- Hodnotit přítomnost/absenci deliria
- Alfa-2 agonisty v sedaci?!





AKUTNĚ.CZ



... sejdeme se na AKUTNĚ.CZ...

16. 11. 2019

Univerzitní kampus Bohunice, Brno

XI. konference AKUTNĚ.CZ

