References

1. Malik A, Bell CM, Stukel TA, et al. Recurrence of inguinal hernias repaired in a large hernia surgical specialty hospital and general hospitals in Ontario, Canada. *Can J Surg* 2016;59:19-25.
2. Statistics Canada. Table 105-0501 - Health indicator profile, annual estimates, by age group and sex, Canada, provinces, territories, health regions (2013 boundaries) and peer groups. CANSIM (database) (accessed 2016, Feb. 12).
3. EU Hernia Trialists Collaboration. Repair of groin hernia with synthetic mesh: meta-analysis of randomized controlled trials. *Ann Surg* 2002;235:322-32.
4. Amato B, Moja L, Panico S, et al. Shouldice technique versus other open techniques for inguinal hernia repair. *Cochrane Database Syst Rev* 2012;4:CD001543.
5. Nordin P, van der Linden W. Volume of procedures and risk of recurrence after repair of groin hernia: national register study. *BMJ* 2008;336:934-7.

DOI: 10.1503/cjs.001916

AUTHOR RESPONSE

We don't know exactly why people who had an inguinal hernia repair at the Shouldice Hospital had a much lower rate of surgery for recurrence than those who had hernias repaired elsewhere in Ontario. Ultimately, there are only 3 possible explanations: patient selection, surgical technique, or perioperative care. Most likely, it is some combination of these factors.

Dr. Vinden suggests that patient selection largely explains the difference, and he may be correct. However, for selection alone to account for the extraordinary difference in surgical recurrences we observed, the influence of selection must be enormous. Even assuming that 30% of all patients seen at the Shouldice Hospital are rejected for surgery and have their hernia repairs done elsewhere, the recurrence rate among those patients would have to be nearly 14% to mask a "true" risk of recurrence that is equivalent to the surgical recurrence risk in general hospitals.

It is true that randomized trials do not support the use of the Shouldice technique for inguinal hernia repair, especially when compared to modern, tension-free repairs. Like Dr. Vinden, we do not believe that general surgeons should stop performing their usual technique of hernia repair — with which they are most skilled and confident — in favour of a repair that is notoriously difficult to perform well in typical practice settings. We also agree that it is neither advisable nor feasible to regionalize a procedure as common as inguinal hernia repair to specialty hospitals.

On the other hand, it appears that much may be learned about inguinal hernia repair from large specialty hospitals — even if those lessons relate to issues such as how patient selection and preparation influence outcomes, and the value of focused expertise even in a relatively minor surgical procedure.

David R. Urbach; Atiqa Malik; Thérèse A. Stukel; Chaim M. Bell

From the Institute of Medical Science, University of Toronto, Toronto, Ont. (Malik, Urbach); the Toronto General Research Institute, Toronto, Ont. (Malik, Urbach); the Department of Surgery, University Health Network, Toronto, Ont. (Urbach); the Department of Medicine, Mount Sinai Hospital, Toronto, Ont. (Bell); and the Institute for Clinical Evaluative Sciences, Toronto, Ont. (Malik, Stukel, Urbach).

DOI: 10.1503/cjs.003416

LETTER TO THE EDITOR

We are writing to respond to Drs. Vinden and Ott's commentary, "GPs with enhanced surgical skills: a questionable solution for remote services." We commend the authors for appealing to research data to inform the discussion of the need for a standardized curriculum by considering the efficacy of family physicians with enhanced surgical skills (FPES) in meeting the health care needs of rural Canadians. However, we feel some of the data referenced has been miscon-

strued and would like to contribute to this discussion, focusing primarily on data regarding maternity services and operative delivery.

Regarding the volume-to-outcomes data cited,¹ the context of the data was analysis of outcomes from 3 major hospital systems in the United States who committed to a volume threshold for 10 high-complexity surgeries. The author explains why volume is traditionally used instead of outcomes in the evaluation of surgical competence (to account for the procedure selection bias of surgeons and ease of data access) but concludes that "the mechanism underlying volume-outcomes relationships remain unknown." Further, he argues that if the underlying mechanism is one of increased practice leading to better outcomes, support for best practice models and quality improvement — not volume thresholds — is the most appropriate response.¹ As the author notes,

if, on the other hand, outcomes improve because hospitals and surgeons gain expertise with incremental experience through a "practice makes perfect" mechanism, then the focus should be on dissemination of best practices and quality improvement.¹

Additionally — and more pertinent to the current discussion — an earlier study by Urbach and colleagues² comparing volume studies from Canada and the United States found:

(...)that volume-outcome associations are much less common in Canada than in the United States, perhaps because different models of health care financing and delivery affect patterns of procedure volumes and volume-outcome associations. Market-based models promote competition between hospitals and providers, which may exacerbate existing variations in quality of care. The extent to which models of health care financing and organization cause variation in health outcomes across hospitals, and contribute to volume-outcome associations, has not been fully appreciated or examined.

Jurisdictions outside of the United States have witnessed their volume-outcomes associations disappear with improving prenatal screening, regionalization and formalized referral systems. No international data after 1996 outside the United States have shown a volume-outcome association in maternity care. The mid-1990s is recognized as a watershed date for advances in prenatal screening, influencing appropriate triage for those cases likely to require higher levels of care.³ For example, Lasswell and colleagues⁴ found an undisputed volume-outcome association for very low-birth weight and very premature infants (those who would be risked out for delivery at a hospital without a neonatal intensive care unit and attendant pediatric specialist). Heller and colleagues⁵ in Germany showed no association between volume and outcomes after 1996. Two large studies in Norway showed a volume-outcome association in data up to 1995,^{6,7} as did a study in Sweden with data to the same date.⁸ In Australia, a study replicating the procedures of Moster and colleagues⁶ but using Australian data from 1999–2001 found no volume association.⁹

Taken together, the weight of evidence for rural obstetrical care suggests that that distance to care has a greater clinical effect than does volume. Not taking into account reported psychosocial stress, sense of belonging and community, Aboriginal claim to birthing in their home territories and other qualitative evidence, BC and Canada-wide population data demonstrate that those women without local services have far worse outcomes than those with primary only (no surgical) services or those with FPES supported surgical services.^{10,11} Further, a positive correlation between increasing adverse maternal-newborn outcomes and distance to services (1–4+ h) has been demonstrated.¹¹ In international data, a study from the Netherlands showed that each minute of travel time is asso-

ciated with an increased risk of neonatal mortality (odds ratio 1.01).¹² In Australia, remoteness was found to be an independent factor in birth outcomes.¹³ In France, greater distance was associated with worse outcomes.¹⁴ In Wales, greater distance to hospital was associated with higher risk of neonatal mortality.¹⁵

Finally, the authors cite the Canadian Institute for Health Information report on “Hospital births in Canada: a focus on women living in rural and remote areas.”¹⁶ Although we applaud the spotlight on rural outcomes that this report brings, it must be noted that “rural” was defined as communities with a population of less than 10 000 not stratified by service delivery level. The influence of poor outcomes from communities with no access to services as noted above would be a primary determinant of the overall poor health outcomes of rural women. This, as much as anything, should be an indicator of the need for finding innovative and safe solutions to meet the perinatal — and other — surgical needs of rural residents. Although we agree with the authors that a plurality of solutions is needed in rural Canada, the available evidence would suggest that the solutions must involve the contribution of FPES.

Jude Kornelsen; Kevin McCartney

From the Applied Policy Research Unit, Department of Family Practice, University of British Columbia, Vancouver, British Columbia

DOI: 10.1503/cjs.001016

References

1. Urbach DR. Pledging to eliminate low volume surgery. *N Engl J Med* 2015; 373:1388-90.
2. Urbach DR, Croxford R, MacCallum NL, et al. How are volume-outcome associations related to models of health care funding and delivery? A comparison of the United States and Canada. *World J Surg* 2005;29:1230-3.
3. Grytten J, Monkerud L, Skau I, et al. Regionalization and local hospital closure in Norwegian maternity care — the effect on neonatal and infant mortality. *Health*

Serv Res 2014;49:1184-204.

4. Lasswell SM, Barfield WD, Rochat RW, et al. Perinatal regionalization for very low-birth-weight and very preterm infants, a meta-analysis. *JAMA* 2010;304:992-1000.
5. Heller G, Richardson DK, Schnell R, et al. Are we regionalized enough? Early neonatal deaths in low-risk births by the size of delivery units in Hesse, Germany 1990-1999. *Int J Epidemiol* 2002;31:1061-8.
6. Moster D, Lie RT, Markestad T. Relation between size of delivery unit and neonatal death in low risk deliveries: population based study. *Arch Dis Child Fetal Neonatal Ed* 1999;80:221-5.
7. Moster D, Lie RT, Markestad T. Neonatal mortality rates in communities with small maternity units compared with those having larger maternity units. *BJOG* 2001; 108:904-9.
8. Merlo J, Gerdtham U, Eckerlund I, et al. Hospital level of care and neonatal mortality in low-and high-risk deliveries: reassessing the question in Sweden by multilevel analysis. *Med Care* 2005;43:1092-1100.
9. Tracy SK, Hartz D, Hall B, et al. A randomised controlled trial of caseload midwifery care: M@NGO (Midwives@ New Group practice Options). *BMC Pregnancy Childbirth* 2011;11:82.
10. Grzybowski S, Fahey J, Lai B, et al. The safety of canadian rural maternity services: a multi-jurisdictional cohort analysis. *BMC Health Serv Res* 2015;15:410.
11. Grzybowski S, Stoll K, Kornelsen J. The outcomes of perinatal surgical services in rural British Columbia: a population-based study. *Can J Rural Med* 2013;18:123-9.
12. Ravelli AC, Jager KJ, de Groot MH, et al. Travel time from home to hospital and adverse perinatal outcomes in women at term in the Netherlands. *BJOG* 2011;118: 457-65.
13. Steenkamp M, Rumbold A, Barclay L, et al. A population-based investigation into inequalities amongst Indigenous mothers and newborns by place of residence in the Northern Territory, Australia. *BMC Pregnancy Childbirth* 2012;12: 44.
14. Combier E, Charreire H, Le Vaillant M, et al. Perinatal health inequalities and accessibility of maternity services in a rural French region: closing maternity units in Burgundy. *Health Place* 2013;24:225-33.
15. Paranjothy S, Watkins W, Rolfe K, et al. Perinatal outcomes and travel time to maternity services: analysis of birth outcome data in Wales from 1995 to 2009. *Arch Dis Child Fetal Neonatal Ed* 2013;98(Suppl 1):A94.
16. Hospital births in Canada: a focus on women living in rural and remote areas. Ottawa: Canadian Institute for Health Research (CIHR); 2005.