

Demands on tertiary care for cardiovascular diseases in India: analysis of data for 1960–89*

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Data on 43 544 consecutive patients with cardiac disorders admitted to one hospital were analysed under four etiological groups to study the changing trend in the demand for tertiary care between 1960 and 1989. While rheumatic fever went down in frequency, rheumatic valvular disease remained at an average of 40% of total cardiac admissions, coronary heart disease steadily increased from 4% in 1960 to about 33% in 1989, and congenital heart cases accounted for 24% of cardiac admissions. While other etiological groups have varied, coronary heart disease has shown an almost linear increase. The demand for cardiac surgery also has risen almost linearly. The implications of these findings on the health needs and health planning in the whole country pose a great challenge to planners.

Introduction

Cardiovascular diseases are conspicuous among world health problems because they account for 16% of deaths in developing countries and 48% in developed countries (1). In-depth studies are therefore being carried out to design methods for the prevention, in childhood itself, of adult cardiovascular diseases (1).

Although health planning must be based on the direct assessment of the health needs of the population, for a number of reasons the data on health status from developing countries, and the available projection models (e.g., actuarial, demographic, econometric, bioactuarial and process projections) are limited (2). The Delphi method of data collection and forecasting, which requires knowledgeable informants (3), has yet to be implemented in developing countries on a large scale.

How much do we know about the health needs for cardiovascular diseases in India? Hospital statistics, for example, show that 33–55% of all cardiac admissions are for rheumatic heart disease, with a few regional variations (4, 5). How much do we know about coronary heart disease or congenital heart disease, if only from available hospital data? What changes have occurred over the years? What is the present demand for tertiary care of cardiovascular diseases? How much will it be 5 years from now, and after 10 years? To answer these questions precisely the following data have been generated

from a recognized, and possibly one of the oldest, tertiary care centres for cardiovascular diseases in India, the Christian Medical College Hospital at Vellore. Data on every patient admitted to the Cardiology Department of this hospital over a 30-year period from 1960 to 1989 are presented here.

Materials and methods

The Christian Medical College and Hospital had humble beginnings in 1900 and is now an active teaching medical institution with a 1200-bed hospital, which has every known modern medical speciality and attracts patients from all over India. The medical records system was initiated in the mid-1950s on a very solid footing, with the future in mind. In addition, the Cardiology Department, which was established in 1956, commenced its own records system in 1961 using index cards that give data on every patient admitted into the department since 1960, and this continues even now. Changes in the International Classification of Diseases (ICD) were readily adapted and the patients have been coded to give more details using about 240 diagnostic codes.

The discharge diagnosis was based on clinical findings and appropriate laboratory diagnostic tests including the latest technology; for example, cardiac catheterization and angiography became available in our department in 1958. Trained personnel with experience both in and outside India were always available to ensure high standards. In the mid-1970s the card system was replaced by computerized data storage using modern software. The data on 43 544 patients (up to and including December 1989) are stored in about 135 000 records in the system. The details on each patient include the name, age, sex, hospital number, specific cardiac diagnosis, as well

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as results from cardiac catheterization and surgery. The same hospital number was never given to two patients, thus avoiding errors from duplication. We believe that the results presented here are representative of the pattern of work in all tertiary care centres for cardiovascular disorders in India. There are now 30 such centres for the whole country of about 860 million people; at least 18 of them were established only in the last 5 years.

Using the available computerized data we obtained answers to the following epidemiological issues:

- (1) The number of patients seeking hospitalization for cardiac disorders.
- (2) The distribution of these patients, by etiology.
- (3) The changes in this distribution over the past 30 years.
- (4) The indications for future trends.
- (5) The deductions to be made from our data on the health needs and health planning needs for cardiovascular diseases for the whole country, with reference to both tertiary care and prevention.
- (6) Cost implications.

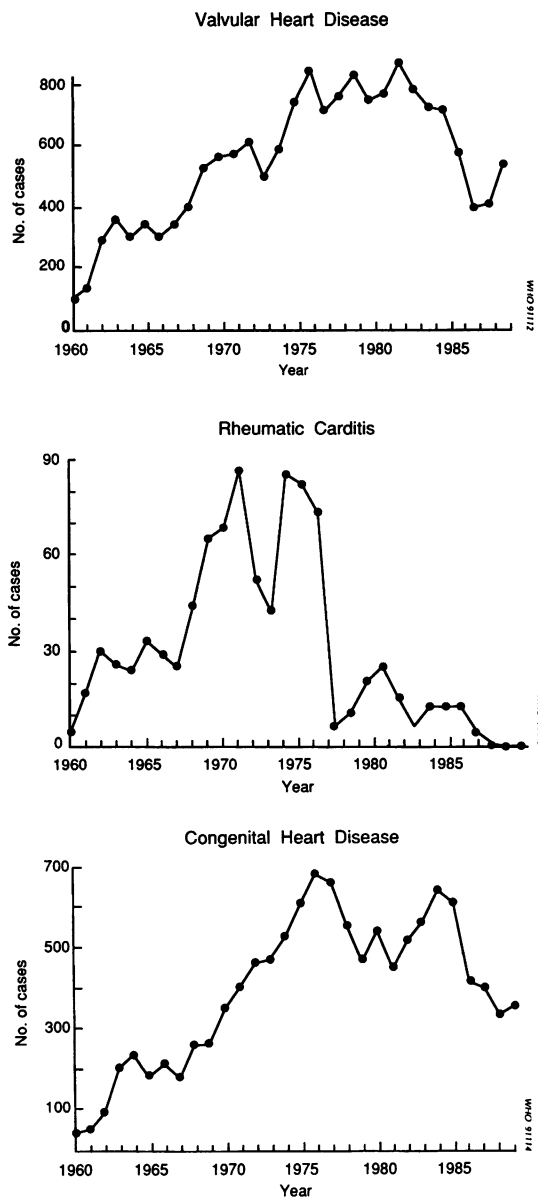
The computerized data were analysed by standard software packages, considerable care being taken in the entry of data to avoid errors such as duplication. We should mention here that one of the authors (S.K.) has been associated with this system for 22 out of the 30 years of collection.

Results

Fig. 1 shows the number of patients admitted each year with confirmed rheumatic valvular heart disease, active rheumatic fever or rheumatic carditis, and congenital heart disorders from 1960 to 1989. The discernible fall in carditis admissions during the 1970s continued in the 1980s; this is unlikely to be due to a change in the management of these patients without hospitalization because their numbers seen as outpatients during this period averaged only 3 patients per year. Other epidemiological factors should therefore be studied to explain this decline. Fig. 1 (bottom) shows that patients with congenital heart disorders went up from about 75 per year in the early 1960s to around 680 in 1984 and down to 350 in 1989.

Fig. 2 (top) shows a steady rise in the number of patients with coronary heart disease from the mid-1960s (about 50 patients per year) to around 500 patients per year in the late 1980s. Fig. 2 (bottom) shows the changes over the 30-year period with miscellaneous cardiac disorders, including cor pulmonale, all varieties of cardiomyopathy, pericardi-

Fig. 1. Number of patients admitted with valvular heart disease, rheumatic carditis, and congenital heart disorders, 1960-89.



titis, endomyocardial fibrosis, aorto-arteritis, myocarditis, myxoma of the left or right atria, and mitral valve prolapse. The diagnostic entities not included in this group are cardiac arrhythmias and conduction defects, which were often seen along with other

Fig. 2. Pattern of hospital admissions for coronary heart disease (top) and for miscellaneous cardiac conditions (see text), 1960–89.

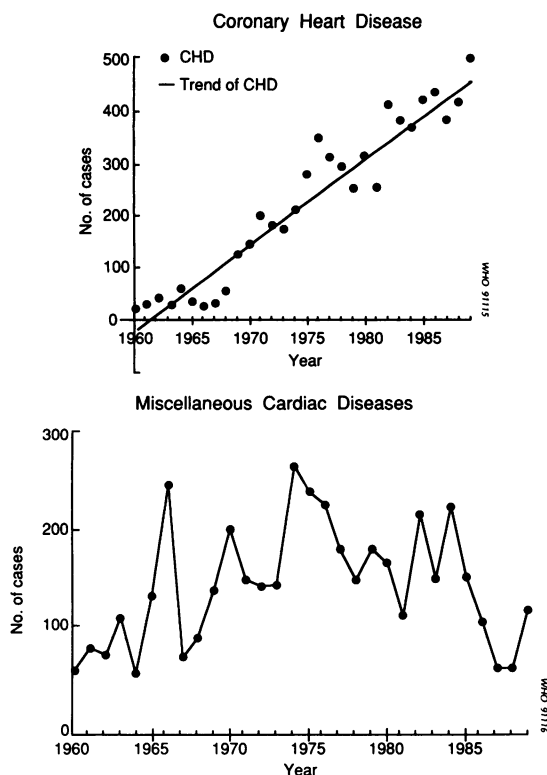
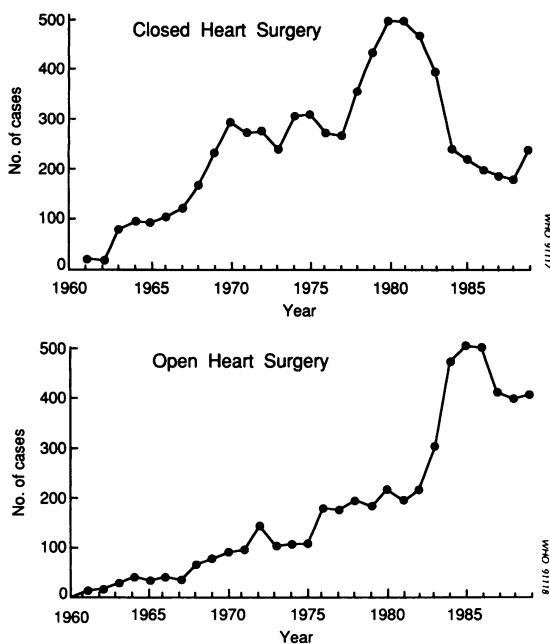


Fig. 3. Demand for closed and open heart surgery, 1960–89.



cardiac disorders, and congestive cardiac failure and secondary pulmonary hypertension, which occurred in a very large number of patients but always with one of the above-mentioned underlying disorders.

Fig. 3 (top) shows that the number of patients who had closed heart surgery increased from around 20 cases a year in the early 1960s to a peak in the early 1980s and then dropped to about 250 in 1989. Fig. 3 also shows that patients who underwent open heart surgery increased, possibly at the cost of closed heart procedures. In response to the increasing demand for and greater patient acceptance of open heart surgery, the hospital made more specialist surgical teams available around 1984.

Fig. 4 (top) shows the linear trends in the percentage distribution of our four etiological groups over the 30 years. Table 1 shows the trend patterns and trend differences, while Table 2 shows tentative projections for 1995 and 1999 based on these trend patterns. Fig. 4 (bottom) shows the steadily increasing number of patients admitted for cardiac disorders, which averaged around 6% of all patients hospitalized in any year.

Discussion

The admissions to our hospital for each group of cardiac disorder varied considerably over the 30 years, except for coronary patients whose numbers increased steadily. These findings are applicable to any tertiary care centre for cardiovascular diseases in India. However, some centres may receive more congenital heart cases while others may have more coronary patients. Our hospital has a steady mix because of its reputation as a centre for cardiac care, to which patients have gravitated.

The trends shown in Tables 1 and 2 and Fig. 4 confirm the continuing existence of patients with valvular, congenital and miscellaneous disorders, as well as a progressive rise in coronary heart disease. Our data on hospital admissions, however, cannot be fully representative of the disease situation in the population, which could be influenced by changes in hospital admissions policy and by the availability of other centres to deal with these problems. Since rheumatic valvular heart disease formed around 50% of cardiac admissions to our hospital in the early 1960s, 45% in the early 1980s, and was still around 40% in 1989, we estimate that it will continue to be with us for another 30–50 years at least; only progress in health care delivery will help to change this situation. The rise in coronary heart

Table 1: Admissions and trend patterns for various cardiovascular disease groups, 1960–89

	Admissions per year			30-year trend difference	Trend difference per decade		
	Minimum	Maximum	Mean ± SD		1960–69	1970–79	1980–89
Rheumatic fever	0	86	30.6 ± 26.82	-1.14	+4.37	-2.32	-6.57
Rheumatic valvular disease	96	884	551.37 ± 218.52	+16.76	+36.13	+36.35	-44.16
Coronary heart disease	19	498	222.9 ± 152.67	+16.52	+6.59	+17.39	+17.50
Congenital heart disease	42	679	390.97 ± 184.08	+14.71	+23.52	+23.30	-21.13
Miscellaneous heart diseases	50	266	143.27 ± 62.97	+1.61	+8.21	+1.57	-10.65
Closed heart surgery	3	502	236.0 ± 138.83	+9.61	+22.51	+11.88	-40.52
Open heart surgery	0	504	174.0 ± 158.60	+16.49	+6.97	+11.73	+29.08
Total cardiac surgery	3	724	410.07 ± 242.46	+26.29	+29.47	+23.61	-11.43
Cardiac admissions	699	2325	1451.47 ± 481.59	+47.96	+35.96	+62.69	-32.4

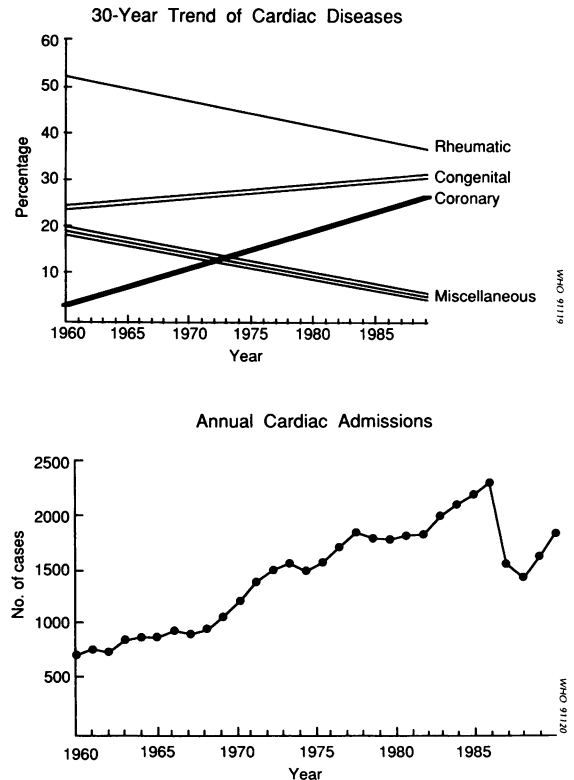
disease can be attributed to longer survival of the population, their increasing awareness and acceptance of hospital facilities, and their willingness to undergo investigations and treatment. Which of these factors is the most relevant can only be decided by prospective sociological studies. Our investigation of linear trends as against secular trends was guided by a desire to learn about the prevailing situation in a single tertiary care centre and about the disease pattern itself; we know that secular trends are much more likely to be influenced by the number of centres available, patient preference, funding, etc.

Table 2: Projections of the number of patients after 5 and 10 years

	No. of patients			
	In 1989	30-year trend difference	Projections	
			1994	1999
Rheumatic valvular disease (36.2) ^a	554	+17	639	724
Congenital heart disease (23.3)	357	+15	432	507
Coronary heart disease (32.5)	498	+17	583	668
Miscellaneous heart diseases (8.0)	123	+2	133	143
Total cardiac surgery	645	+26	775	905

^a Figures in parentheses are percentages.

Fig. 4. Linear trends in admissions for the four etiological groups studied (top) and the steady increase in numbers of patients seeking admission for cardiac disorders (averaging 6% of all hospital admissions) (bottom).



Projections for the future

The data in Tables 1 and 2 indicate the need to handle a larger number of cases than at present in each diagnostic group, except possibly active rheumatic fever and carditis. Hospital discharge rates in the USA showed a fall in the number of patients diagnosed to have rheumatic valvular heart disease from 7.5 in 1970–71 to 3 per 100 000 in 1977–78 (6) and a total of less than 3000 for the whole country in 1983. Valve surgery procedures, which increased from 15 000 in 1970 to 39 000 in 1983 in the USA, levelled off during the later 1980s (6). Our data suggest that the need for specific treatment of chronic rheumatic valvular disease will continue in India for many more years.

The 10-year trends (Table 1) for coronary heart disease and open heart procedures show increasing demands on the hospital; for other disease groups the demand during 1980–89 showed a decreasing trend. Epidemiological studies are needed for interpreting these differences in trends.

The first four of the epidemiological issues (see p. 324) were answered in this study, but the fifth issue (concerning the present resources and what is required for a population of 860 million to meet the demand for tertiary care in cardiovascular diseases) still remains. Eight of the 30 centres now functioning in the country are government funded; the rest are in the private sector. Assessment of the technical and financial inputs required to provide more services to meet the existing and rising demand will be a major exercise in health planning.

Our results, especially the epidemiological data on the age and sex distribution for each diagnostic disease entity along with the available follow-up data and changes with time, could be of importance to other developing countries with similar health problems. However, one limitation in our study is that it could not take into account any clinically unrecognized cases and those who were managed as outpatients, as others have reported (6).

The increase in cardiovascular diseases will make health planning more difficult in India and possibly other developing countries. As and when more diagnostic and treatment centres become available, the handling of these patients will be facilitated and the burden shared more equitably. Prevention efforts, however, are highly important to help reduce this problem, which is likely to remain for many years to come.

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Résumé

Demande de soins tertiaires pour maladies cardio-vasculaires en Inde: analyse des données pour 1960–1989

Un système d'enregistrement des données concernant les malades admis dans un hôpital pour maladie cardiaque a été inauguré en 1960 et totalement informatisé dans le milieu des années 70. Les informations enregistrées sur 43 544 malades consécutifs comprenaient leurs nom, âge, sexe, numéro de maladie, diagnostic principal, diagnostic secondaire (basé sur la classification internationale des maladies), et traitement, de même que toutes les investigations pratiquées (données des cathétérismes cardiaques et des angiographies) et les données de suivi annuel.

Une analyse préliminaire des données de 30 ans, portant sur les tendances de la demande de soins tertiaires, montre que le rhumatisme articulaire aigu et ses atteintes cardiaques ont été moins fréquents depuis 1975 alors que les maladies valvulaires représentent environ 40% des admissions actuelles. Les affections coronariennes (environ 33% des admissions actuelles) continuent à augmenter. Les affections cardiaques congénitales et d'origines diverses représentent environ 24% et 8%, respectivement, de toutes les admissions pour maladie cardiaque. La demande de soins chirurgicaux concernait environ 645 malades en 1989 et est estimée, par une étude des différences de tendances, devoir atteindre 775 malades en 1994, et au moins 905 en 1999.

Certaines modifications des tendances et des nombres d'hospitalisations ont été notées depuis 1984, sans doute en raison de la création d'environ 18 nouveaux centres dans le pays. On peut conclure que les maladies valvulaires et leur traitement continueront à exercer une demande sur les services de cardiologie pendant encore 40 à 50 ans, tandis que le nombre des maladies coronariennes continuera à augmenter et à nécessiter des hospitalisations. Ces résultats pourraient être utilisés pour la planification sanitaire future et pour intensifier les mesures de prévention afin de limiter la demande croissante de soins tertiaires.

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