Early adoption of technology and peer competition frequently vie with such considerations as cost, patient safety and clinician efficiency in making decisions about provision of medical gases in patient rooms.

Often, such decisions are made arbitrarily in the absence of empirical data to support or refute any contention. The often considerable cost of adopting new technology means any decision to do so should be supported by research.

Methodology
Toward that objective, we conducted a study to assess the relative impacts of headwalls and ceiling booms. We focused on the management of four physical-functional elements: 1) intravenous tubing, 2) electrical cords, 3) medical gas tubing, and 4) equipment. We designed a series of simulations involving the two medical gas options. In each set of scenarios, we manipulated the physical environment only with the provision of medical gases. In total, we designed five scenarios for comparative assessment: 1) patient admission, 2) intubation, 3) surgery, 4) code, and 5) ECMO life support. Video recording of simulations and field notes by the research team constituted the main data.

The 66-bed intensive care unit at Children’s Medical Center Dallas has both headwalls and medical gas booms, and a section of the clinicians work in both types of environments. Capitalizing on existing variations in the setting, it offered an ideal environment for the study. An ICU room with ceiling boom was selected, and a headwall mock-up was used in the same room to minimize disturbances from the research activities. All required equipment and supplies for each scenario were used to closely replicate real life. A pediatric manikin simulated the patient. The sample constituted four nurses and two each of physicians, nurse practitioners and respiratory therapists.
Findings
Among other results, our data analysis addressed a key question: Under which set of circumstances should one invest in ceiling booms? This is a commonly encountered question, typically, without a straightforward solution. Our first round of analyses of video segments and field notes suggests four key areas to assess: 1) acuity, 2) procedures, 3) head access, and 4) budget.

For an objective assessment of a particular context, respond to the questions below.

Anticipated level of acuity
Various levels of patient acuity exist within intensive care units. Acuity levels bear a direct relationship to equipment and number of providers moving in and out of the room to manage patient care.

What level of patient acuity are you anticipating? Do you anticipate any of the following modalities: ECMO, ventricular assist devices (VAD), intra-aortic balloon pumping (IABP), high-frequency ventilation, nitric oxide administration, renal replacement therapy (RRT), plasma exchange/pheresis, intracranial pressure monitoring, continuous video EEG monitoring?

a. Yes: consider ceiling boom
b. No: headwall may serve most needs

Anticipated surgical procedures
Surgical procedures vary in complexity. Patient safety, population type and acuity often demand complex surgical procedures at the patient bedside.

Are you planning to conduct surgical procedures in the patient room?
c. Yes, immediately on occupancy: consider ceiling boom
d. Yes, possibly sometime in the future: consider providing boom structural support only
e. No: headwall may serve most needs

Anticipated frequency for head access
Intubation is a common procedure in all intensive care units; however, the length of time as well as number of re-intubations varies. In addition, certain patient populations require specific procedures not common to other intensive care patients.

How frequently do you anticipate encountering the following scenarios in patient rooms: 1) intubation, 2) cervical spine immobilization precautions and care, 3) EEG monitoring, and 4) other vascular access and procedures in patients’ head and neck regions (e.g., ECMO, RRT). (These four scenarios are the primary reasons clinicians need access to the head of the bed.)
f. Yes, frequently: consider ceiling boom
g. Yes, intermittently: consider provision of duplicate headwall medical gases of sufficient quantity on each side of the patient bed.

Anticipated budget
Flexibility for caregivers is the number one reason to provide the ceiling boom. Therefore, designing for flexibility with a lower cost may be possible.

Is your budget limited, but you encounter some or all of the critical scenarios listed above?
h. Yes: consider provision of duplicate headwall medical gases of sufficient quantity on each side of the patient bed

Since one size does not fit all, we are presenting questions in this article to support decision making. We hope these are helpful in your own assessment.

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