Title: Systematic Bias in Handwritten Anesthetic Records

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Introduction
It may be that the anesthesiologist acts to filter monitor data before it is recorded, and that this role is responsible for the reluctance to use automated anesthetic records. We compared automated and handwritten records and found evidence of systematic bias in the handwritten record.

Methods
Forty-seven patients gave informal consent for participation in a study of the efficacy of monitoring modalities. All patients were monitored using automated blood pressure cuff instruments. None had arterial pressure catheters.

Automatic recordings were obtained using chart recorders connected to the operating room monitors. No effort was made to "blind" the anesthesiologist to the recording.

The first hour of the case was analyzed. The maximum and minimum systolic and diastolic blood pressures were extracted both from the chart recordings and the handwritten records.

Results
The maximum and minimum systolic and diastolic pressures from the written and automatic records are shown. Points lying above the line of identity represent cases where the automatically recorded maximum or minimum value exceeds that found in the handwritten record. Points lying below the line of identity represent cases where the automatically recorded value is less than the handwritten one. The automatically recorded maxima and minima are different from the handwritten values. For each measurement the average discrepancy is significantly different from zero (Student’s t-test, p<0.001).

Minimum systolic pressures less than 90 torr are reported in only one-third of cases (three out of nine). Maximum systolic pressures over 165 torr occur 14 times but are recorded only five times. Maximum diastolic pressures greater than 100 torr are reported in 25 cases but recorded in only seven. Four cases had total discrepancies of 100 torr or more.

Discussion
The data suggest a significant bias towards recording more "normal" or nominal values in the anesthetic record. Over half of the records examined had substantial discrepancies.

The presence of this bias may have significant implications. It is impossible, based on the handwritten record alone, to distinguish between the truly "smooth" case and one which has simply been recorded without substantial pressure variations. Bias in some records calls all records into question. The elimination of this bias may require, as a standard of care, automatic recording of every blood pressure taken in the operating room.

1 Approval for the study was obtained from the Institutional human subjects review board.