The Problem of the Population at Risk in Primary Care

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SUMMARY

Until we know numbers of patients at risk, their ages and sexes, we can do very little epidemiological research in family practice. This pilot study sought to establish whether family physicians could define their populations at risk, whether volunteer recording would work, and whether medicare-generated data could be used.

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"In science, as in love, a concentration on technique is quite likely to lead to impotence".

P. L. Berger, 1969.

WHAT IS the denominator problem? Why do we need to know the denominator or the population at risk? If a family physician reports that there are 25 people in his practice suffering with multiple sclerosis, this may sound to be approaching an epidemic; in particular might this seem so if we hear that the neighboring doctor has only seven. But we have no way of knowing, for we cannot look at those two numbers in a comparative way until we know the numbers of patients at risk in each practice. If we knew, for example, that there were 25 people out of 4,000 in the first practice and seven people out of 1,000 in the second, we could soon determine that there is no significant difference in the rates of incidence. Secondly, not only do we need to know how many people there are, but we also need to know what is the age/sex distribution. A quick glance at Table 1 shows that in the study presented here we do in fact know how many people of what ages and which sex consulted their doctor during the second quarter of 1974. What we do not know is how many extra people *would have gone* to see the doctors in the study group had they become ill. This is essential knowledge if we are to have accurate knowledge of illness rates.

Much information is required on the natural history of diseases and their epidemiological phenomena. The most logical health workers to provide this information are of course those who work in the community: the family physician, the general dental practitioner, social workers, public health nurses, to mention but a few.

In primary care, however, we have been bedevilled by the problem of the denominator, or population at risk, in all our studies. Some of the savants have gone so far as to state that primary physicians cannot solve the denominator problem and have also suggested that self-selection will hopelessly bias our results. But that is not all – our madness infects our patients, and thus they too suffer with self-selection.

It is to the first objection, the insoluble nature of the denominator problem, that this paper will address itself. It is to the second objection that I dedicate my opening quotation from P. L. Berger.

In 1974, the Board of Directors of the College of Family Physicians of Canada granted the National Research Committee a working capital of $5,000 to undertake a pilot study in defining population at risk. I was chosen by my colleagues on the National Research Committee for two reasons: first, because Saskatchewan has one of the western hemisphere's most sophisticated data-collecting programs under a tax-financed service; second, because I volunteered!

Aims

By means of a pilot study:

1. To test a weekly recording system of volunteer family physicians in Saskatchewan.

2. To attempt a solution of the denominator problem in family practice studies outside of the academic units.

Method

There appear to be six methods of estimating the population at risk:

1. *Census:* a list of names of people living in an area during a given period of time, where that area is served by only one doctor, or a single group of doctors. An example of this method is the outstanding work of Bentsen in Norway.[1]

2. *Registration by Intent:* a list of names of people undertaking to obtain all their primary care from one practice. This constitutes registering a practice, as physicians and their patients make a commitment to one another in the NHS in the United Kingdom. In Canada, this method has been pioneered in the community by workers such as Collyer in London, Ont.,[2] and Falk in Victoria, B.C.[3] In the academic family practices, this method of registration has been pioneered by McWhinney and his group at the University of Western Ontario.[4]

3. *De Facto Registration:* a list of names of people who have consulted a practice; this list is periodically updated by various techniques. This method may be made less complicated by keeping an age/sex register of dis-

crete patients who consulted during a year, but without making a list. The Saskatoon Community Clinic uses this method in studies.[5, 6]

4. *Indicator Diseases:* this assumes that there are some diseases for which the incidence is constant throughout Canada; therefore, from a case count the population at risk can be calculated. In my opinion, this method is unsuitable for primary care physicians since the numbers needed to make the mathematics of this method realistic are too great for family practice populations.

5. *Episodes of Illness:* (as demonstrated by Kilpatrick[7]) in densely populated areas the frequency of episodes of illness follows a negative binomial distribution. This method has most interesting prospects for use in practices with available sophisticated counting ability. I suspect the preliminary reports of 'goodness of fit' may prove to be true only where practices are compact, and in Canada that means in major cities.

6. *Medicare Ratio:* this assumes that the discrete patient count, obtained from Medicare billing, bears a constant relationship to the population at risk; this is more likely to be true with larger and more representative physician samples. The present report is based on this method.

A letter was sent to all members of the College's Saskatchewan Chapter asking for volunteers to report weekly to me for 13 weeks, the number of patients seen suffering with bacteriologically proven gonorrhea, Monospot-proven mononucleosis and influenza-like illness. We also decided to try an activity item and chose night telephone calls. A brief explanation was supplied as to why this study was being done; it was couched in terms similar to the introductory remarks in this paper.

A tear-off at the end of the letter was posted to me identifying each doctor who wished to participate. I received tearoffs from 28 doctors. My response to these volunteers took the form of a personal letter of thanks and instructions with the following definitions of the four observations to be made:

1. Gonorrhea in any site, e.g. conjunctivae, pharynx, urethra, cervix, anus.

2. In the diagnosis of influenza-like illness, only those patients who complain of both cough and headache should be included.

3. Infectious mononucleosis: the Monospot test is to be used and must be reported as definitely positive.

4. Night telephone call: between 2300 hours and 0800 hours from or about a patient.

It is evident that neither I, as coordinator of the recorders, nor my wife, as research assistant, met at any time with the recorders. This was due to fear of using up the budget too early in the course of the study by

TABLE 1.

Discrete Patients by Age and Sex For Saskatchewan Recording Physicians, 2nd Quarter, 1974

Males					Females					Grand	
0-14	15-44	45-64	65+	Total	0-14	15-44	45-64	65	Total	Total	
86	86	48	44	264	63	113	60	51	287	551	
156	168	103	76	503	159	310	136	74	679	1,182	
114	157	107	82	460	103	224	122	95	544	1,004	
86	96	88	66	336	98	146	120	63	427	763	
149	146	100	84	479	158	229	142	88	617	1,096	
110	140	98	99	447	116	245	153	108	622	1,069	
107	37	71	83	348	105	167	96	78	446	794	
107	122	59	85	373	102	274	162	105	643	1,016	
155	239	149	64	607	178	362	198	104	842	1,449	
45	145	99	63	352	47	246	97	83	473	825	
60	133	64	27	284	56	236	93	46	431	715	
108	153	113	98	472	93	204	149	95	541	1,013	
31	73	62	43	209	17	102	73	42	234	443	
85	121	38	11	255	84	208	57	29	378	633	
115	165	71	40	389	126	291	126	52	595	984	
49	110	54	32	245	54	169	75	49	347	592	
71	161	142	89	463	55	208	145	108	516	979	JZG
185	155	106	49	495	195	227	151	73	645	1,142	
175	135	93	79	482	143	249	158	100	650	1,132	
5	5	5	28	43	4	10	1	29	44	87	
103	87	52	50	292	76	183	98	66	423	715	
81	134	60	42	317	80	252	91	47	470	787	
15	15	5	81	116	15	25	7	115	162	278	
										19,249	

TABLE 2

Saskatchewan Beneficiaries Seen by FPs, Both in Percentages and Numbers, 2nd Quarter 1974

	No.	%
Saskatchewan beneficiaries	885,300	
Discrete patients seen during 2nd Quarter of 1974	386,934	43.7
Discrete patients seen in my study	19,250	5
Active FPs in Saskatchewan	466	
Recording FPs in this study	23	4.9

paying the travelling expenses of the recorders to come together for a meeting, and we had only four weeks to start before summer holidays would disrupt the study.

Of the 28 original volunteers, 23 successfully completed the study. The five who did not were dropped either at their own request in two cases, or in three cases by me as a result of their silence.

Difficulties and Solutions

1. The recording doctors, in some instances, did not realize that nil returns were essential. This meant that my wife had to telephone doctors for the first few weeks, explaining the essential nature of the nil return. This was not a bad thing. I think it supplied for some recorders the necessary human touch; in some cases, 'telephone pals' developed.

2. When doctors were away from their practices, it had to be made absolutely clear that their deputies must not report to the recorder's unit unless they were in the study themselves, to avoid artificially inflating the figures.

3. It was essential to work with the age groups identical with those the Commission supplied at the end of the study. I forgot.

Results

Twenty-three recorders saw 19,249 discrete or separate patients during the second quarter of 1974. They reported on four things:

Gonorrhea:

Rate – 1.25/1,000 people seen

Mononucleosis:

Rate – 0.78/1,000 people seen

Flu-like illness:

Rate – 55.27/1,000 people seen

Night Telephone Call:

Rate – 39.38/1,000 people seen

But what are the rates per 1,000 persons at risk? In an attempt to answer this question (aim No. 2 of this study), I have attempted to obtain a 'correction factor' to enable us to convert the number of patients seen into the population at risk. Table 1 shows the number of discrete patients (i.e. no patient is counted twice during the period of the study) seen by each recorder during the study period. The underlined row represents my work during that time. Figure 1 shows the distribution and the arrow represents my point in this distribution.

Next, I determined where my workload came in relation to my ten colleagues in the Clinic. It will be seen at once that my workload was again at the mean in the case of the 11 FPs in the Saskatoon Community Clinic (see Fig. 2). I then needed to determine where our recorders came in relation to all the doctors of the province. Once again the provincial Medical Care Insurance Commission came to the rescue, providing me with the number of active family physicians (defined as those billing $10,000 p.a. or more) by

Fig. 1. Discrete Patients Seen by Saskatchewan Recording Physicians, 2nd Quarter 1974

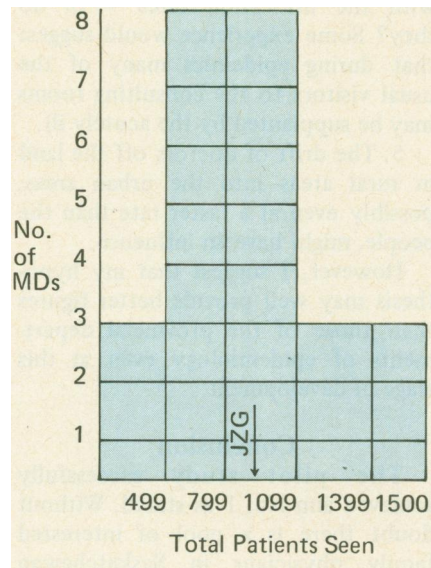


Fig. 2. Distribution of Community Clinic Doctors by Patients Seen During the Same Three Months (1974)

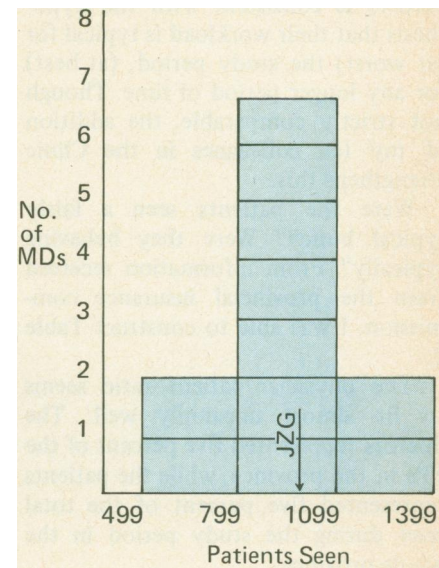
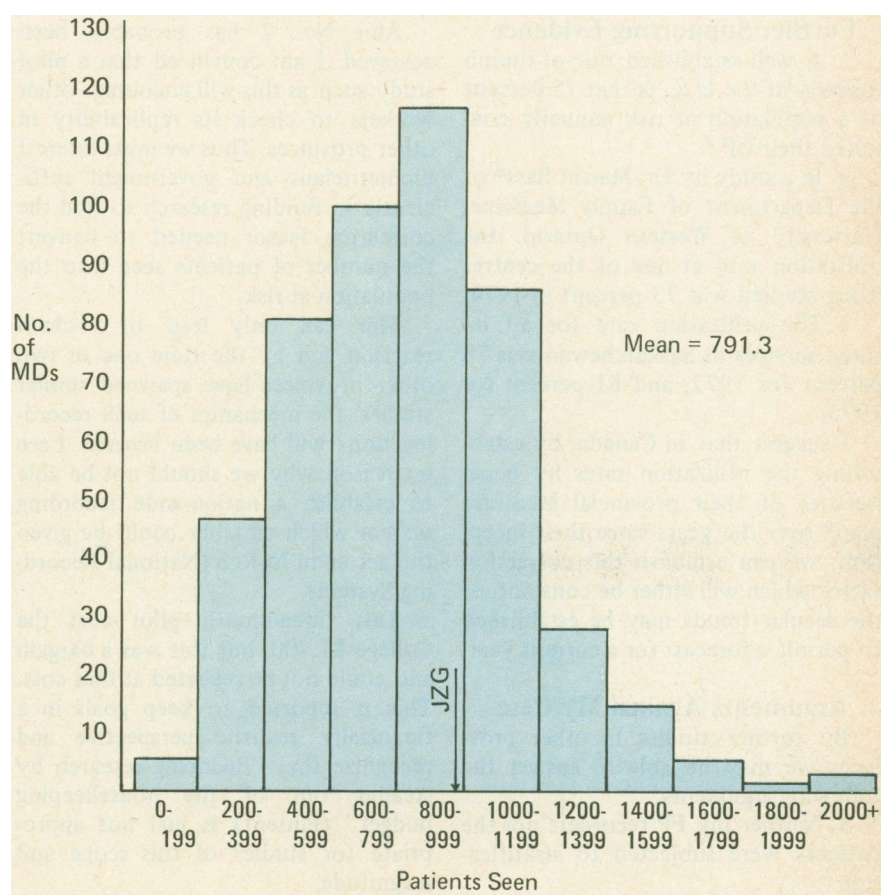


Fig. 3. Discrete Patients Seen by All Saskatchewan Family Physicians, 2nd Quarter 1974



range of discrete patients seen during the same quarter of 1974.

Figure 3 shows the results of the frequency distribution. If compared with the previous tables and histograms, once again the fit is good.

The evidence so far suggests that even though these 23 doctors were self-selected, that did not appear to have made any difference to their workload pattern. Our sample of recorders is consistent with the hypothesis that their workload is typical for (at worst) the study period, (at best) for any longer period of time. Though not strictly comparable, the addition of my ten colleagues in the Clinic strengthens this.

Were the patients seen a fairly typical bunch? Were they behaving typically? From information received from the provincial insurance commission, I was able to construct Table 2.

The physician/patient ratio seems to fit almost uncannily well: The doctors represented five percent of the FPs in the province, while the patients represented five percent of the total *seen* during the study period in the whole province.

If we accept this, I dare to suggest the correction factor is perhaps very simple.

Further Supporting Evidence

1. A well-established rule-of-thumb formula in the U.K. is that 75 percent of a population at risk annually consulted their GP.[8]

2. In a study by Dr. Martin Bass[8] of the Department of Family Medicine, University of Western Ontario, the utilization rate at one of the centres being studied was 73 percent in 1974.

3. The utilization rate for all insured services in Saskatchewan was 78 percent for 1972, and 81 percent for 1973.

I suggest that in Canada, by establishing the utilization rates by beneficiaries of their provincial Medicare plan[9] over the years since their inception, we can establish this correction factor which will either be constant, or the secular trends may be established to permit a forecast for a current year.

Arguments Against My Case

By further studies in other provinces we may be able to answer the following arguments:

1. Neither my FP recorders nor the patients were subjected to stratification.

2. One major centre in Saskatchewan was not represented at all – Prince Albert. But it is probable that the doctors and patients were behaving in the same way there, as were those in Saskatoon and Regina, both of which were represented in an acceptable number in the sense of stratification.

3. Utilization rates may differ from area to area in the province.

4. Odd epidemics will play havoc with the utilization rates – or do they? Some experience would suggest that during epidemics many of the usual visitors to the consulting rooms may be supplanted by the acutely ill.

5. The drift of doctors off the land in rural areas into the urban areas, possibly even at a faster rate than the people, might have an influence.

However, I suggest that my hypothesis may well provide better figures than those of the provincial departments of epidemiology even at this stage of development.

Conclusion

The pilot study successfully achieved aim No. 1 as stated. Without doubt there is a pool of interested family physicians in Saskatchewan which is the equal of those in Great Britain and Holland where nationally-funded recording units have existed for years.

Aim No. 2 has probably been achieved. I am convinced that a pilot study such as this will encourage other workers to check its replicability in other provinces. Thus we must interest biometricians and government sufficiently in funding research to find the correction factor needed to convert the number of patients seen into the population at risk.

This can only lead to a chain reaction and by the time one or two other provinces have spawned similar studies, the mechanics of such recording units will have been learned. I see no reason why we should not be able to establish a nation-wide recording system which suitably could be given the acronym NaReS (National Recording System).

This three-month pilot cost the College $1,700, but this was a bargain and could not be repeated at that cost. This is reported to keep goals in a financially realistic perspective and recognize that "financing research by stealing out of the housekeeping budget" (Pinsent) is just not appropriate for studies of this scope and magnitude.

For details of the method, additional information is available by writing to the author.

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