**Draft from Yangbolun, prepare for the next meeting to combine suggestions:**

The Richards Campbell Sleep Questionnaire (RCSQ) [11] (Appendix 3) is currently the most widely used instrument for assessing sleep in ICU patients [2,3,6]. It consists of five themes assessing **sleep depth**, **falling asleep**, **number of awakenings**, **awake time**, and **overall sleep quality** [11].

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For assessment:

Try to assess user’s sleep quality from the front four divisions, each part account for 25% and the total assessment is the added score.

For sleep depth part, if user in deep sleep, there should be none or very little movements from body, may be can detected by motion sensor (Only after user fall into sleep). If motion sensor detected little movements from sleep, then the score should be a little bit lower. If there are huge movements being detected, the score should be much lower. The different depth of sleep should be recorded and bring to the user (with some chart).

For falling asleep, it should be assessed by how quickly user fall into sleep. This question can also be making sure user is sleeping, not doing other thing. Usually less than 15 minutes should be a perfect sleep, over 15minutes should get less score and with the time extend, the score should be lower and lower. The time should be calculated and bring to the user.

For number of awakenings part, it can be detected from motion sensor and sound sensor, if there is once or twice user wake up from sleeping then it should be a bad sleep and make this part have a low score. The number of this should be count and bring to the user.

For awake time, only if user have awakenings, this part will be modified, otherwise it should be full score. The score will getting lower with the time that user spent to fall into sleep again. The time should be calculated and bring to the user.