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EDITORIAL COMMENT

Secondary transport: Still an important obstacle to the performance of the coronary and stroke fast-track systems in Portugal?

Transporte secundário: ainda um importante entrave ao desempenho das Vias Verdes em Portugal?

Hélder Pereira

Serviço de Cardiologia, Hospital Garcia de Orta, Almada, Portugal

The subject of interhospital transfer is of considerable importance given the current state of the Portuguese health service. The recent technological advances in the treatment of cardiovascular disease have reached this country, but they are mainly accessible only in large centers, and so referral networks between hospitals are required to provide access to these therapies for the wider population.

Medical personnel who work outside the large referral centers are all too familiar with the extreme difficulty of organizing transport for routine as well as emergency activity. Hospital bed availability is frequently affected by the numbers of patients awaiting dental treatment, carotid Doppler ultrasound, respiratory function testing, cardiac computed tomography, cardiac surgery consultations, or other assistance. These delays in routine procedures do not necessarily directly affect mortality, but they greatly increase the inefficiency of the system, particularly concerning the availability of hospital beds.

The situation is even worse regarding emergent or urgent interhospital transfer. Most hospitals are unable to ensure that this transfer takes place with the required speed and efficiency. As a rule, any organization is only *ad hoc*; the process begins with a discussion on whether the medical personnel who will accompany the patient are to come from the hospital department requesting the transfer or from the emergency team, and how to allocate the associated tasks, followed by attempts to find a fire service or private company that will provide the ambulance. All too often, the ambulance services that are geographically nearest to the hospital have not been paid and refuse to provide transport, which ends up being provided by entities that are dozens of kilometers away.

Analyzing the problem at this level of detail may seem excessive, but from my standpoint it is not. In the more than eight years that I have been working with the Stent for Life and Stent Save a Life (SFL/SSL) initiative, there have been constant problems with organizing interhospital transfer that have not been resolved and are often ignored. Precise data on door-in-door-out (DIDO) times in Portugal are unavailable, but the recommended target of 30 min is certainly hard to achieve.

When we began the SFL/SSL initiative in 2011, one of the main obstacles to the performance of the coronary fast-track system (via *Verde Coronária*) was the difficulty in communication between the prehospital system and the interventional cardiology centers, together with problems with organizing secondary transport. Although interhospital transfer of ST-elevation myocardial infarction (STEMI) patients was not initially part of the mission of the National Institute for Emergency Medicine (INEM), negotiations between the SFL/SSL and INEM management led them to take on this task, and as a result, the percentage of

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E-mail address: hpereira@me.com

secondary transport carried out by INEM rose from 0.5% in 2011 to 12.5% in 2014. However, in that year, Legislative Order 10,319/2014 reversed this decision, returning responsibility for interhospital transfer to the hospitals,[1,2] and by 2016 the proportion of secondary transport effected by INEM had fallen to 8.1%.[1]

In reality, many hospitals do not have organized transport that is capable of responding immediately to a diagnosis of STEMI, and this inevitably increases system delay.

The article by Ferreira et al. published in this issue of the *Journal*[3] studies the impact on mortality of direct admission versus interhospital transfer in patients with STEMI undergoing primary percutaneous coronary intervention (PPCI). The authors conclude that interhospital transfer significantly increased the time before PCI (median 145 min in transferred patients vs. 88 min in patients admitted directly), but observed no significant difference in one-year mortality.

The first question to discuss is that of the impact of treatment delay on mortality. Coronary occlusion results in irreversible myocardial necrosis[4] and it is thus crucial to restore coronary flow as rapidly as possible; total ischemic time correlates directly with mortality.[5] In order to characterize the timings involved in the treatment process in a more specific and individualized fashion, total ischemic time is usually divided into its various components: patient delay, system delay, DIDO, door-to-balloon time, and so on. Although this approach has proved very useful, assessment of any one of these components in isolation can lead to contradictory findings. Even total ischemic time can be difficult to measure, since it depends in part on the patient's memory of precisely when symptoms began; in addition, published analyses do not usually include patients who died before reaching hospital. The standard quality indicator for PPCI is door-to-balloon time, which should be less than 90 min, and is used to assess the performance of hospitals by medical societies, regulators, and insurers. However, from the very first year of the SFL/SSL initiative in Portugal, it was clear that this indicator was of little use, because although it was nationally within the recommended limits (median 64 min), this did not reflect the actual situation in the country, in which median total ischemic time was as high as 288 min.[6,7] Even assessments of patient delay and system delay in isolation can be deceptive. While the SFL/SSL initiatives were operational in Portugal, there were no significant changes in these timings (patient delay: 114 min in 2011 vs. 119 min in 2015, and system delay: 115 min in 2011 vs. 127 min in 2015).[8,9] However, significant progress was seen in the total number of patients treated (from 106 PPCI procedures per year per million population in 2002 to 308 procedures per year per million population in 2013), in the proportion of patients who called the emergency services number (35.2% in 2011 vs. 46.6% in 2016), and in the proportion of patients undergoing primary transport by INEM (13.1% in 2011 vs. 30.5% in 2016),[1] all indicators of success for the PPCI program in Portugal.[10–12] As the availability of PPCI is widened to include less densely populated regions of the country, the distances required to transport patients to interventional cardiology centers and hence treatment times will inevitably increase. Even so, the result is a more inclusive health system and therefore one that overall is better than before.

The article by Ferreira e al. is based on a retrospective study from a single interventional cardiology center in the Minho region, where the referring hospitals are served by an excellent road network, which is not the case for the rest of inland Portugal, particularly the Beira Interior region. Their results – median ischemic time of 88 min in the direct admission group and even the 145 min median for the interhospital transfer group – are in fact considerably better than the national figures listed above. The data on mortality may also have been biased by the fact that the proportion of patients in cardiogenic shock at admission, a population with high mortality, in the interhospital transfer group was little more than half of that in the direct admission group (3.2% vs. 5.8%). As the authors acknowledge, it is plausible that patients in shock referred from centers without PPCI capability may have died before transfer had been completed.

The relatively acceptable transfer times reported in the Minho region are welcome, but they do not conceal the negative effect on the Portuguese health system of the lack of a well-organized system for interhospital transfer of emergent and urgent patients.

Problems with secondary transport are not limited to cardiology patients. The fast-track system for stroke (via *Verde do AVC*) faces the same difficulties on an even larger scale, as it is limited to just three large cities, each with a single center, and must deal with a condition in which the therapeutic window is even narrower than with STEMI.

A few years ago it would have been unthinkable, in a country with a good road network and with relatively well-distributed interventional cardiology centers, for anyone to admit publicly to considering going back to fibrinolysis, due to the difficulty in offering PPCI to their patients within a sufficiently short time (120 min from first medical contact). I find such a position understandable, but it is the responsibility of all of us to strive to make primary angioplasty the treatment for STEMI in Portugal.

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