Family Practice Incidence Rates

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Background: **It is difficult for practicing physicians to understand the annual incidence of disease in terms that are directly relevant to their practices. A simple calculation, called the family practice incidence rate (FPIR), has been developed to assist family physicians in applying epidemiological information to their own patient population.**

Methods: **By multiplying the annual incidence of a disease by the practice panel size and dividing by the population, it is possible to determine the number of cases a family physician will see in 1 year. When the answer is a fraction, that fraction can be divided into 1 year to determine the number of years required to encounter one case. This formula can be adjusted for panel size, specific percentages of the practice panel, and regional variations in incidence rates.**

Results and Conclusions: **The FPIR is a convenient model to make the incidence of disease, mortality data, and demographic data immediately available to the practicing physician. Using this calculation will help physicians better understand the patient population they serve. (J Am Board Fam Pract 1994; 7:303-9.)**

The annual incidence of disease is usually reported in a statistical format designed to describe the occurrence of the condition in a defined population, usually per 100,000 persons. Information in this format offers a standard for research and public health purposes, but it is not directly relevant to the experience of an individual family physician. From the statistical format a practicing physician might derive a vague, if not erroneous, impression of the incidence of the illness. This report offers a simple concept to make statistical information more relevant to the individual family physician.

Methods

I have developed a simple calculation, called the family practice incidence rate (FPIR), to convert annual incidence rates from the traditional format of cases per 100,000 population to a format based on the size of a family physician's practice. Using the FPIR, a family physician can determine how many cases of a certain disease or condition will occur during 1 year of practice. When the answer is a fraction, the formula is divided into 1 year to determine the number of years required to encounter one case.

The FPIR calculation assumes that a physician cares for a group of patients (a panel) that has a specific number of persons. It assumes also that the panel has average age, sex, and racial distributions. These assumptions are not necessarily precise, but they allow development of usable estimates.

The family physician's panel size is an important factor in the FPIR calculation. Panel size discussions can be confusing to family physicians practicing in the traditional model. The patient population is diffuse, and the number of charts in the office has often been equated to the number of patients managed. The following is an illustration of a method to estimate panel size: if the family physician sees 25 patients a day, 5 days a week, 48 weeks a year and we assume the average patient sees a physician four times each year, the panel size would be 1500.

Some panel expertise is evolving out of the health maintenance organization (HMO) management experience to equalize physician workload, as well as to make the physician more accountable for the resource utilization of a defined group of patients. For example, family physicians at the Group Health Cooperative in Seattle, Washington, provide comprehensive out-patient care, in-patient care, and obstetric care; each physician has an age-sex adjusted panel size of approximately 1700 patients (oral communication, Stephen Tarnoff, MD, and Cyrus Appell, MD, November 1992*). Other physicians who do less hospital care use a somewhat higher figure.

*This care includes all preventive services, health promotion, and patient education, as well as in-patient, out-patient, and obstetric care.

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The FPIR can be calculated with any panel size. For the sake of clarity, a patient panel size of 2000 (2K) is used in this paper unless otherwise stated.

The FPIR equals the annual incidence multiplied by the panel size and divided by the population. Stated differently, the panel size can be expressed as a percentage of the population.

$$FPIR = \frac{\text{Incidence} \times \text{Panel Size}}{\text{Population}}$$

This formula can be adjusted for panel size, specific percentages of the practice panel, and regional differences in incidence rates.

Results

In the use of this formula, $FP^{2K}IR$ indicates the calculation was made using a patient panel size of 2000. For example, the annual incidence rate of cardiovascular mortality is 311 per 100,000 persons.[1] If the family practice panel size is 2000, then the formula would be:

$$FP^{2K}IR = \frac{311 \times 2000}{100,000} = 6.2 \text{ Cases per Year}$$

or

$$FP^{2K}IR = 311 \times 0.02 = 6.2 \text{ Cases per Year}$$

(Unless other calculations are required, I will use the second expression of the formula throughout this report.) Using this set of numbers, a conclusion can be reached that family physicians with a patient panel size of 2000 can expect 6.2 cardiovascular-related deaths per year, if the panel has a normal distribution. A different size panel would demonstrate a proportionately different number of cases seen per year.

For instance, if the family practice panel size is 3000 ($FP^{3K}IR$), then the formula would be:

$$FP^{3K}IR = 311 \times 0.03 = 9.3 \text{ Cases per Year}$$

If the incidence rate relates to a specific proportion of the population (for instance, the percentage of a given age range or sex), this percentage can be factored into the equation:

$$FPIR = \text{Incidence} \times \text{Percent of Known Population} \times \frac{\text{Panel Size}}{\text{Population}} = \text{Cases per Year}$$

As an example, the incidence of bacterial meningitis in children less than 1 year of age is 40 per 100,000 persons. When 7.5 percent of the population is less than 1 year of age,[2] then:

$$FP^{2K}IR = 40 \times 0.075 \times 0.02 = 0.06 \text{ Cases per Year}$$

When either calculation produces a fraction, as in this example, the formula can be divided into 1 to determine the number of family practice years required to encounter one case:

$$FP^{2K}IR = \frac{1}{40 \times 0.075 \times 0.02} = 16.7 \text{ Years}$$

or

$$FP^{2K}IR = 1/0.06 = 16.7 \text{ Years}$$

In this example a family physician with a panel size of 2000 normally distributed patients might expect to see one case of bacterial meningitis in a child younger than 1 year of age every 16.7 years.

Application Examples

A family physician can apply this formula to numerous data sets to understand better the meaning of new data in terms of an individual practice. For example, Buist and Vollmer[3] recently reported that asthma mortality has increased 31 percent. This striking increase concerns family physicians, because asthma is such a common illness. According to Buist and Vollmer, the annual incidence of deaths has risen from 1.3 deaths per 100,000 general population to 1.7 deaths per 100,000 general population. Using the FPIR calculation, the family physician can convert these numbers into a family practice context:

Old data

$$FP^{2K}IR = \frac{1}{1.3 \times 0.02} = 38.5 \text{ Years}$$

New data

$$FP^{2K}IR = \frac{1}{1.7 \times 0.02} = 29.4 \text{ Years}$$

The information is now in a family practice context. In an individual family physician's practice, the incidence of death from asthma might be expected to increase from 1 case every 38.5 years to 1 case every 29.4 years. As a consequence, the information is more relevant to a family physician than the statement that asthma deaths have increased 31 percent.

The consideration of Lyme disease offers another good example of how the FPIR can assist in interpreting data in terms of an individual family practice. The incidence varies by region, and family physicians should think about Lyme disease in a regional as well as a family practice context, that is, the national average annual incidence is 3.9 cases per 100,000 population, whereas the highest incidence is in Connecticut, which has a rate of 53.6 cases per 100,000 population.[4] Therefore:

Annual National Incidence of Lyme Disease

$$FP^{2K}IR = \frac{1}{3.9 \times 0.02} = 12.8 \text{ Years}$$

Annual Connecticut Incidence of Lyme Disease

$$FP^{2K}IR = \frac{1}{53.6 \times 0.02} = 0.9 \text{ Years}$$

Connecticut family physicians will encounter Lyme disease frequently (1 case per year on an average), whereas nationally, the family physician can expect just 1 case every 12.8 years.

A recent publication states that the incidence of acquired immunodeficiency syndrome (AIDS) in Texas is increasing. This article presents the data in the standard epidemiologic manner: 17.9 per 100,000 persons.[5] Using the FPIR to convert the data into family practice terms:

$$FP^{2K}IR = \frac{1}{17.9 \times 0.02} = 2.8 \text{ Years}$$

The FPIR suggests that the average family physician in Texas will see one case every 2.8 years. This format is now more relevant to the family physician than the traditional 17.9 cases per 100,000 persons.

Another official government document states that end-stage renal disease (ESRD) is a major public health problem in the United States with an annual growth rate of 7.6 percent.[6] The document states that this problem has grown to 12 new cases per 100,000.

$$FP^{2K}IR = \frac{1}{12 \times 0.02} = 4.2 \text{ Years}$$

When this information is extrapolated to a standard family practice panel, it indicates 1 ESRD patient in the panel every 4.2 years. Again, this formulation is more meaningful to a family physician than the government document. The nephrologist's view, however, would be different. The nephrologist's panel might be 100,000 persons[7]; therefore, the nephrology incidence rate ($NEPH^{100K}IR$) would be 12 cases a year. As a result, ESRD would be 50 times (50 × 2000) more common in the nephrologist's practice than in the family physician's practice. To the nephrologist, ESRD is a common health problem that should be looked for carefully. To a family physician, on the other hand, ESRD is an uncommon illness that might easily be overlooked.

Cancer of the cervix presents an interesting issue for analysis. Recently the accuracy of the Papanicolaou smear has been condemned before Congress; as a consequence, new legislation has been enacted. The death rate for cancer of the cervix in 1988 was 4.4 per 100,000 women[8] (women older than 15 years represent 40.5 percent of the population).

$$FP^{2K}IR = \frac{1}{4.4 \times 0.405 \times 0.02} = 28.1 \text{ Years}$$

The $FP^{2K}IR$ for cancer of the cervix is 1 death every 28 family practice years, which would also include women who do not receive a regular Papanicolaou smear. Common sense would indicate that either cancer of the cervix is rare or the Papanicolaou smear has been highly effective and is inappropriately maligned. Once again, the context is exceedingly important.

This calculation is also appropriate for other health issues as well. Take birth and death rates, for instance. The annual birth rate is 1570 per 100,000 persons.[9]

$$FP^{2K}IR = 1570 \times 0.02 = 31.4 \text{ Births per Year}$$

The $FP^{2K}IR$ is 31.4 births per family practice year. On the other hand, mortality is 541.7 per 100,000 persons.[1]

$$FP^{2K}IR = 541.7 \times 0.02 = 10.8 \text{ Deaths per Year}$$

An average family physician might expect 11 deaths per year. Of these deaths, cardiovascular mortality is 311 per 100,000 persons,[1] which calculates to 6.2 cardiovascular deaths per family practice year.

$$(FP^{2K}IR = 311 \times 0.02 = 6.2) \text{ Cardiovascular-related Deaths per Year}$$

The overall cancer death rate is 133 per 100,000 persons or 2.7 cancer deaths per family practice year.[1]

$$FP^{2K}IR = 133 \times 0.02 = 2.7 \text{ Cancer-related Deaths per Year}$$

Other examples of family practice incidence rates are listed in Tables 1 through 4.[1-2,9-19]

Conclusion

United States medicine is undergoing a transformation to allocate more appropriately finite medical resources. Family physicians will continue to be important in the delivery of personalized care. As the delivery system evolves, family physicians will also have to care for patients in the context of a specific population. Whether one calls the evolving process of care "gatekeeper controlled" or "personal physician orchestrated," the family physician will be increasingly involved in managing a group or panel of patients. The FPIR helps the physician to think in terms of the population "managed."

The FPIR does not replace traditional methods to present data. For public health reasons, these data on large populations will continue to be im-

Table 1. Family Practice Incidence Rate (FPIR) of Mortality Data.

Mortality	Annual Incidence per 100,000 Population	Simplified Calculation	$FP^{2K}IR$* Cases	Years
All causes	541[1]	541×0.02	10.8	1
Cardiovascular mortality	311[1]	311×0.02	6.2	1
Cancer mortality	133[1]	133×0.02	2.7	1
Injury mortality	35.2[1]	$\frac{1}{35.2 \times 0.02}$	1	1.4
Automobile fatality	19.4[1]	$\frac{1}{19.4 \times 0.02}$	1	2.6
Suicide overall, 1979	12.1[11]	$\frac{1}{12.1 \times 0.02}$	1	4.1
Suicide overall, 1986	12.8[11]	$\frac{1}{12.8 \times 0.02}$	1	3.9
Suicide, aged 75–84 years, 1979	20.8, when group is 3.9% of the population[11]	$\frac{1}{20.8 \times 0.039 \times 0.02}$	1	61.6
Suicide, aged 75–84 years, 1986	25.2, when group is 3.9% of the population[11]	$\frac{1}{25.2 \times 0.039 \times 0.02}$	1	50.9
Murder-suicide	0.3[12]	$\frac{1}{0.3 \times 0.02}$	1	166.7
Accidental drowning	2[13]	$\frac{1}{2 \times 0.02}$	1	25
Drowning, men aged 20–29 years (the highest risk group)	11.5, when group is 8.3% of the population[13]	$\frac{1}{11.5 \times 0.083 \times 0.02}$	1	52.4

*Family practice incidence rate with a panel of 2000 patients.

Table 2. Family Practice Incidence Rate of Illness.

Illness	Annual Incidence per 100,000 Population	Simplified Calculation	FP2KIR* Cases	FP2KIR* Years
Squamous cell skin cancer, Dallas	99[14]	99×0.02	2	1
Basal cell and squamous cell carcinomas, Kauai, Hawaii	927[14]	927×0.02	18.5	1
Bacterial meningitis in children <1 year old	40, when group is 7.5% of the population[2]	$\frac{1}{40 \times 0.075 \times 0.02}$	1	16.7
Bacterial meningitis in adults aged 16–64 years	1, when group is 50.8% of the population[2]	$\frac{1}{1 \times 0.508 \times 0.02}$	1	98.4
Primary and secondary syphilis, 1985	12[15]	$\frac{1}{12 \times 0.02}$	1	4.2
Primary and secondary syphilis, 1989	18[15]	$\frac{1}{18 \times 0.02}$	1	2.8
Tuberculosis	9[15]	$\frac{1}{9 \times 0.02}$	1	5.6
Tuberculosis in the elderly >65 years	60, when group is 12.4% of the population[16]	$\frac{1}{60 \times 0.124 \times 0.02}$	1	6.7
Subarachnoid hemorrhage	12[17]	$\frac{1}{12 \times 0.02}$	1	4.2
Mycosis fungoides	0.29[18]	$\frac{1}{0.29 \times 0.02}$	1	172.4

*Family practice incidence rate with a panel of 2000 patients.

Table 3. Family Practice Incidence Rate of Demographic Information.

Demographics	Annual Incidence per 100,000 Population	Simplified Calculation	FP2KIR* Cases	FP2KIR* Years
Birth	1570[9]	1570×0.02	31.4	1
Legal abortions, 1985	1035[9]	1035×0.02	20.7	1
Divorce	490[9]	490×0.02	9.8	1
Murder	8.5[19]	$\frac{1}{8.5 \times 0.02}$	1	5.9
Armed robbery	236[19]	236×0.02	4.7	1

*Family practice incidence rate with a panel of 2000 patients.

Table 4. Family Practice Incidence Rate of Surgical Procedure.

Surgical Procedures	Annual Incidence per 100,000 Population[19]	Simplified Calculation	$FP^{2K}IR$*	
			Cases	Years
Cataract surgery	532	532×0.02	10.6	1
Cholecystectomy	206	206×0.02	4.1	1
Coronary artery bypass	155	155×0.02	3.1	1
Hip replacement	149	149×0.02	3	1
Prostatectomy	141	141×0.02	2.8	1
Kidney transplant	3.9	$\frac{1}{3.9 \times 0.02}$	1	12.8
Liver transplant	1.2	$\frac{1}{1.2 \times 0.02}$	1	41.7
Heart transplant	0.8	$\frac{1}{0.8 \times 0.02}$	1.	62.5

*Family practice incidence rate with panel of 2000 patients.

portant. When these public health methodologies are used to emphasize dramatic increases in percentages for asthma deaths, tuberculosis, or suicide, however, the data must be viewed by family physicians from their perspective to get a more intellectually satisfying grasp of the information.

This format can also be used to make the likelihood of the presence of a specific disease more easily understood by the lay public, such as a jury. For example, information extrapolated from two recent legal cases illustrates how incidence might be described in this practical manner. A physician in a malpractice suit for late diagnosis of streptococcal toxic shock syndrome (STSS) could emphasize that STSS has an incidence rate of 0.344 cases per 100,000 population per year,[10] and family physicians might see 1 case every 145 years. Likewise, the physician sued for late diagnosis of gastric carcinoma in an 18-year-old girl might be viewed differently by a jury if the jury understood a family physician could anticipate seeing 1 case every 3380 years.

The FPIR is imperfect because it is an approximation. Physicians may never know the precise size of the population (panel) they serve, panels are never uniform in age and sex, and panels will overlap. In spite of these limitations, this format could complement the traditional methods of presenting incidence data in future family practice literature. Each individual family physician could then decide whether the FPIR helps them in their struggle to understand that group of patients that they serve.

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