

# PRELIMINARY ASSESSMENT OF NOISE IN THE OPERATING ROOM

S. Mark Poler, MD

Geisinger Health System, Danville, PA,

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Sound levels affect communication, perception of clinical situations, and patient care in the operating room (OR). Noise in this context refers to the aggregate of all sounds present in the operating room environment. The OR is typically an undamped environment that resonates sound. While noise is a suspected contributor to some adverse events, attention to patient care details, and impairment of timely communication, its contribution is qualitative, unstructured, and difficult to document.

**Methods:** Sound levels were measured in a convenience sample of 39 general anesthesia cases attended by the author. Most cases involved tracheal intubation, though one involved LMA insertion. Some cases involved Rapid Sequence Inductions, difficult intubations, and intubated ICU transfers. Patient ages ranged from infant to nearly a century. ASA class ranged from 1 to 4. Eight surgical services were represented. No adverse induction-related events occurred during collection of this data sample.

Acoustic decibels (dB) are logarithmic (ratio) units sound intensity. Minimum (dBmin), maximum (dBmax) and average (dBavg) sound levels were recorded using an uncalibrated Radio Shack Digital Sound Level Meter (catalog no. 33-2055) for an indefinite period starting just before pharmacological induction of anesthesia until after satisfactory control of the airway. Concurrent observations of circumstances that might affect ambient noise were noted. Additional variables were identified when perceived to be either a consequence of noise, or a potential contributing factor. Thus there are many gaps and inconsistencies in this data sample. The Radio Shack meter is only capable of holding measurements within a preset 20 dB range, usually set for 60-80 dB. Fast response (0.2 second samples) and “C weighting” (flat, 32-10,000 Hz) were used. Under-range (“LO”) values were recorded as the range minimum.

**Results:** Whenever the sound meter was noticed by OR staff there was an associated decrement in sound level. As such, reported measurements probably underestimate what would have occurred without observation bias. 39 cases were collected. The sample size is small and there is much missing data, so statistical assessment has little basis for validity. The mean of averages (dBavg) was 65 dB and the mean of maxima (dBmax) was 70 dB overall. By service, average and maximum decibels each differed by about 5 dB from least to most.

There is no firm relationship between recorded sound pressure levels in decibels (dB) and qualitative perception of noise that might affect communication at the head of the OR table. Depending on the character and source of ambient sound, differences of 5-10 dB could be perceived as qualitatively similar. That is, 65-70 dB conversation seems less intrusive than a low-pitched musical beat measuring the same intensity. In general, less than 60 dB characterizes a quiet office environment and soft speech. 65 dB is typical for normal conversation, while 70 dB characterizes moderately loud music or animated conversation. By 80 dB definitely raised voice and repetition are required for communication. Shouting is sometimes required for communication over 90 dB background noise. One loud, spurious monitor alarm registered 74 dB right at the head of the bed due to “high pressure” for an arterial line that had not yet been inserted. The highest sound levels recorded in this series of observations was 95 dB. On another occasion the author has recorded 105 dB in an operating room (loud music and correspondingly loud conversation). Pneumatic devices when used can be louder.

**Future Plans:** This preliminary quality assessment (QA) study was undertaken without IRB approval. No patient or staff identities were recorded. This study identified variables that may be incorporated in a formal prospective study of OR sound and provides preliminary data for estimation of statistical power. Qualitative observations will be used to define nominal scales for assessment of ambient conditions and potential impact on quality of patient care. A formal study assessing noise in the OR is anticipated.