CLINICAL ISSUES: RETURN TO WORK AND PUBLIC SAFETY

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Cardiovascular disease (CVD) commonly occurs before the age of retirement, and some of those who suffer a heart attack are still in normal, full-time employment. By virtue of their age, such subjects are highly experienced and are often in positions of responsibility. Indirect costs associated with sick leave can be high. Thus, exactly when a patient can go back to work is an important issue for employers and for the worker. By way of reference, in England in 1983 the prevalence of coronary heart disease (CHD) among industrial workers was 10.4 cases for every 1000 individuals,[19] and the disease was responsible for 13% of all health-related early retirements.

Advances in cardiovascular therapy (e.g., fibrinolysis, coronary angioplasty, coronary bypass surgery, pacemaker technology, automatic implantable cardioverter-defibrillators, and drugs) mean that the cardiovascular function of many patients is restored to such an extent that returning to work is possible.[9] However, CVD can entail a whole range of medical problems: the need for physical rehabilitation; how to assess residual functional capacity; the short- and medium-term prognosis for the disease; the risk of a heart attack putting at risk either the life of the patient and/or their colleagues; being sure that the treatment administered will not interfere with the subject's ability to perform his or her job. Even with ideal medical treatment, many subjects should not go back to work for a variety of psychological or social reasons, all of which have to be taken into account. Work can only be resumed with the cooperation of several parties, i.e., the patient's personal physician, cardiologist, and employer (job modifications may be required of the latter). Therefore, in technical terms, the decision whether or not to go back to work involves not only weighing medical considerations but also the patient's psychosocial profile and factors associated with his or her particular job.

MEDICAL ASSESSMENT AND PSYCHOSOCIAL PROFILE

Studies on going back to work have shown that a number of different elements are involved:

1. The exact nature of the original cardiovascular event that led to the patient stopping work. The most common reason is **coronary artery disease** (CAD) which can range from myocardial infarction (MI) to angina treated with coronary artery bypass, angioplasty, or just drugs. In CAD, whatever its particular form, certain clinical issues always dominate: whether or not the patient still experiences angina

during exercise; whether there is a risk of arrhythmia; and the level of left ventricular function, if this is likely to limit the capacity for physical exertion. It is important to note that, for patients with no residual angina, neither their cardiovascular status (whether there is any infarction or not) nor the nature of the treatment (whether it involves only drugs or also a coronary artery bypass) is important when it comes to deciding on return to work. The possibility of silent myocardial ischemia also should be considered, given its prognostic importance; and systematic maximal exercise test and/or ECG Holter monitoring should be recommended in at-risk patients, especially those with diabetes. Although patients tend to go back sooner following coronary angioplasty than after bypass surgery, figures show that long-term employment prospects are the same.[10]

Unmanaged high blood pressure (BP) can make returning to work difficult, partly because of symptoms (e.g., headaches, dizziness, feeling unwell) that interfere with the patient's ability to perform the job, but more importantly because the very fact of working tends to exacerbate high BP. Static and dynamic effort can induce significant increases in BP load, and psychological factors can disrupt key balance mechanisms, thereby perturbing the patient's BP level, not only during working hours but also throughout the rest of the circadian cycle.

Feelings of **malaise** and **cardiac syncope** are strong indicators of a risk of relapse and all the associated consequences vis-à-vis the working environment. Different conclusions have been arrived at concerning physical examinations and function tests,[13,14] but sending a patient back to work should not even be contemplated until an overall evaluation has been performed and a stable treatment strategy has been definitively established.

Improvements in the drugs available for treating heart failure (ACE inhibitors, specific beta-blockers), and in rehabilitation techniques have significantly increased the number of patients able to resume their professional lives. The main clinical consideration in this case is how well the heart problem that originally gave rise to the heart failure is being managed.

2. The extent of loss of function. Going back to work always entails some extra physical effort corresponding to routine actions (e.g., commuting and moving around in the workplace) and, beyond that, specific forms of exertion associated with the job. During a standard cardiologic examination, a patient's **functional capacity** can be assessed in an exercise stress test (for hypertension and CAD) or an exercise stress test with measurement of oxygen consumption (for heart failure). Although not part of the usual cardiologic examination, some of the physical as well as psychological workplace noxins can be simulated in the laboratory while monitoring cardiovascular response[12] (see Chapter 8).

Functional capacity can be increased by cardiac rehabilitation, so consider sending patients to a physical therapy center before they return to work. These centers offer programs geared towards preparing patients for a variety of different types of working conditions—for example, by carrying progressively heavier loads or practicing increasingly more demanding arm manipulations.[12]

Once the patient is working again, the physical stress involved in the job can be estimated using a Holter ambulatory ECG monitor or a heart rate integrator in conjunction with specific, validated indices.[6] In many workplaces, it is also possible to measure ambulatory BP. In addition to gauging the dynamic-aerobic demands of work, ambulatory monitoring (ideally Holter and BP monitoring together) is of great utility for assessing the impact of other work stressors (e.g., physical, chemical, psychosocial, ergometric)—especially their additive burden—on clinically relevant

cardiovascular parameters. With the help of such techniques, physicians can review their decision to allow the patient to go back to work.

3. Prognosis and the risk factors associated with the heart disorder. A return to work is only worthwhile if it is to be for a significant period of time. Thus it is important to weigh the probability that a subject will be able to continue his or her professional life through the medium and perhaps the long term. This **prognostic assessment** must include: the likelihood of the condition deteriorating; any job-related risk factors (e.g., stress, heavy physical demands); any other risk factors (smoking, blood cholesterol levels, BP); patient compliance level.

4. Personal factors involved in deciding whether or not to go back to work. **Psychological and social factors** are more important than medical considerations when it comes to deciding whether or not to go back to work.[4] To do so means that the patient will have to stick to the agreed upon plan, especially if job reassignment or professional retraining is necessary. Many studies have used multivariate analysis to identify the key factors that determine or modify whether and when patients return to work.[5] These factors can be broken down into a number of different groups:

- The probability of going back is inversely proportional to the length of time away from work, whatever the prognosis of the cardiovascular event.
- The psychological representation of the cardiovascular event that caused the patient to stop working becomes particularly significant when the episode of malaise or unconsciousness occurred in the workplace (in front of others), or if the patient was treated surgically and is suffering complications of sternotomy (i.e., if the healing of the operative wound is causing pain).
- The worker's age and level of retirement coverage are closely linked: the older the patient (i.e., the closer to retirement age), the more they will be eligible for anticipated redundancy provisions and the more likely they will be to stop work before the statutory retirement age.
- The motivation to go back to work corresponds to the patient's daily interest in getting up and undertaking the job. Patients are less likely to go back to monotonous, routine work that makes no demands on their personal talents or skills.
- The patient's level of education or training and their suitability for retraining is an important factor. When necessary, reassignment tends to mean changing to a less physical job, but one which might be more mentally or psychologically demanding (e.g., in information technology). Such a change is not always consistent with the patient's original training and skills.

5. The physician's motivation. Physicians often are reluctant to send their patients back to work, even in the face of a nonischemic exercise test, based on their concern about prognosis.[18]

THE JOB AND THE WORK ENVIRONMENT

All the relevant information normally can be obtained in the course of an in-depth interview with the patient, but in some cases a visit to the patient's workplace also may be necessary. It is essential to work together with the employer's health and safety department. The interview should cover any aspects of the patient's job which could affect the return to work and should highlight any working conditions that might exacerbate the patient's condition.

Job Aspects to Consider

Different jobs combine, to different extents, physical activity (static and dynamic work) with psychosensory stress. The most common argument against an

early return to work is that the job involves heavy and/or sustained physical work (either static or dynamic). However, a job that involves a moderate level of physical effort probably protects against the recurrence of CAD more effectively than completely sedentary work. In the context of coronary insufficiency, it is also necessary to identify factors that might exacerbate any residual coronary ischemia, e.g., work at high altitudes or extreme temperatures (either hot or cold), or the possibility that the patient may be exposed to carbon monoxide (particularly if the patient is continuing to smoke). It is especially important to identify patients in high-risk jobs—jobs in which the operative, in the event of sudden cardiac incapacitation (cardiac syncope, serious arrhythmia), could be at risk or could risk other lives.

Potentially Harmful Work Practices

Shift work can exacerbate heart disease (hypertension and cardiac or coronary insufficiency) by upsetting the circadian rhythms that regulate BP and heart rate. Working the night shift or getting up for the early morning shift (4–5 AM) coincides with the time when the cardiovascular system is normally at rest (with catecholamines at their lowest levels). Moreover, if the daily routine is constantly changing, it is difficult to schedule medications to cover the 24-hour period effectively.

Long work hours are of interest, for they are a cardionoxious factor that could be prevented.

Work-related psychological stress, as defined by Karasek or Siegrist can exacerbate high BP and CHD. If the support system in the workplace is poor, the therapeutic equilibrium can be thrown off, and new symptoms may develop.[23] Even when no direct link can be proven, patients sometimes blame such stress for their condition, and this should be taken into account when there is a strong possibility that the patient will refuse to go back to work. In most return-to-work studies, the psychosocial quality of the work environment has not been assessed in relation to prognostic criteria.[1,3,7,9,11,16,20] Furthermore, studies examining prognosis often have not had sufficient followup periods. However, in a clinical prospective study of a group of men up to the age of 45 who were followed for 5 years, the prognostic significance of returning to high-strain work after MI was comparable to the degree of angiographically assessed coronary atherosclerosis, and of greater importance than the left ventricular ejection fraction.[21] On the basis of these data, together with numerous cohort studies showing an excess risk of CHD morbidity and mortality among workers exposed to job strain or other untoward psychosocial work conditions, Theorell and Karasek have questioned whether heart attack patients should return to stressful jobs.[21]

Deciding About a Return to Work

It is only possible to send a patient back to work if he or she wants to go. Problems arise when it is necessary, because of diminished functional capacities, to modify working conditions or completely change to another job. The final decision on whether the patient should go back to work is up to the cardiologist, optimally, together with the occupational health specialist.[17] Every country (every state in the U.S.) has its own regulations. In Europe, especially in France and Germany where occupational health is mainly dealt with by specialists, return to work is most easily organized with full participation of the company, because it is familiar with all the relevant working conditions and the possibilities for reassignment within the company. The approach is necessarily more complicated in countries where occupational health is less tightly regulated and mainly concerns safety issues.

It is useful to let patients with less severe cardiovascular problems who wish to go back to work at any price return for a predefined period of up to 6 months. Ensure that the resources are available to check that they are responding well. This followup may include a physical examination, an ECG during working hours, and an assessment of cardiovascular risk factors.

PUBLIC SAFETY ISSUES

A job is considered high risk if the worker involved puts lives at risk in the event of experiencing a sudden loss of ability to carry out the job duties. Such abrupt deterioration can take the form of a profound malaise, syncope, or even sudden death. From a cardiologic point of view, a sudden loss of consciousness is usually due to arrhythmia exacerbating a pre-existing cardiac problem. Although ventricular arrhythmia traditionally has been considered the main danger, certain kinds of supraventricular arrhythmia which have hitherto been thought of as relatively benign as well as bradyarrhythmias also can cause syncope or sudden death. Accurately gauging the risk of syncope is difficult, and it is not always possible to predict its appearance, even when a comprehensive cardiologic examination is performed.

The Type of Job

Most of the jobs presenting public safety problems are those that involve operating vehicles, e.g., trucks, public transport vehicles, machines used in the construction industry, cars, airplanes, and trains. However, other jobs, such as operating cranes and handling dangerous industrial processes, also are implicated. Additionally, although perhaps not directly associated with the job, driving a car—essential to many people for getting to the workplace—can affect public safety.

Risk assessment for driving a car remains complicated, but figures have been extensively studied for professional drivers on the road: U.S. and Canadian studies indicate that less than 0.1% of all accidents can be attributed to a health problem, and only 10–25% of these are associated with a cardiac event. In a study of the London Public Transport system, only six accidents over a 20-year period were found to have happened as a result of the driver suffering a coronary heart problem; during that time, 6.8 million miles were covered, corresponding to 334,000 driver-hours.[19] It is reasonable to conclude that asymptomatic drivers who match the current criteria laid down by cardiologic experts[2,24] can go back to their jobs without significantly endangering themselves, their passengers, or other drivers.

Commercial airplane accidents associated with health problems also are rare. Although one-third of pilots have developed some kind of transient incapacitation (mainly gastrointestinal) while flying,[8] in each case there was enough time for the copilot to take over. In Europe, the estimate for fatal commercial airplane accidents is 1 for every 10^7 flying hours, and of these only 1% can be attributed to health problems. Epstein and colleagues state: "A review of the International Air Transport Association of 36,000 pilots at risk over 10 years found 26 cardiovascular or neurological medical events that could have jeopardized safety if they occurred at a critical time (i.e., takeoff or approach)."[8] No figures are available for other high-risk jobs.

The Risk of Losing Consciousness

Assessing any individual's risk of syncope relies on a diagnostic approach based on the guidelines recently issued by the American College of Physicians.[13,14] These take into account the patient's clinical history and the results of a variety of

examinations, e.g., electrocardiography, electrophysiology, Holter monitoring or telemetry, loop monitoring, and tilt testing.

The decision whether or not to go back to a high-risk job depends on the exact nature of the cardiac disorder and the likelihood of its inducing serious arrhythmia. In practice, the main factors to be taken into account are: the probability that the patient's arrhythmia might reappear following treatment; the probability that any such arrhythmia might lead to the patient losing control of any machinery or procedure for which he or she is responsible; and the probability that any such loss of control might lead to an accident. With respect to car driving, a mathematical model for calculating this risk has been developed.[2] This calculation takes into account the vehicle type, the number of hours of driving per year, the risk of syncope or sudden death within the year, and the chance that loss of control might endanger other road users.

Following an assessment of the various risks, the medical/scientific statement of the American Heart Association estimates the risk of an accident occurring as very low, but emphasizes that it is the chance of arrhythmia which should be taken most seriously in making the decision as to whether or not to send a patient back to a high-risk job.[8] Although every case should be treated on its own merits, taking into account the particularities of the work and especially the period within the workday during which there is a genuine danger, the following typical circumstances can be considered for reference.

- Those for whom the possibility of going back to a high risk job is completely excluded: patients with Class III or IV heart failure; those who are waiting for cardiac transplantation; those who have recently had an MI coupled with serious loss of ventricular function, with ventricular arrhythmia, or with reduced variability of their heart rate; or those who have already experienced cardiac arrest and been revived.
- Patients who should be able to go back to work without any problem: if asymptomatic, those with sinus bradycardia or tachycardia, paroxysmal supraventricular tachycardia, and first or second-degree type 1 atrioventricular block.
- For all other kinds of arrhythmia (ventricular dysrhythmia, atrioventricular node re-entry, Wolff-Parkinson-White syndrome, neurally mediated syncopal syndromes): a cardiologist's opinion should be sought for diagnosis, treatment strategy, and decisions about return to work.

Cardiac Pacemakers and Cardiovascular Pharmacological Agents

Carrying a pacemaker does not automatically exclude working in a high-risk job, but special care should be taken if the work involves intense magnetic fields (e.g., electrolysis technicians and electricians). The decision whether or not to send patients with implanted defibrillators back to work does not depend on the presence of the device, but rather on the reason the device was implanted in the first place. A European study of 46 queried pacemaker cardiologists, regarding driving advice, actual practices, and outcomes among patients with automatic implanted cardioverterdefibrillators, showed that over half the patients advised not to drive by their physicians had done so within 6 months of implantation, and no arrhythmia-related fatal accidents were reported.[15]

Out of all the drugs that may be prescribed, particular caution should be attached to β-blockers and antiarrhythmic agents. The former can induce diminution of mental alertness, somnolence, or depression, possibilities to consider when prescribing. Class I and III antiarrhythmic drugs should not be used in cases of benign

arrhythmia because, as is widely recognized amongst cardiologists, they can themselves induce more pronounced arrhythmia (proarrhythmic effect). In all cases of arrhythmia, continuous ECG monitoring should be undertaken to check that the drugs are working before the patient is allowed to return to work.

Ethical Considerations

Despite the fact that many patients may derive great benefit from radical treatment (e.g., correction of coronary insufficiency or heart failure, surgery or other techniques designed to ablate conduction pathways, or implantation of a pacemaker), they may still be barred from resuming their work because of specific regulations related to insurance policies, driving license suspension, or other professional restrictions. The physician responsible for treating the heart disorder is subject to all the rules of medical confidentiality, but adhering to them may raise ethical problems if a patient is intent on ignoring the risk entailed in going back to work, especially if the patient refuses to consent to fully informing the physician who will be responsible for allowing resumption of a high-risk job. The attending physician is open to censure if he or she fails to maintain medical confidentiality, but a personal sense of responsibility may demand that confidentiality be breached.

This type of ethical problem most often arises with the drivers of heavy vehicles, for whom professional and social lives often are one and the same, and who often are reluctant to abandon their work. Moreover, the regulations stipulating the physical examination criteria that must be fulfilled to keep the special driver's licenses required for heavy goods and public service vehicles are not always relevant to patients with cardiac problems. The regulations do not address the shortcomings of physicians nor the work conditions (e.g., lone driving, long working hours, stress associated with delivery deadlines, heavy physical work involved in unloading, drastic temperature changes).

Therefore, the best approach is to conduct a series of interviews—possibly including the patient's family or a qualified psychologist—to try and make the patient see reason. This is the only possible option, because there is nothing to stop the patient from finding a job in another transportation company where it is not known that he has a heart problem.

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