

**Supplementary Table 1.** List of actionable quality indicators to monitor adequate pain management in an ICU.

Indicator	Definition	Indicator type	Numerator	Denominator	Optimal value
1. Performing pain measurements	Percentage of patient-shift observations during which pain was measured at least once.  <i>Specified for subgroups:</i> 1) type of admission, 2) type of shift	Process	Number of patient-shift observations during which pain was measured at least once	Total number of patient-shift observations with or without a pain measurement	100%
2. Re-measuring unacceptable pain within 1 hour <sup>#</sup>	Percentage of patient-shift observations during which an unacceptable pain score was measured*, and pain was re-measured within one hour  <i>Specified for subgroups:</i> 1) type of admission, 2) type of shift	Process	Number of patient-shift observations during which an unacceptable pain score was measured*, and pain was re-measured within one hour	Total number of patient-shift observations during which an unacceptable pain score was measured*	100%
3. Acceptable pain scores <sup>#</sup>	Percentage of patient-shift observations during which pain was measured* and no unacceptable pain scores were observed  <i>Specified for subgroups:</i> 1) type of admission, 2) type of shift	Outcome	Number of patient-shift observations during which pain was measured* and no unacceptable pain scores were observed	Total number of patient-shift observations during which pain was measured*	100%
4. Unacceptable pain scores normalized within 1 hour <sup>#</sup>	Percentage of patient-shift observations during which an unacceptable pain score was measured*, and pain was re-measured within one hour indicating that the pain score was normalized  <i>Specified for subgroups:</i> 1) type of admission, 2) type of shift	Outcome	Number of patient-shift observations during which an unacceptable pain score was measured*, and pain was re-measured within 1 hour indicating that the pain score was normalized	Total number of patient-shift observations during which an unacceptable pain score was measured*	100%

\*Only pain scores measured with a standardized pain assessment tool, such as the Visual Analog Scale (VAS), Numerical Rating Scale (NRS), Behavioral Pain Scale (BPS), or Critical-Care Pain Observation Tool (CPOT) are included.

<sup>#</sup>Unacceptable pain scores were defined as measurements with a VAS or NRS score of  $\geq 4$ , a CPOT  $\geq 3$  or a BPS  $\geq 6$ . Acceptable or normalized scores were defined as VAS/NRS  $< 4$ , CPOT  $< 3$  and BPS  $< 6$ .