

Association between Anesthesiologist Age and Litigation

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ABSTRACT

Background: The threat of being sued is a concern for many anesthesiologists. This paper asks whether litigation brought against anesthesiologists is associated with the age of the anesthesiologist.

Methods: Institutional research ethics approval was granted. We obtained billing data for all procedures performed by specialist anesthesiologists stratified into three age groups (less than 51, 51–64, and 65 and older) from British Columbia, Quebec, and Ontario for the 10-yr period from Jan. 1, 1993 to Dec. 31, 2002. We also obtained all litigations (including disability weighted claims) handled by the Canadian Medical Protective Association during the same time period in which the Canadian Medical Protective Association experts considered the anesthesiologist cited to be at least partially responsible for the adverse event leading to the complaint.

Results: In univariate analysis with the less than 51 age group as the reference category, the litigation rate ratio for the 51–64 age group was 1.14 (95% CI: 0.99–1.32) and for the 65 and older age group was 1.50 (95% CI: 1.14–1.97). Our analyses using disability weighted claims showed the 51–64

What We Already Know about This Topic

- Older anesthesiologists in one study report working fewer hours and express less concern over liability than younger ones, but whether litigation risk changes with age has not been adequately studied

What This Article Tells Us That Is New

- Using billing and malpractice data from 1993–2002 in British Columbia, Ontario, and Quebec, Canada, the risk of litigation was greater (odds ratio 1.50, confidence limits 1.14–1.97) among anesthesiologists older than 65 yr compared with those younger than 51 yr

group to have 1.31 (95% CI: 0.95–1.80) and 65 and older group to have 1.94 (95% CI: 1.41–2.67) relative increase in disability compared to the less than 51 age group.

Conclusions: We found a higher frequency of litigation and a greater severity of injury in patients treated by anesthesiologists in the 65 and older group. The reasons for these findings should become an active field of research.

A regional survey of anesthesiologists in New England reported that older anesthesiologists work fewer hours per week and were less stressed by liability concerns when compared with younger anesthesiologists.¹ We wondered what the risk of litigation is among different age groups of anesthesiologists for a given clinical exposure. Thus, the objective of this paper is to determine if there is an association between anesthesiologist age and litigation in patients undergoing anesthesia.

Materials and Methods

The Research Ethics Committee of the SMBD-Jewish General Hospital (Federalwide Assurance Number: 0796) (Montreal, Quebec, Canada) granted approval of the study.

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Received from the Department of Anesthesia, the Centre for Clinical Epidemiology and Community Medicine of the Lady Davis Institute for Medical Research, Jewish General Hospital, McGill University, Montreal, Quebec, Canada, and the Department of Mathematics and Statistics, McGill University. Submitted for publication November 29, 2010. Accepted for publication November 3, 2011. Supported in part by the Lady Davis Institute, a research facility associated with the Jewish General Hospital, Montreal, Quebec, Canada, whose contribution assisted in the acquisition of provincial data.

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◆ This article is accompanied by an Editorial View. Please see: Warner MA: More than just taking the keys away ANESTHESIOLOGY 2012; 116:501–3.

Independent Variables (Anesthesiologist and Patient Interactions, Age, Gender, Academic vs. Nonacademic, Case Complexity, Rural vs. Urban)

We obtained billing data for all physician-patient interactions performed by specialist anesthesiologists from British Columbia (BC: BC Medical Services Commission), Quebec (QC: Regie de l'Assurance Maladie du Quebec), and Ontario (ON: Ministry of Health and Long Term Care) for the 10-yr period from Jan. 1, 1993 to Dec. 31, 2002. The information included the age of the anesthesiologist at the time of billing (divided into age groups of less than 51, 51–64, 65 and older), billing code for the act, unique anonymized patient identifier code, and the date of the procedure. We chose these age groups because they represent postresidency to mid-career, mid-career to late-career, and late-career to retirement, and we thought are large enough to maintain provider anonymity. In order to exclude anesthesiologists who might have licenses in more than one province and bill provincial agencies for work done outside the province studied, we excluded all anesthesiologists who billed for fewer than 50 patients in any given year (always less than 10% of anesthesiologists in any province in any year, with a median of 5.9% across all provinces and years). We did not stratify anesthesiologists according to gender, as this would have allowed for identification of individual anesthesiologists. We could not determine the effect of venue of practice (academic *vs.* non-academic) on litigation because the ages of the anesthesiologists for academic sites are not recorded. However, this would only be a confounder if the age distribution of anesthesiologists were different between academic and nonacademic sites.

For the QC billing data, we trichotomized case complexity using a payment-fee complexity categorization created by the tariff committee of the Association des Anesthésiologistes du Quebec. In brief, each procedure was considered as an exposure for a potential litigation and was assigned a number between 3 and 18 as defined by its QC base unit code (we assigned a number of 3 for patient visits/consultations without procedures). Procedures with numbers less than 8 were paid the least (low complexity), those with numbers between 8–11 were paid an intermediate amount (moderate complexity), and those with numbers greater than 11 were paid at the highest rate (high complexity). When more than one procedure (*e.g.*, low anterior resection, cystoscopy, and ureteral stent insertion) was applied to the same patient on the same day, we categorized it as a single case and assigned the highest complexity code billed among the set of procedures for that patient. However, if an anesthesiologist billed for procedures on two separate days for the same patient (*e.g.*, femoral artery to popliteal artery bypass graft on May 5 and a below-knee amputation on May 6), we considered this as two separate cases. This categorization scheme assumes that surgical cases paid similar base units have equivalent complexity. Although this is often true, there are exceptions and other categorization systems are possible.

For the BC data we used the BC Medical Association Guide to Fees December 2002 edition and translated all the submitted BC anesthesia-related codes into the corresponding QC code. The BC payment system underwent an overhaul in 1997, so the procedures translated as determined by the 2002 guide (applicable as of 1997) were used as the basis for cases before 1997, as well. We then trichotomized the procedures following the same processes as we did with the QC data. Finally, we used the Ontario Health Insurance Plan codebook and matched all submitted ON anesthesia codes to the QC and BC codes in one master list.

We obtained data on the distribution of rural and urban anesthesiologists across Canada for each year of our study from the Canadian Institute for Health Information, which uses the postal code of the address for correspondence to distinguish rural and urban practitioners. However, for confidentiality reasons, the Canadian Institute for Health Information would not provide the exact number for a particular year if there were between one and four anesthesiologists in an age group (occurred only in the rural group). According to the Canadian Institute for Health Information data, urban anesthesiologists were generally older than rural anesthesiologists. Therefore, in order to address possible confounding through a conservative imputation process, we assumed that urban anesthesiologists are litigated against more than rural anesthesiologists (*i.e.*, urban practice instead of age could be the true causal factor). We then imputed the smallest value of 1 for the missing rural 65+ anesthesiologists in order to underestimate their number. We also imputed the value 4 for the other age groups in order to overestimate the number of rural less than 51 and 51–64 anesthesiologists.

Malpractice Litigation Events (Outcome)

In Canada, the Canadian Medical Protective Association (CMPA) handles the defense for virtually 100% of Canadian specialist anesthesiologists. Therefore, we considered all litigations involving procedures conducted between Jan. 1, 1993, and Dec. 31, 2002, in which the CMPA ascribed at least partial responsibility to the anesthesiologist for the adverse event leading to the litigation. The year assigned to each case was the year in which the patient was treated. Using malpractice litigation events as a proxy for adverse events is controversial,² but litigation requires, at the very least, the perception that damages have occurred. There is no evidence in the literature or theoretical reason why any age group of anesthesiologists is more likely to contribute to an adverse event and not be litigated, especially since the article by Edbril and Lagasse² found that systems errors contributed to almost 90% of cases of adverse outcome. Thus, using litigation data are unlikely to introduce age-related event bias.

We recorded the anesthesiologist age in the same groups as exposure (less than 51, 51–64, 65 and older) for each litigation. In addition, the severity of the injury was determined by the CMPA before the study as part of their internal coding procedure. The severity scoring is based on the fol-

lowing ordinal scale: none, emotional injury, physical minor temporary, physical major temporary, physical minor permanent, physical major permanent, physical catastrophic permanent, and death.

The CMPA also captures data related to the provincial health authorities that includes complaints filed against physicians with the licensing provincial colleges. They provided us with the total number of combined legal actions and complaints they were made aware of over the same time period where the CMPA ascribed at least partial responsibility for the adverse event to the anesthesiologist, stratified by age group (less than 51, 51–64, 65 and older).

Assumption

We were unable to adjust for patient-related factors such as socio-economic status, comorbidity, and so on. This would only introduce bias if there were a difference in the age distribution of anesthesiologists and these factors. We believe our assumption is appropriate because surgical assignments in Canada rarely come from requests by individual surgeons or patients. Rather, the operating room schedule is generated in keeping with the policy of the anesthesiology department's designated assignor, such as the anesthesiologist-in-chief, or rotation through the department. In essence, this means the age of the anesthesiologist is causally unrelated to other factors (like a randomized trial) except through case complexity where certain anesthesiologists will be responsible for particular types of cases (*e.g.*, coronary arterial bypass surgery).

Statistical Analysis

We have previously reported median number of physician-patient interactions with interquartile range from our data.^{3,4} In this analysis, we report the raw data across all anesthesiologists grouped by age for the total number of anesthesiologists, procedures, claims, and claim rate. These data are provided as line graphs showing the median values for each year across all the provinces studied. We used generalized estimating equation (GEE) to compare the litigation claim rate (number of litigations/number of patient cases) among anesthesiologists of different age groups (less than 51, 51–64, 65 and older) over the 10-yr period, including year as a random variable to adjust for repeated measures. In sensitivity analyses, Poisson and quasiPoisson regression analyses gave similar results with CIs that were sometimes a little wider or narrower but did not affect the overall conclusions. We report the GEE results because they require the fewest number of assumptions about the distribution of the response variable and the correlation structure of events within a particular year.⁵

As a secondary analysis, we investigated the role of case complexity. In these analyses, each litigation case was also categorized according to whether the associated surgery was of low, moderate, or high complexity. Therefore, we used GEE to calculate the litigation rates for low complexity cases (number of low complexity cases/number of low complexity

exposures) for each age group. Because of sparse data for high complexity cases in the 65 and older age group, we combined the moderate and high complexity into one category. We again conducted sensitivity analyses using Poisson and quasiPoisson but report only the GEE results in detail because the results were qualitatively similar and did not affect the overall conclusions.

In further secondary analyses, we explored if there were a relationship between anesthesiologist age and seriousness of the injury in the litigated case as determined by the CMPA disability weighted claims data or cost. These analyses were conducted for all cases, and stratified by low or moderate-high complexity levels. We log-transformed disability and cost (and the offset of population) and then used linear regression. We allowed for dependence of the three group outcomes within a year, using a random effects term to account for potential year-to-year fluctuations in litigation. In these analyses, the model that included year as a random effect was inappropriate for the moderate-high complexity levels because there were some years with zero disability and no cost for the 65 and older age group. We therefore report the simple mean for each group in these analyses.

Finally, in an exploratory *post hoc* sensitivity analysis, we considered age as a continuous variable. However, we could not match the anesthesiologists who experienced the outcome to the exposure data, and therefore did not have direct information on the number of procedures. Therefore, we used the age for each anesthesiologist experiencing the outcome (obtained from CMPA files), and assigned the median number of procedures for that anesthesiologist based on the age group of that anesthesiologist (obtained from the billing data). Using a GEE analysis accounting for repeated measures on anesthesiologists, the pattern of increasing litigation with increasing age was present, but the CIs were too wide to make any substantial conclusions based on this analysis.

Results

Figure 1 shows the total number of specialist anesthesiologists (fig. 1A: 1490–1667, 624–754, and 165–241 in the less than 51, 51–64, and 65 and older age groups, respectively, over the 10-yr period), number of legal claims (fig. 1B: 21–46, 12–23, and 2–9 in the less than 51, 51–64, and 65 and older age groups, respectively, over the 10-yr period), number of procedures (fig. 1C: 888,209–1,056,690, 400,866–522,750, and 85,158–125,172 in the less than 51, 51–64, and 65 and older age groups, respectively, over the 10-yr period) and legal claim rate (fig. 1D: 2.04–4.97, 2.37–5.39, and 2.02–7.19 in the less than 51, 51–64, and 65 and older age groups, respectively, over the 10-yr period) for each age group (less than 51: dashed, 51–64: dotted, 65 and older: solid) from 1993 to 2002. The claim rates are calculated as the number of claims divided by the number of procedures, expressed per 100,000 procedures. Although the number of claims is consistently less for the older age group, the number of exposures is also much less, and this is why the 65 and

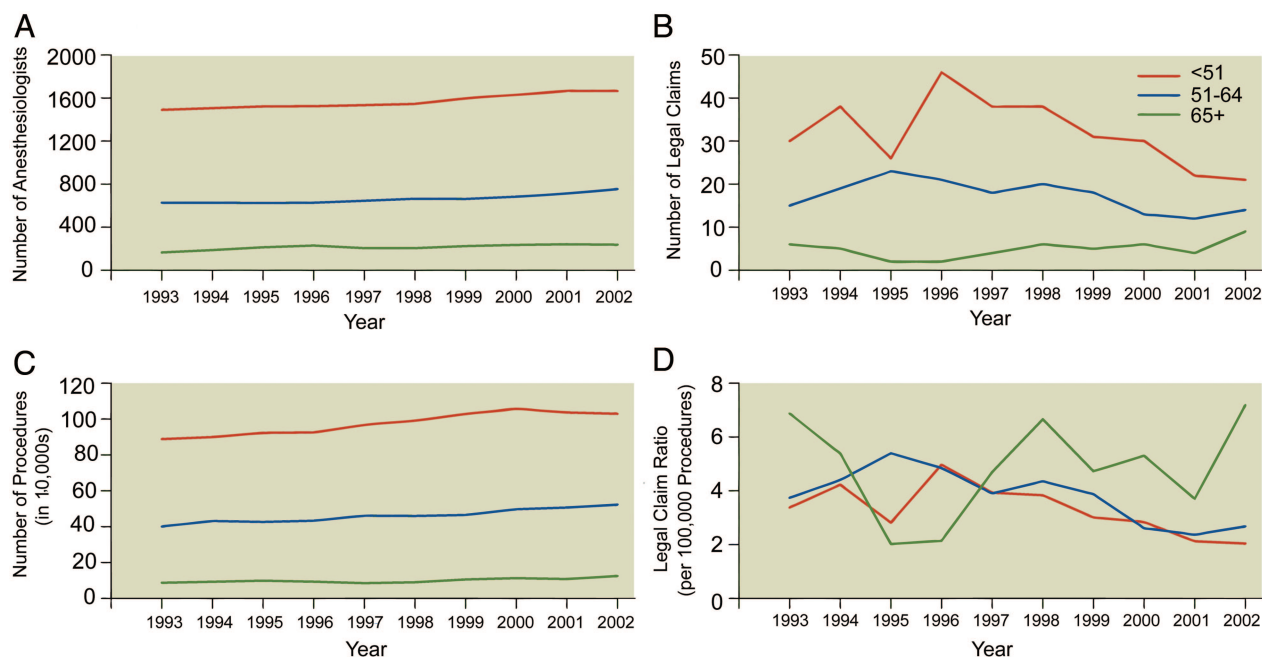


Fig. 1. The total number of specialist anesthesiologists (A), number of legal claims (B), number of procedures (C), and legal claim rate (D) for each age group (less than 51: *dashed*, 51–64: *dotted*, 65 and older: *solid*) are shown for each year between 1993 and 2002. Although the number of claims is much less for the older age group, the number of exposures is also much less. Therefore, the claim rate for the 65 and older age group is generally higher in each year.

older age group generally has a higher legal claim rate in each year.

The associations between age group and litigation after adjusting for the severity of the damages to the patient (disability-weighted litigation rates and cost) are shown in table 1 for the overall group, and for the low complexity procedures category. In general, the trends for overall group and low complexity category are similar to the GEE analysis on litigation rates, with disability being lowest in the less than 51 group, slightly higher in the 51–64 age group, and higher again in the 65 and older age group. For the moderate-high complexity category, the disability-weighted rates increased with increasing age (less than 51: 8 per 100,000; 51–64: 9.8 per 100,000; 65 and older: 15.0 per 100,000), but the associated costs were highest in the 51–64 age group (less than

51: \$2,435 per 1,000 procedures; 51–64: \$28,893 per 1,000 procedures; 65 and older: \$12,372 per 1,000 procedures).

Using the less than 51 age group as a reference, the litigation rate ratio was 1.14 (95% CI: 0.99–1.32) for cases filed through the CMPA for the 51–64 age group, and 1.50 (95% CI: 1.14–1.97) for the 65 and older age group. Because adverse events may sometimes incur complaints to a professional college rather than legal action, we also analyzed the data using the outcome of combined legal actions and complaints. Including complaints resulted in varying numbers of additional outcome events depending on the year and age group: there were 9–23 college complaints that were not litigated cases for the less than 51 group (representing 19–43% of total legal actions and complaints in this age group); 6–13 college complaints (23–46%) for the 51–64 group;

Table 1. Relative Increase in Disability (95% CI) and Cost (95% CI) per Procedure When Compared with the Younger than 51 Age Group*

	51–64 Age Group	65 and Older Age Group
Disability-weighted analyses		
Legal claims only (overall)	1.31 (0.95–1.80)	1.94 (1.41–2.67)
Legal and college claims (overall)	1.22 (0.82–1.79)	1.51 (1.03–2.23)
Legal claims only (low complexity)	1.26 (0.71–2.22)	2.34 (1.33–4.13)
Cost analyses		
Legal claims only (overall)	2.56 (0.79–8.32)	3.04 (0.93–9.88)
Legal claims only (low complexity)	1.69 (0.30–9.48)	5.42 (0.97–30.37)

The 51–64 age group has 1.31 times the disability for legal claims as the younger than 51 age group.

* Based on generalized estimating equations that included year as a random effect to adjust for repeated measures. As such, the “n” is different for each year and not reported. The actual number of anesthesiologists and number of procedures for each year for each age group within each province can be found in figure 1.

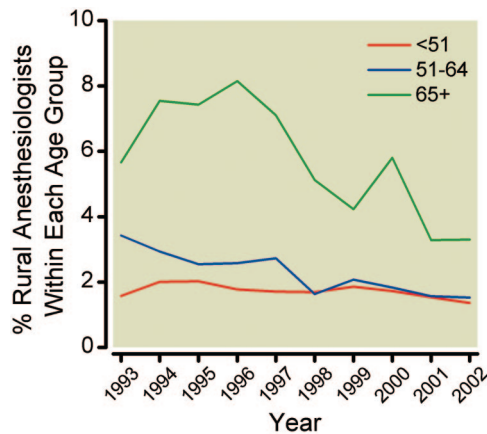


Fig. 2. The percentage of specialist anesthesiologists working in rural areas in each age group is shown for each year between 1993 and 2002. Data were obtained from the Canadian Institute for Health Information, which bases its definition of rural and urban on the postal code of the address for correspondence.

and 0–3 college complaints (0–50%) for the 65 and older group. When we included both litigation and complaints to the provincial colleges, the rate ratio for the 51–64 age group was 1.16 (95% CI: 1.07–1.26) and the rate ratio for the 65 and older age group was 1.29 (95% CI: 1.02–1.62).

When we restricted the analysis to only low complexity cases, the 51–64 group had no increased risk of litigation (0.97; 95% CI: 0.85–1.11) but the 65+ group again had higher litigation rates (2.20; 95% CI: 1.65–2.94). When we restricted the analyses to moderate to high case complexity cases only, the 51–64 group had an increase in litigation (1.62; 95% CI: 1.04–2.53) as did the 65 and older group, but the CIs were wide because of the low number of absolute legal actions (1.57; 95% CI: 0.61–4.06).

Figure 2 illustrates that the proportion of rural anesthesiologists in each of the age groups was small and unlikely to have a significant effect on the interpretation of results. Further, our conservative analysis of urban and rural anesthesiologists shows a two to three times higher percentage of anesthesiologists 65 and older in rural locations in any given year (fig. 2). If rural anesthesiologists are less likely to be litigated, this means that the values reported above are underestimates of the true frequency of litigation against the oldest age group.

Discussion

Malpractice litigation against anesthesiologists in Canada is infrequent regardless of the age of the anesthesiologist. However, our results show that anesthesiologists 65 and older have approximately 1.5 times the risk (after adjusting for exposure) of being found responsible for litigation compared with their younger colleagues (younger than 51). Further, the degree of injury identified in the claim is of greater severity. This is so even though the older anesthesiologists are involved in fewer moderate and high complexity cases.

We could not determine the actual underlying mechanism for the increased risk (*e.g.*, easier fatigability resulting in reduced vigilance, longer response time, lack of continuing education, poorer communication skills, among others) and believe this should become an active field of research. Although the idea to investigate different age groups of anesthesiologists developed from a survey of anesthesiologists, some more recent literature assessing the quality of care provided by older physicians^{6–8} suggests our results might be applicable to other specialties as well.

Our study has several strengths. We used billing data to calculate exposure and did not rely upon anesthesiologists to recollect their clinical work. We assessed 10 yr worth of billing so our results represent a decade's activities and not an isolated single year's "snapshot" of experience. We analyzed specialist anesthesiologists exclusively, the vast majority of whom in Canada are Canadian-trained physicians and specialists. Because anesthesiologists are generally assigned cases based on departmental policy in Canada and are not selected by surgeons or patients, the age of an anesthesiologist managing any particular case is causally independent from patient characteristics, conditional on complexity, and confounding bias is minimized. We had access to the CMPA's analysis of claims for litigation, so our data for malpractice litigation and exposure were as complete and objective as possible. Finally, litigation can occur years after the actual "exposure," and in our data, some claims were indeed initiated more than 5 yr after the adverse event. Therefore, even though the last of our data were 2002, it remains as current as possible if one wants to account for all litigation that occurred as a result of exposures.

There are limitations to our analysis. We described our assumptions and our rationale for them. We are basing our exposure on almost 80% of Canadian anesthesiologists, but not 100%. However, the three provinces studied include all the fee regions where exposures and severity of damages are represented. In order to maintain confidentiality and abide by research ethics guidelines, we did not stratify by gender⁹ and used relatively large age groups. The analysis of rural and urban anesthesiologists demonstrates some of the difficulties in terms of confidentiality. Many of the cells contained fewer than five practitioners and we cannot determine any more detailed analysis. As an ecological analysis (*i.e.*, we did not match the cases to specific anesthesiologists but only to an age-group), the study is subject to the same limitations as many quality assurance studies using similar types of data sources.

In summary, we investigated the risk of malpractice litigation for three age groups of anesthesiologists across Canada and found a higher rate of litigation and a greater severity of injury in patients treated by the 65+ anesthesiologist age group. The reasons for these findings should become an active field of research.

The authors gratefully acknowledge the data and expertise provided by the Research Department of the Risk Management Services at the Canadian Medical Protective Association (Ottawa, Ontario, Canada). They thank BC Health in British Columbia (Victoria, British

Columbia, Canada), the Ministry of Health and Long-Term Care in Ontario (Toronto, Ontario, Canada), and the Department of Statistics at the Regie de L'Assurance Maladie du Quebec (Quebec, Canada) for their help in obtaining the respective provincial data. They also thank the Canadian Institute for Health Information (Ottawa, Ontario, Canada) for their contribution.

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ANESTHESIOLOGY REFLECTIONS

Bateman's Drops of Tinctured Opium



On March 31, 1726, King George I granted British Patent No. 483 to businessman Benjamin Okell for "Pectoral drops for rheumatism, gravel, *etc.*" Supposedly formulated by a Doctor Bateman, "Bateman's Pectoral Drops" were advertised as a "Chymicall Preparacion . . . for the Rheumatism, . . . the Afflictions of the Stone, Gravell, Pains, Agues, and Hysterias. . . ." "Bateman's Drops" were distributed in tall glass vials. On its paper label, the example depicted (*above*) reads "BATEMAN'S DROPS / Contains not over 50% ALCOHOL & 20min. TINCT. OPIUM to each fluid ounce." (Copyright © the American Society of Anesthesiologists, Inc. This image also appears in the *Anesthesiology Reflections* online collection available at www.anesthesiology.org.)

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