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Surgical Care in Small Alberta Communities

SUMMARY

A three-phase study was carried out in 1981 to determine the number of surgical procedures being done in Alberta communities with fewer than 10,000 inhabitants. Health insurance statistics grouped according to hospital and community size revealed that approximately 25% of physicians practicing in smaller communities did relatively uncomplicated major procedures, such as inguinal hernia repair. Those physicians who were surgically active tended to be versatile, carrying out procedures in several surgical disciplines. A questionnaire to individual hospitals revealed significant differences in procedural work between hospitals of similar size, serving similar populations. A second questionnaire showed that almost all rural hospitals, regardless of size, felt that the ability to monitor cardiac arrhythmias, provide physiotherapy and manage normal obstetrics was important and indicated that the importance of the ability to do surgical procedures varied according to the size of the hospital. The majority of physicians performing these procedures are not surgeons, and many of them will be retiring in the next ten years, so the training of their replacements becomes an important issue. While some consolidation of facilities will be inevitable, it should be combined with technological upgrading. (Can Fam Physician 1983; 29:1591-1601).

SOMMAIRE

Une étude en trois étapes a été menée en 1981 en vue de déterminer le nombre d'actes chirurgicaux posés dans les communautés albertaines de moins de 10,000 habitants. Les statistiques de l'assurance-maladie compilées selon la dimension de l'hôpital et de la communauté révèlent qu'approximativement 25% des médecins pratiquant dans les petites communautés ont posé des actes chirurgicaux majeurs relativement non compliqués, comme la réparation d'une hernie inguinale. Les médecins chirurgicalement actifs ont tendance à être versatiles, posant des actes dans différentes disciplines chirurgicales. Un questionnaire envoyé aux hôpitaux concernés a révélé des différences significatives au niveau de procédures entre les hôpitaux de dimension similaire, desservant une population similaire. Un deuxième questionnaire a démontré que presque tous les hôpitaux ruraux, indépendamment de leur taille, croient que la capacité de surveiller les arrhythmies cardiaques, d'offrir de la physiothérapie et de s'occuper des cas normaux d'obstétrique était importante et que l'importance de la capacité de poser des actes chirurgicaux variait selon la taille de l'hôpital. La plupart des médecins qui posent ces actes ne sont pas des chirurgiens, et plusieurs d'entre eux prendront leur retraite au cours des dix prochaines années, de sorte que la formation de leurs remplaçants devient un facteur important. Bien qu'une certaine consolidation des facilités sera de toute évidence inévitable, elle devra être combinée à une amélioration technologique.

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THE TREND TOWARDS urbanization, which has characterized population distribution in Canada in this century, has stopped and even reversed in some cases.¹⁻³ In Alberta, approximately 30% of the population lives in communities of 10,000 or less; this will likely continue for the foreseeable future. The province's health planners must therefore see that smaller communities have appropriate health professionals and equipment if the population of these communities is to receive high quality health care.

What patterns of medical and surgical care are actually being carried out in these communities at present? Greenhill and Singh⁴ compared the work of urban general practitioners with general practitioners in a single rural community and noted significant differences in their practices. The rural general practitioners studied did more major surgery, fewer follow up visits than did their urban counterparts. Kane et al.⁵ noted that in Utah, where 20% of the population live in widely scattered rural communities, both urban and rural subscribers to the Blue Shield Plan had similar rates for most common surgical procedures. There were only three qualified surgeons in the rural areas, but 30% of the whole range of procedures studied were carried out in rural communities, chiefly by surgeons and family physicians who did not possess formal qualifications. Other patients apparently travelled to major urban centres for their procedures. The simpler, more common procedures were more likely to be done in rural communities, while the more complex tended to be done in centres. Folse et al.⁶ reported that in a rural area in Illinois with a significantly denser population and with larger communities, there was a higher proportion of surgical specialists, but

approximately 30% of their practices tended to be primary care and only 50% surgery.

Method

In the summer of 1981, in order to identify what was currently taking place in Alberta for a conference on rural health care later that year, I carried out a three-part study. The first part used Alberta Health Care Insurance Commission data to identify the numbers of certain procedures for which doctors in rural communities were billing the Commission. For the purpose of this study, 'rural' referred to all Alberta communities with a population of 10,000 or less. Because confidentiality requirements prevented the releasing of information about individual physicians or hospitals, the hospitals were grouped into four classes, based on the size of the community and the number of active treatment beds. The physicians were also grouped according to the same classification. The classes of hospital and the basis for classification are shown in Table 1.

The procedures were chosen from three disciplines: general surgery, orthopedics, and obstetrics and gynecology. Certain procedures were selected to represent different levels of expertise or different needs within each:

1. General surgery: inguinal hernia, cholecystectomy.
2. Orthopedics: closed reduction of Colles fracture, open reduction of fractured hip.
3. Obstetrics and gynecology: cesarean section, hysterectomy.

The computer supplied the numbers of each procedure billed for by each group of physicians classified in Table 1. In addition, within each group, we identified those who billed for more than five and ten per year of each procedure.

TABLE 1
Classification of Rural Hospitals in Alberta

Group	Characteristics	# of Hospitals	# of Doctors
A	Population: 4-10,000 50+ active beds	20	150
B	Population: 4-10,000 or 50+ active beds but not both	15	98
C	Population: 1-4,000 20-50 active beds	50	163
D	Population less than 1,000 and/or 20 beds or less	11	12

The second part of the study was a questionnaire sent to the administrators of all the rural hospitals, asking them to report the following:

1. The numbers of each of the procedures identified in the AHCIC study that were performed in their hospitals, plus the total number of general anesthetics given and the number of obstetrical deliveries.

2. The number of patients admitted with myocardial infarction, cerebrovascular accident, acute psychiatric problems and trauma.

3. The number of patients transferred to other hospitals for further care among maternity, newborn, trauma and psychiatric patients.

The hospitals were grouped in the same way as in the first part of the study.

The third part of the study was a second questionnaire sent separately to both the administrator and the chief of the medical staff in all the hospitals covered in the second part of the study, asking each to rate the importance for their community, and their hospital in particular, of the ability to carry out certain procedures in that community. The procedures in question were normal obstetrical delivery, cesarean section, open reduction of major fractures, monitoring of cardiac arrhythmias, major abdominal surgery, treatment of acutely disturbed patients, and physiotherapy. They were asked to rate the importance of

being able to do each on a four-point scale from essential to not important. They were also asked to identify what they considered to be their community's unmet health care needs. Where administrator and medical staff differed, the results for that community were averaged if they were separated by two on the four-point scale; if separated by one, the lower figure was used.

There was one initial mailing and one follow up letter. The whole process was interrupted by a six-week mail strike, which limited the number of follow up letters which could be sent.

Results

1. *Who is Doing What in Smaller Communities?*

The overall results from AHCIC billings are shown in Table 2. So few procedures in the study were performed in Class D hospitals that they are not included.

Among the other classes of hospitals, there was remarkable uniformity in the percentage of physicians who billed for at least one inguinal hernia repair and closed reduction of a Colles fracture. The latter was the only procedure for which more than half the physicians billed in 1980. Open reduction of a fractured hip was carried out in only a few communities where presumably the physician had the necessary training and the hospital had the

resources. The majority of physicians involved in procedural work in all classes of hospitals billed for five or less of the procedures listed, with the exception of cesarean section in Class A and B hospitals, where a slight majority of physicians billed for more than five.

Tables 3 and 4 show that the majority of procedures were billed for by a few physicians who are surgically quite active. There is some clumping of expertise, most apparent in Class A hospitals, but also discernible in Class B, in that those physicians who billed for more than five cholecystectomies billed for a high percentage of the major orthopedic or general surgical procedures and a lower, though significant, proportion of the obstetrical and gynecological procedures. The situation was reversed for those who billed for five or more cesarean sections. However, most of those who are surgically active perform the whole range of surgical procedures. These data reflect billings only: in some cases a more experienced surgeon may have been involved in advising or assisting the physician who billed for the procedure.

2. *Response to Questionnaires*

Table 5 lists the responses rates for the two questionnaires. For questionnaire #2, returns were tabulated on the basis of community only. In many cases, returns arrived separately from the chief of medical staff and the administrator; in some cases it was not specified who had filled out the questionnaire. In a few it was specified that the form had been completed in a joint effort between medical staff and administration.

3. *Procedures Carried out in Hospitals Responding to Questionnaire #1 (Part 2 of the Study)*

This is summarized in Table 6. Some problems arose in the interpretation of results. Many hospitals do not keep records of their outpatient care, so the reporting of Colles fracture reduction, largely an outpatient procedure, is incomplete and is not included in this table. For similar reasons, psychiatric problems and trauma were also excluded although they were important components of the hospital's workload.

Within Class C hospitals, there were

TABLE 2
Percentage* of Doctors Who Billed for Certain Procedures

Hospitals	Hernia	GB	Colles	Hip	Cesarean	Hysterectomy
Class A (20 hosp., 150 drs.)						
More than 10/year	7%	7%	1%	0%	8%	3%
6-10/year	8%	3%	8%	1%	3%	2%
1-5/year	13%	13%	42%	2%	13%	13%
At least one*	28%	23%	51%	3%	25%	18%
Class B (15 hosp., 98 drs.)						
More than 10/year	4%	4%	0%	0%	6%	3%
6-10/year	6%	7%	2%	0%	11%	7%
1-5/year	17%	14%	58%	5%	15%	13%
At least one*	27%	25%	60%	5%	32%	23%
Class C (53 hosp., 163 drs.)						
More than 10/year	1%	2%	1%	0%	2%	1%
6-10/year	7%	4%	4%	0%	4%	2%
1-5/year	18%	7%	54%	2%	10%	10%
At least one*	26%	14%	59%	2%	15%	12%
Class D	Insufficient data					

* Percentages vary due to rounding

two groups: those who carried out a fairly wide range of procedures and those who did not. I noted a gap between 51 and 90 anesthetics per year, apparently differentiating those hospitals where significant numbers of procedures were carried out from those where they were not. The non-procedural work of both subgroups within Class C, as exemplified by the number of admissions for myocardial infarction and CVA, did not differ significantly. Comments on the questionnaires often indicated a lack of a qualified surgeon or anesthetist, or both.

There is a wide variation in the number of procedures and other work performed in hospitals of the same class. These variations were greatest in the smaller hospitals and for the more complex procedures.

With the exception of Class C and D hospitals, the range of number of procedures, MIs and CVAs does not differ significantly according to class.

4. What Capabilities do Smaller Hospitals Consider Important?

The results of the second questionnaire are shown in Table 7. All hospitals rated the capacity to do normal obstetrics, monitor cardiac arrhythmias

and provide physiotherapy as important or essential. All classes of hospitals tended to regard the open reduction of major fractures as of low priority, with the notable exception of two communities with major ski resorts. The importance of the capacity to do major abdominal surgery diminished progressively from Classes A to D while the importance of the ability to handle acutely disturbed patients was rated highly in the larger hospitals, but again diminished in Classes C and D.

In Class D hospitals a significant proportion regarded as important such procedures as open reduction of fractures and the capacity to carry out major abdominal surgery, despite what would obviously be a very small patient volume. Similar delusions of grandeur, perhaps somewhat more justified, can be noted among some Class C hospitals.

5. Perception of Their Community's Unmet Health Needs

In the portion of the second questionnaire provided for written comments about unmet health care needs in their community, the unanimous first choice was provision of facilities for the care of elderly and chronically

TABLE 3
Percentage of Total Number of Each Procedure Performed in Each Class of Hospital by Doctors Who Did More Than Five Cesareans Per Year

Hospital Class	# of Doctors	Hernias	GB	Colles	Hips	Cesareans	Hysterectomies
A	17	38%	33%	16%	12%	84%	85%
B	17	51%	63%	27%	38%	83%	71%
C	8	18%	36%	9%	0%	71%	47%

TABLE 4
Percentage of Total Number of Each Procedure Performed in Each Class of Hospital by Doctors Who Did More than Five Cholecystectomies Per Year

Hospital Class	# of Doctors	Hernias	GB	Colles	Hips	Cesareans	Hysterectomies
A	15	72%	85%	31%	94%	36%	36%
B	11	63%	76%	28%	50%	40%	63%
C	11	40%	78%	14%	0%	50%	71%

TABLE 5
Response Rate to Questionnaires

	Class A	Class B	Class C	Class D
# of Hospitals	20	15	50	11
Returns from first questionnaire	16	14	30	6
Returns from second questionnaire	17	15	40	8

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CONTRAINDICATIONS:

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ill. Close behind that, again in all classes of hospitals, was the need for more physicians suitably prepared for rural practice. Anesthetic and procedural skills were identified as the primary deficiencies. The need for psychiatric services was given high priority for all except the Class D hospitals. All classes frequently mentioned upgraded laboratory service, ambulance services, alcohol and drug abuse services and the ability to moni-

tor and stabilize patients as important unmet needs.

Discussion

The most striking finding is the diversity in nature and volume of work performed in hospitals and communities of similar size. We must speculate that a number of factors contribute to such differences, including demography, traditional patterns of care, ease of access to major centres, physi-

cians' skills, and the hospital's resources.

Another important observation is the diversity of skills of those physicians who are doing surgery, very few of whom possess formal Canadian specialty qualifications. In Alberta in 1980, out of 522 physicians in rural practice, 23 were qualified in general surgery, six qualified in internal medicine and three in anesthesia. Of these, 11 surgeons, three internists and three

TABLE 6
The Numbers of Procedures, Myocardial Infarctions and Strokes in Rural Hospitals by Classes

Hospital Class	Inguinal Hernia	GB	Hips	Anesthetics	Normal Deliveries	Cesareans	Hyster.	MI	CVA
Class A: 16 hospitals									
Mean	20.7	16.5	0.6	467	157.6	15.4	11.9	23.1	12.6
Range	4-36	3-51	0-7	97-920	39-279	1-35	0-35	7-50	5-29
Class B: 14 hospitals									
Mean	13.2	11.4	0	282.9	140.2	15.1	8.2	13.3	8.8
Range	0-25	0-35		56-745	38-309	0-43	0-20	5-25	1-35
Class C: >90 anesth. (procedure) 17 hospitals									
Mean	8.6	7.3	0	204.6	71.6	3.8	3.9	11.4	6.8
Range	1-25	0-20		92-390	27-168	0-14*	0-17	3-34	0-20
Class C: <90 anesth. (non-procedure) 13 hospitals									
Mean	1.1	0	0	19.5	37.2	1	1	8.7	5.2*
Range	0-8			0-50	0-177			2-27	0-14
Class D: 6 hospitals									
Mean	1.0	0	0	12.3	8.8	1	0	6.7	5.0
Range	0-50			0-61**	0-36			0-23	0-24

* 6 did 0; ** 4 did 0.

TABLE 7
Capabilities Rural Hospitals Consider Important, Based on Four Point Rating Scale*

Hospital Class of & Rating	Normal Delivery	Cesarean Section	Open Reduction of Major Fractures	Monitor Cardiac Arrhythmia	Major Abdominal Surgery	Handle Acutely Disturbed Patients	Provide Physiotherapy
Class A							
4, 3	100	100	47	100	82	82	94
1	0	0	23	0	0	6	6
Class B							
4, 3	100	87	27	87	93	73	93
1	0	0	33	0	0	0	0
Class C							
4, 3	95	53	20	98	60	53	77
1	2	25	40	0	25	8	2
Class D							
4, 3	88	50	38	75	38	25	100
1	0	25	25	0	50	0	0

* 4 = essential 3 = important 2 = helpful but not essential 1 = not important

anesthetists qualified before 1955 and thus can be expected to retire within the next ten years.⁸ A high proportion of those who are not so qualified and who are doing major procedures in smaller communities are similarly close to retirement. There will obviously be a need for adequately trained replacements. Immigration, which in the past has provided a significant proportion of rural medical manpower, has largely been cut off, so we have to staff our rural health care system with graduates of our own medical schools.

Before this can be properly undertaken, we have to predict the pattern of practice in rural communities for the future. Should the current practice of performing procedures in smaller communities be continued and even enhanced by assisting physicians and hospitals to use the latest technological advances and by continuing to train family physicians in surgical procedures—or should patients be transferred to major centres for all but the most simple, uncomplicated procedural care?

Representatives of university surgical departments advocate the latter,⁹ pointing out that serious complications, requiring the best available surgical expertise and resources, can occur in cases which appear simple at onset. They claimed that it is relatively easy to transfer patients to larger centres for surgery. They also believe that the problem is not the supply of qualified surgeons, which is adequate, but that when qualified surgeons go to smaller communities, whose surgical work would support a fulltime surgeon, they come into competition with local physicians who want to continue doing the relatively easy surgery, leaving the surgeon only a narrow spectrum of moderately complex surgery. Its upper range is constrained by the limited resources of the small community hospitals. Therefore, in order to make a living, these surgeons are forced to do general practice as well.

The 1981 Edmonton Conference on Rural Health Care concluded that "appropriate" surgery—common procedures to treat common conditions—should continue to be carried out in smaller communities.⁷ The major argument made by rural physicians and consumers related to those emergency situations where immediate intervention is appropriate and necessary. Un-

less the physicians who have to do the necessary procedure 'keep their hands in' by doing a reasonable amount of procedural work, they will not be competent to handle emergency situations. They pointed out that transportation of patients was not as rapid and uncomplicated as one would wish: even when the actual travelling time in good weather was short, an additional hour on average was needed to organize the transport and to allow for delays at either end.

Obstetrics probably best illustrates the problem. Cesarean section has become the accepted way of managing many perinatal complications. All classes of hospitals regarded the ability to carry out cesarean section as important or essential in direct proportion to the number of deliveries taking place. Exceptions were noted in a number of communities located on the fringes of a large metropolitan area where, despite a relatively high maternity rate, the ability to do cesarean section was not regarded as important, presumably because it is easy to transfer patients quickly to major urban hospitals. All of these hospitals had a maternal transfer rate of over 10%. Overall, the transfer rate of maternity patients tended to vary inversely with the cesarean rate (Table 8), although the transfer rate for newborn infants did not vary. There was a wide variation among individual hospitals, and these trends represent the mean.

In a small community hospital, the ability to do cesarean section requires the presence of a physician competent to do the procedure, together with an anesthetist, nursing staff and appropriately equipped operating room, backed by the ability to give blood transfusions and to do other necessary laboratory procedures. They must do this procedure frequently enough to maintain their skills. Black and

Gick,¹⁰ reporting on the management of obstetrical complications in a small rural hospital, observed that current methods of assessing fetal risk are of little help in identifying those mothers who would require operative assistance at delivery. They concluded that it was almost impossible to identify and refer to larger centres all those who might require an emergency cesarean section, and therefore suggested that every hospital doing obstetrics should have the capacity to do cesareans. They maintained that if a hospital had 100 deliveries per year, an average of one cesarean section per month would be required, which they believed was the minimum for the staff to maintain its competence. They concluded that no hospital with fewer than 100 deliveries per year should continue to do obstetrics, except in exceptional circumstances.

If these criteria were applied to Alberta, there would be a great change in obstetrical practice, because only 24 rural hospitals had more than 100 deliveries in 1980; 16 had 50-100 and 37 had less than 25. One cannot visualize such a change being tolerated. Black and Gick do not allow for a carry-over in skills and competence from one type of procedure to another: if the surgeon and operating room staff have been maintaining their skills with other regular procedures, they should be competent to handle a cesarean section even if it occurs only five or six times a year.

There are also strong community feelings about the desirability of obstetrics being carried out in community hospitals. Guard,¹¹ reporting from an isolated community where there were fewer than 50 deliveries per year, noted this community pressure. Without the capacity to do cesarean section, he referred 30% of his cases out of town for delivery, pointing out the im-

TABLE 8
Rates of Transfer for Mothers and Newborn
by Class of Hospital and Cesarean Rate

Class of Hospital	Rate of Cesareans	# of Deliveries	Maternal Referral Rate	Newborn Referral Rate
A	>10%	1041	5.2%	3.9%
	<10%	1248	8.8%	3.9%
B	>10%	1118	2.8%	3.3%
	<10%	651	8.1%	4.1%
C	>10%	822	2.0%	2.0%
	<10%	477	8.2%	5.0%
	0	806	24.0%	3.6%

portance of careful screening. He concluded that maternal and fetal risks under such circumstances were higher than if the patient had been delivered in a major centre, but thought that the community accepted the risk.

In Alberta at least, strong pressure will continue to be exerted for present patterns of surgery to continue, and be upgraded if possible. However, in some of the smaller hospitals, the volume of work does not seem to justify continuing use of operating room or diagnostic facilities, on grounds either of maintaining skills or of economic efficiency. When several such hospitals are situated in the same district, it seems reasonable that some agreement be worked out locally to concentrate all the diagnostic and procedural work at one hospital. This has many implications, including the fact that the hospital in small communities is often a major employer. Physicians and hospital employees might need to relocate homes and offices, often at a significant cost. Thus, an evolutionary process, motivated by the carrot and not the stick, is probably the only way in which this will be achieved.

Greater technical assistance may ease this process. Ultrasound is one example: its application to rural practice could be facilitated by the use of slow scan television which holds one television image and converts it to digital information, transmitting it over normal telephone lines at the speed of one picture every 32 seconds. Since it uses telephone lines, it is relatively inexpensive and is one way in which

diagnostic images can be transmitted for remote interpretation. A number of studies have reported on its use, particularly in relation to X-rays.¹²⁻¹⁴

Financial assistance for such upgrading can be the 'carrot' referred to above. If a group of small hospitals in one district were offered the opportunity of having such facilities available to only one of them, providing that related procedures are consolidated at that hospital, this might motivate the other hospitals to cooperate for the overall good of the district. The decision on which hospital should be upgraded should, if possible, be left to the local hospital boards to decide.

Conclusion

It seems probable that, for the foreseeable future, there will be a need for family physicians well trained in both primary care and common surgical procedures. There must also be continuing upgrading of facilities and consolidation of resources. Universities in provinces where such conditions exist must develop appropriate training programs for rural physicians, as well as upgrading and continuing education resources. The communities must develop ways of attracting these physicians, both by developing facilities and by regarding a skilled physician as a valued community resource. ●

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