How did the study come about?

This article presents the Hospital das Clínicas da UFMG Cohort (HC UFMG cohort), a study carried out in Belo Horizonte, Brazil. After a review of the specialized literature, we believe that it represents the only stable cohort of workers in Latin America.

Hospitals are appropriate settings where worker cohorts can be followed, their numerous occupational hazards and complex types of job, and hence a great variability of activities, admit the possibility of selecting various groups exposed to different environment risks.1

Like the Whitehall Study2,3 which enrolled civil servants in a well-designed longitudinal study, workers in public hospitals tend to have stable contracts, so that long-term follow-up is possible and effects due to hazard exposures may be observed and evaluated according to related risk factors.

Also, like the ‘closed population’ of the Framingham Heart Study,4 the hospital population has a homogeneous structure and definite risk factors, the set of possible confounding factors being smaller than if the cohort were to involve a general ‘open’ population.

When the Serviço de Atenção à Saúde do Trabalhador (SAST), a worker’s health care service, was created in 1999, within the Universidade Federal de Minas Gerais, the necessity of knowing the university hospital worker’s health status indicators was immediately perceived. In order to obtain the maximum of the necessary information, a computerized medical form was created and has been completed at each consultation since then.

SAST characteristics

Briefly, SAST activities are organized in three principal areas: it has a general medicine unit addressed to all hospital workers; a second unit is dedicated to occupational medicine and the third is a safety engineering unit. Their principal activities are attendance to medical demands of the workers and the

The Hospital das Clínicas

Hospital das Clínicas of the Universidade Federal de Minas Gerais (HC UFMG) is a public institution, whose principal activity is provision of health care, but it is also engaged in medical education and research. The hospital is regarded as a reference in the municipal and state health system in the care of patients whose diseases are of medium or high complexity. The installed capacity is about 470 beds. Every month the hospital handles over 3500 emergency cases, 1600 admissions, 32000 ambulatory consultations and 98000 complementary tests.

Patients are from the Sistema Único de Saúde (SUS) the Public and Unified Health System of Brazil.5

Initially, the SAST staff proposal was to analyse not only prevalence rates of any morbidity problem, but also incidence density rates, in order to evaluate different risk factors associated to hospital activities. With this aim, a longitudinal study of short duration work absences by disease and their main risk factors, by age and sex, was planned.

After 1 year of gathering data and preliminary analyses, the data was considered of adequate quality and sufficiently stable to start a cohort study. The date 1 January 2000 was fixed as the start of study.

Prior to constitution of SAST, a cooperative project between UFMG and the Universitat Autònoma de Barcelona (UAB) was signed as a consequence of a previous collaboration study on Strain Repetitive Injury and factors associated to job organization conditions6 involving Belo Horizonte workers, as well as a short-term study about nursing absenteeism at this same hospital in Belo Horizonte.7
attribution of work absence due to health problems; conducting regular health check-ups, pre-employment and cessation examinations, and prevention and investigation of accidents suffered on the job by means of a special study of the environment and organizational conditions of every level of hospital activity.

In more detail, the characteristics of the service are as follows:

1. Institutional: The service is directly dependent on the Pro-Reitoria de Recursos Humanos da UFMG, its activity being not only administrative but also academic, collaborating in lecturing, research and university extension activities in several occupational health programs.

2. Functional:
   a. Attendance to the workers spontaneous demand, specifically those health problems asking for immediate solution and consequent evaluation for temporary incapacity.
   b. Legal and normative health revisions and cessations end of incapacity period, regular periodic revisions and those required by change of work place and pre-employment examinations.
   c. Forensic and personal medical advising to the workers about contractual and conflict situations such as permanent incapacity. Official advisors to the Hospital das Clínicas da UFMG in the occupational health area, acting as prevention agents in the workplace.
   d. Implementation and follow-up of occupation related prevention programs.

3. Staff: Administrative personnel plus two general practitioners, two occupational medicine specialists, one psychologist, one psychiatric therapist, one statistician, one physiotherapist, one safety engineer and two safety technicians.

Since the beginning of the project, several training sessions involving students and workers from both sites (Brazil and Spain) have been held to assist the development of the project. Thus, in these 5 years eight researchers have completed periods of from 1 to 3 months training, three in the UAB and five in the SAST.

What does it cover?

There are three different objectives: administrative, clinical and epidemiological.

- The cohort intends to answer queries of the personnel department about the labour situation of workers affected by health problems, their evaluation in terms of periods of absence, the administrative management of social benefits and also to detect problems related to labour organization.

- The second aspect consists of evaluating the medical activity of the service, quantifying the spontaneous demand, the nature and quality of diagnoses, the clinical laboratory demands, and the general characteristics of sickness leave episodes.

- The third aspect, of an epidemiological nature, intends to evaluate the presence of risk factors associated to the general morbidity and especially to the diagnoses linked to sickness leave episodes at individual and organizational level.

Specific objectives can be summarized as:

- Socio-demographic characterization of workers admitted to the cohort: sex, age, educational level, occupation, shift work, contract type and date of employment in the hospital and position.
- Evaluation of exposures taking into account all kinds of leave and holidays each year.
- Evaluation of clinical spontaneous demand for assistance and associated diagnosis. Perceived and real morbidities and analysis of problems associated to the kind of work activity.
- Evaluation of incidence of sick leave episodes, associated diagnosis, recurrence level, days off and possible risk factors.

Who is in the sample?

Eligible subjects for the study included all hospital workers formally registered at the Human Resources Department with contractual activity between 1 January 2000 and 31 December 2005. Two different kinds of contracts were considered: civil servants with UFMG dependence and tertiary contracted workers, outsourced by a university foundation.

The cohort is not censored and permits all possible situations associated to the workers occupation mobility: new incorporations post 1 January 2000, cessations before 31 December 2005, retirements, re-employments, change of position or schooling and short-term sick leave absences.

How often have they been followed-up?

Follow-up procedures include collection of data every time a worker attends the health service. At this moment, information regarding his or her situation is registered.

No specific follow-ups are planned due to the fact that cohort is exhaustive and daily actualized.

What has been measured?

Two databases are involved.
General Management Patients File: Information is updated every time the worker demands assistance to the SAST or attends a programmed periodic health revision. It reflects changes in socio-demographic variables and position changes in the hospital.

Morbidity Profile Data File: It reflects every consultation generated by the worker, with one record per day: date, type of care sought (medical, expert, psychological, occupational, social service), the reason expressed for consultation recorded according to the International Classification of Primary Care (ICPC), diagnosis according to the 10th version of International Classification of Diseases (ICD-10), indications of having asked for a medical referee and referrals to another service or medical concession, beginning and days of duration of sick leave.

In addition, another database is completed by the Personnel Department.

Personal Hospital Database: This includes socio-demographic and occupational information of the hospital staff. It serves as a reference and validation of the General Management Patients File, and records all the required data, especially regarding vacations, leave and days off, necessary to be able to determine the rates of incidence accurately. This information is modified or confirmed every time the worker attends the SAST.

What is attrition like?
Due to the characteristics of the cohort, 100% of workers presents during the study period were observed. A total of 2134 workers active on 1 January 2000 were included as members of the cohort. Since the cohort started, there have been 1324 new entries into the study, so the total number of workers enrolled after 5 years of operation is 3458, with 2515 women and 943 men.

What has been found?

Population
A total of 13197.63 person-years of follow-up have been accumulated, resulting an average of 2199.6 person-years per year. Each worker has been followed, on average, for 3.89 years (95% CI = 3.74–3.89). At least 50% of the workers have been followed for 4 years or more (i.e. median = 4 years).

Of the 1324 enrollments since 1 January 2000, 61 had already had some previous contractual relationship with HC UFMG, so the total number of new inclusions is 1263, a mean of 210.5 per year. Figure 1 shows movements of workers into and out of the cohort.

Considering only the 1263 new inclusions, at least 50% of these workers have been followed for 1.53 years or more, the average being 1.81 years (95% CI = 1.74–1.89). Figure 2 presents the distribution by sex and age of HC UFMG workers. When compared with the sex and age distribution of the active general population in Brazil or, in particular, with that described for Belo Horizonte, several important differences are notable, differences always present in hospital studies.

SAST demand
During the period of study, the workers generated a total of 24601 consultations; that means 341.7
consultations per month and 4100.1 consultations per year. An average of 15.5 consultations per 100 workers per month was registered during the study period, and 186.5 for each 100 workers per year. This rate remains almost the same for every year in the period of study.

About 50% of the workers had consulted four or more times, the maximum number of consultations per worker in the period was 84. Crude rates differed significantly between men and women, 139.6 and 203.2 per 100 workers per year respectively (RR = 1.46, 95% CI = 1.41–1.50) and also between FUNDEP and UFMG contractual status, 172.3 and 191.3 per 100 workers per year respectively (RR = 1.11, 95% CI = 1.08–1.14).

**Diagnosis**

Acute upper respiratory infections have represented the most prevalent diagnosis during consultations, followed by dorsopathies.

**Sickness leave episodes**

A total of 17165 sickness leave episodes have occurred during the study period, a mean of 238.4 per month, in other words 10.8 leave episodes for every 100 workers per month.

These sickness leave episodes represent 68614 days of absence, the average being 4.0 days per episode (95% CI = 3.9–4.1), while the cumulative mean number of days off per worker during the study period was 19.8 (95% CI = 19.0–20.7). There are significant differences between crude rates for men and women (83.6 and 146.7, respectively; RR = 1.75, 95% CI = 1.68–1.82) as well as between UFMG and tertiary contractual status (135.7 and 113.8, respectively; RR = 1.19, 95% CI = 1.15–1.24).

Table 1 presents a general description of the different diagnoses associated with sickness leave episodes.

**What are the main strengths and weaknesses?**

The HC UFMG cohort, begun on 1 January 2000, has several characteristics that distinguish it from other cohorts. First of all, the HC UFMG cohort is open at both ends, and is of exhaustive pursuit and follow-up of all the workers who were engaged in it. This characteristic allows the researcher to plan any type of studies, cross-sectional, longitudinal retrospective or prospective. By the nature of the service, all health problems that can be related to the occupation of all the workers are documented and registered thus serving as a data bank for any kind of epidemiological study design which may be planned in the future.

The volume of information generated is completely manageable without difficulties by means of standard data management and statistical analysis programs.

The cohort budget does not represent a significant burden, since the specific activity of follow-up of the cohort arising from collaboration between the universities UFMG and UAB, only requires a small number of interchanges of investigators which can be self-financed by institutions and programs of the two universities.

In fact, the cohort offers the first opportunity of studying a hospital workers group with its own characteristics, some being quite different from those described in the literature pertaining to studies conducted in completely developed countries. The group analysed has many similarities, whether social, organizational, patterns of morbidity or epidemiological profiles, with any comparable hospital in many Latin American countries and could therefore become a more realistic reference than those that already exist in the western world. Furthermore, it constitutes an important example and stimulus for all those places holding similar information, but which unfortunately has not yet been analysed.

The fact of analysing short duration sickness leave episodes has a very interesting characteristic. It permits studying the recurrence of the event at several complexity levels, whether using marginal distributions or otherwise, introducing the modification of the probability of occurrence of the studied phenomena as well as consideration of the variation of the possible risk factors over time. This design to analyse the incidence as a phenomenon with ‘memory’ calculation by the structural nature of the data generated by a cohort lends additional importance and value to the study.

It is certain that, like any study begun under precarious budgetary conditions, there is a certain danger of lack of sustainability of the project. Nevertheless, with this work we think that after 7 years of operation of the cohort, already being able to present analyses involving 6 years of follow-up, we may consider this danger to be minimal.

In this study the phenomenon of sickness leave is considered in agreement with the Brazilian law for civil servants, in other words as a process that must be medically diagnosed and be attributed from the first day of its detection, even if certified a posteriori, if the worker’s condition did not allow them to attend the SAST on the first day. This characteristic differs, therefore, from other countries, for example Spain, where certification does not require diagnosis, but that after a fixed number of days (currently three in Spain). Another differential characteristic is the fact that the organization certifying the sick-leave episode and its duration forms part of the organization itself, a fact which without doubt permits more complete knowledge about diagnoses associated with workers’ medical consultations and hence about reasons associated with working days lost through illness.

Despite these differences, this cohort serves as an important reference study due to the organizational
and cultural proximity of Latin American countries with similarly structured health systems.

Can I get hold of the data?

Complete data files are not available except for administrative staff of the UFMG Hospital das Clínicas worker health service SAST. Nevertheless, simplified data files covering years 2000–2002 are accessible for academic use on Biostatistics and Public Health PhD program at the Universitat Autònoma of Barcelona (http://graal.uab.cat/ver_Libro3.html).

Table 1 Diagnoses associated with sickness leave episodes

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute upper respiratory infections</td>
<td>2408</td>
<td>14.0</td>
</tr>
<tr>
<td>Dorsopathies</td>
<td>1189</td>
<td>6.9</td>
</tr>
<tr>
<td>Other soft tissue disorders</td>
<td>879</td>
<td>5.1</td>
</tr>
<tr>
<td>Intestinal infectious diseases</td>
<td>802</td>
<td>4.7</td>
</tr>
<tr>
<td>Persons encountering health services for specific procedures and health care</td>
<td>707</td>
<td>4.1</td>
</tr>
<tr>
<td>Mood (affective) disorders</td>
<td>706</td>
<td>4.1</td>
</tr>
<tr>
<td>Persons encountering health services for examination and investigation</td>
<td>526</td>
<td>3.1</td>
</tr>
<tr>
<td>Episodic and paroxysmal disorders</td>
<td>486</td>
<td>2.8</td>
</tr>
<tr>
<td>Influenza and pneumonia</td>
<td>468</td>
<td>2.7</td>
</tr>
<tr>
<td>Neurotic, stress-related and somatoform disorders</td>
<td>450</td>
<td>2.6</td>
</tr>
<tr>
<td>General symptoms and signs</td>
<td>405</td>
<td>2.3</td>
</tr>
<tr>
<td>Symptoms and signs involving the digestive system and abdomen</td>
<td>385</td>
<td>2.2</td>
</tr>
<tr>
<td>Diseases of oral cavity, salivary glands and jaws</td>
<td>383</td>
<td>2.2</td>
</tr>
<tr>
<td>Arthropathies</td>
<td>371</td>
<td>2.2</td>
</tr>
<tr>
<td>Disorders of conjunctiva</td>
<td>353</td>
<td>2.0</td>
</tr>
<tr>
<td>Viral infections characterized by skin and mucous membrane lesions</td>
<td>323</td>
<td>1.9</td>
</tr>
<tr>
<td>Other maternal disorders predominantly related to pregnancy</td>
<td>310</td>
<td>1.8</td>
</tr>
<tr>
<td>Injuries to the ankle and foot</td>
<td>309</td>
<td>1.8</td>
</tr>
<tr>
<td>Non inflammatory disorders of female genital tract</td>
<td>309</td>
<td>1.8</td>
</tr>
<tr>
<td>Hypertensive diseases</td>
<td>280</td>
<td>1.6</td>
</tr>
<tr>
<td>Diseases of veins, lymphatic vessels and lymph nodes, not elsewhere classified</td>
<td>269</td>
<td>1.6</td>
</tr>
<tr>
<td>Infections of the skin and subcutaneous tissue</td>
<td>244</td>
<td>1.4</td>
</tr>
<tr>
<td>Other diseases of urinary system</td>
<td>222</td>
<td>1.3</td>
</tr>
<tr>
<td>Injuries to the wrist and hand</td>
<td>220</td>
<td>1.3</td>
</tr>
<tr>
<td>Dermatitis and eczema</td>
<td>163</td>
<td>0.9</td>
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<tr>
<td>Diseases of oesophagus, stomach and duodenum</td>
<td>158</td>
<td>0.9</td>
</tr>
<tr>
<td>Chronic lower respiratory diseases</td>
<td>153</td>
<td>0.9</td>
</tr>
<tr>
<td>Urolithiasis</td>
<td>146</td>
<td>0.8</td>
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<tr>
<td>Symptoms and signs involving cognition, perception, emotional state and behaviour</td>
<td>137</td>
<td>0.8</td>
</tr>
<tr>
<td>Injuries to the knee and lower leg</td>
<td>117</td>
<td>0.7</td>
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<tr>
<td>Diseases of inner ear</td>
<td>116</td>
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<tr>
<td>Other diseases of upper respiratory tract</td>
<td>114</td>
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<tr>
<td>Disorders of skin appendages</td>
<td>112</td>
<td>0.6</td>
</tr>
<tr>
<td>Exposure to inanimate mechanical forces</td>
<td>104</td>
<td>0.6</td>
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<tr>
<td>Others</td>
<td>2916</td>
<td>16.9</td>
</tr>
</tbody>
</table>

References

1 Lim A, Chongsuvivatwong V, Geater A, Chayaphum N, Thammasuwan U. Influence of work type on sickness


