Acute myocardial infarction (AMI) is one of the main causes of death in Spain. Given its high incidence, rate of complications, and mortality, it is important to attempt to improve its prognosis. Although some people still maintain that guidelines are not to be followed, compliance with their recommendations does lead to a reduction in morbidity and mortality. A proportional reduction in 1-year mortality of 22% has been calculated for acute coronary syndrome when the guidelines are followed.\(^1\) The increasingly rapid pace of scientific discovery means that guidelines are updated in ever shorter periods of time. This implies a continual effort in order to become acquainted with, assimilate, and put into practice the latest recommendations at the earliest opportunity.

When patients were selected for the Acute Myocardial Infarction Hospital Registry Project (Proyecto de Registro de Infarto de Miocardio Hospitalario; PRIAMHO) I and II registries, the definition of AMI had not yet been modified; consequently, the study by Heras et al\(^5\) in this issue of Revista Española de Cardiología relates to an old definition. The first PRIAMHO registry was undertaken in 1995 and the second in 2000. The current study, which compares the 2 registries, is of unquestionable interest since it reveals the extent of adherence to guidelines at each stage and how mortality changed in patients admitted to coronary care units (CCU) for AMI in Spain over the course of those 5 years. The raw data showed a reduction in mortality of 2.9% (14.2% to 11.3%) at 28 days and 2.1% (18.5% to 16.4%) at 1 year. Proportionally, the reduction is 12.8% at 1 year if no adjustment is made for risk factors and 22% if the reduction is adjusted for those variables. This figure is identical to the reduction calculated by Alexander et al.\(^1\)

There are differences between the 2 PRIAMHO registries in terms of the way that participating hospitals were selected, and these differences could bias the results. In 1995, “the majority of the 228 CCUs in Spanish hospitals were invited to participate...Of the 47 that initially expressed interest in being involved in the study...24 met all of the criteria.”\(^2\) Thus, 10.5% of the invited hospitals were ultimately included. In 2000, data were collected on the patients admitted for AMI “in the CCUs of 58 (71.6%) of the 81 Spanish hospitals that were selected at random...”\(^3\) Those who were interested in being involved in the study were probably also those who adhered better to the guidelines, while random selection prevented this form of bias. Nevertheless, the mortality was reduced. There was a correlation between 2 of the variables studied (extent of adherence to guidelines and mortality) and one is probably responsible for the other. However, there may have been other factors that were not analyzed that would influence the increased survival.

The current study shows that there was greater adherence to the guidelines and fewer patients died due to AMI in 2000 than in 1995, despite the fact that the patients registered in 2000 were at higher risk.\(^1\) This suggests that if the degree of adherence were increased further then there would be an even greater reduction in mortality. To test whether the differences in mortality were due to a greater adherence to the guidelines, the authors established 3 adjusted models.\(^5\) The first model included risk factors and hospital characteristics. The second added administration of antiplatelet drugs, reperfusion, and delay prior to reperfusion, and the third added beta-blockers and angiotensin converting enzyme inhibitors (ACEI). In the first model, the difference in 1-year mortality between the 2 registries was 22%, in the second it was 13%, and in the third there was no significant difference. The authors concluded that the reduction in mortality is due to the greater frequency of administration of drugs recommended in the guidelines. Although this is plausible and probably true, another
cause could be the lack of statistical power to detect differences due to the inclusion of too many variables.

It is clear that increasing time prior to reperfusion has a negative effect on survival. Only the door-to-needle time and not the time elapsed prior to reperfusion was found to be reduced in the period between 1995 and 2000; however, the time between the onset of symptoms and reperfusion is the most important factor, and this was not found to be reduced according to the results shown in Table 3 by Heras et al. There would certainly have been a further reduction in mortality if this time had been reduced. Bearing in mind that the majority of deaths due to AMI occur prior to arrival at hospital, it may be more important to reduce the time from the onset of symptoms to arrival in the emergency department than the door-to-needle time. Although it is desirable to act more rapidly once the patient is inside the hospital, it is more important to educate the public so that patients arrive sooner.

The lesson to be learnt from the study by Heras et al is that the guidelines should be followed. Although the patients included in clinical trials are not very representative of the general population, since they relate to highly selected low-risk subgroups, guidelines are useful for patients from the “real world” and doctors should only omit recommended practices when there is a contraindication in the guidelines themselves. Numerous studies have shown that patients in higher risk categories receive greater benefit from aggressive treatment, despite the fact that the treatment carries increased risk.

A careful balance must be ensured between risk and benefit, and patients must be informed so that they can accept or reject the treatment.

Registries, unlike trials, are representative of the general population. Such studies confirm that treatment of lower risk patients in Spain tends to be more aggressive. This is usually due to doctors attempting to avoid possible treatment-related complications, which the patients and their families may attribute to poor overactivity, and as a class II recommendation (it is not always possible, it is quite another for the procedure to not always be possible, it should have been possible to perform a much greater number in 2000 than actually took place. It is one thing is for the procedure to not always be possible, it is quite another for it to hardly ever be possible.

1. The administration of antiplatelet drugs, which is a class I recommendation, increased from 89.1% in 1995 to 96.3% in 2000. Only 3.7% of patients did not receive them.

2. Reperfusion: 71% of patients with an indication for reperfusion received this treatment in 2000. Fibri

3. The proportion of patients in whom Swan-Ganz catheters were used (6.2% in 1995 and 3.3% in 2000) was very low, despite being indicated in cases of heart failure or hemodynamic instability. In the PRIAMHO II registry, more than 38% of patients in the CCU presented some degree of heart failure and 17.5% presented acute pulmonary edema or cardiogenic shock. The figures were similar in PRIAMHO I. The proportion of patients in whom intraaortic balloon pumps were used (0.8% in 1995 and 1.3% in 2000) is also very low, probably substantially below the proportion of patients presenting cardiogenic shock.

7. The proportion of coronary angiography performed in the CCU in 2000 was very low (12.5%), as was the proportion of primary and rescue angioplasties. Although the 1999 guidelines indicate that Spain was not prepared at that time to perform primary angioplasty, it should have been possible to perform a much greater number in 2000 than actually took place. It is one thing is for the procedure to not always be possible, it is quite another for it to hardly ever be possible.
According to these 7 points, the recommendations were only well followed for the use of antiplatelet drugs. Less fibrinolysis was performed than should have been the case. Few echocardiograms were performed and there was little use of Swan-Ganz catheters or intraaortic balloon pumps. Coronary angiography and angioplasty were rarely performed. Beta-blockers and ACEI were used more than recommended by the SEC guidelines from 1999 and less than recommended in the American guidelines from the same year. This indicates that we follow the recommendations from other countries more (although inadequately) than those from Spain.

Of all the recommended treatments, some have a greater impact than others in terms of the reduction of mortality. A metaanalysis of the influence of treatments on mortality due to AMI between 1975 and 1995 indicated that the following (shown in order of significance) have a clear benefit in terms of survival: primary angioplasty, fibrinolysis, aspirin, beta-blockers, and ACEI. When the results are adjusted for interactions between the various treatments, the order remains the same but the impact of ACEI is reduced since they have little additional benefit over other drugs. A study based on the Euro-Heart Survey revealed that adherence to the guidelines is particularly poor in relation to cardiogenic shock, which is treated much less aggressively than recommended in relation to angiography, revascularization, and use of intraaortic balloon pumps. These treatments are used at the same rate in patients with cardiogenic shock as in other patients. This confirms once again that the greater the patient risk the less likely it is that the indicated treatment will be used. It is likely that better adherence to the guidelines would reduce the high mortality.

Although the study by Heras et al does not refer to this point, a high degree of variability can be seen in the PRIAMHO I and II registries in terms of the practice in the selected hospitals, both for drug therapies and the use of different techniques (echocardiography, Swan-Ganz catheter, coronary angiography, etc) in AMI. What is not clear from the available data is whether in the different hospitals, both for drug therapies and the use of different techniques (echocardiography, Swan-Ganz catheter, coronary angiography, etc) in AMI. A study based on the Euro-Heart Survey ACS1 revealed that adherence to the guidelines is particularly poor in relation to cardiogenic shock, which is treated much less aggressively than recommended in relation to angiography, revascularization, and use of intraaortic balloon pumps. These treatments are used at the same rate in patients with cardiogenic shock as in other patients. This confirms once again that the greater the patient risk the less likely it is that the indicated treatment will be used. It is likely that better adherence to the guidelines would reduce the high mortality.

Although the study by Heras et al does not refer to this point, a high degree of variability can be seen in the PRIAMHO I and II registries in terms of the practice in the selected hospitals, both for drug therapies and the use of different techniques (echocardiography, Swan-Ganz catheter, coronary angiography, etc) in AMI. What is not clear from the available data is whether in the different hospitals, both for drug therapies and the use of different techniques (echocardiography, Swan-Ganz catheter, coronary angiography, etc) in AMI. A study based on the Euro-Heart Survey ACS1 revealed that adherence to the guidelines is particularly poor in relation to cardiogenic shock, which is treated much less aggressively than recommended in relation to angiography, revascularization, and use of intraaortic balloon pumps. These treatments are used at the same rate in patients with cardiogenic shock as in other patients. This confirms once again that the greater the patient risk the less likely it is that the indicated treatment will be used. It is likely that better adherence to the guidelines would reduce the high mortality.

Although the study by Heras et al does not refer to this point, a high degree of variability can be seen in the PRIAMHO I and II registries in terms of the practice in the selected hospitals, both for drug therapies and the use of different techniques (echocardiography, Swan-Ganz catheter, coronary angiography, etc) in AMI. What is not clear from the available data is whether in the different hospitals, both for drug therapies and the use of different techniques (echocardiography, Swan-Ganz catheter, coronary angiography, etc) in AMI. A study based on the Euro-Heart Survey ACS1 revealed that adherence to the guidelines is particularly poor in relation to cardiogenic shock, which is treated much less aggressively than recommended in relation to angiography, revascularization, and use of intraaortic balloon pumps. These treatments are used at the same rate in patients with cardiogenic shock as in other patients. This confirms once again that the greater the patient risk the less likely it is that the indicated treatment will be used. It is likely that better adherence to the guidelines would reduce the high mortality.

Although the study by Heras et al does not refer to this point, a high degree of variability can be seen in the PRIAMHO I and II registries in terms of the practice in the selected hospitals, both for drug therapies and the use of different techniques (echocardiography, Swan-Ganz catheter, coronary angiography, etc) in AMI. What is not clear from the available data is whether in the different hospitals, both for drug therapies and the use of different techniques (echocardiography, Swan-Ganz catheter, coronary angiography, etc) in AMI. A study based on the Euro-Heart Survey ACS1 revealed that adherence to the guidelines is particularly poor in relation to cardiogenic shock, which is treated much less aggressively than recommended in relation to angiography, revascularization, and use of intraaortic balloon pumps. These treatments are used at the same rate in patients with cardiogenic shock as in other patients. This confirms once again that the greater the patient risk the less likely it is that the indicated treatment will be used. It is likely that better adherence to the guidelines would reduce the high mortality.

Although the study by Heras et al does not refer to this point, a high degree of variability can be seen in the PRIAMHO I and II registries in terms of the practice in the selected hospitals, both for drug therapies and the use of different techniques (echocardiography, Swan-Ganz catheter, coronary angiography, etc) in AMI. What is not clear from the available data is whether in the different hospitals, both for drug therapies and the use of different techniques (echocardiography, Swan-Ganz catheter, coronary angiography, etc) in AMI. A study based on the Euro-Heart Survey ACS1 revealed that adherence to the guidelines is particularly poor in relation to cardiogenic shock, which is treated much less aggressively than recommended in relation to angiography, revascularization, and use of intraaortic balloon pumps. These treatments are used at the same rate in patients with cardiogenic shock as in other patients. This confirms once again that the greater the patient risk the less likely it is that the indicated treatment will be used. It is likely that better adherence to the guidelines would reduce the high mortality.

Although the study by Heras et al does not refer to this point, a high degree of variability can be seen in the PRIAMHO I and II registries in terms of the practice in the selected hospitals, both for drug therapies and the use of different techniques (echocardiography, Swan-Ganz catheter, coronary angiography, etc) in AMI. What is not clear from the available data is whether in the different hospitals, both for drug therapies and the use of different techniques (echocardiography, Swan-Ganz catheter, coronary angiography, etc) in AMI. A study based on the Euro-Heart Survey ACS1 revealed that adherence to the guidelines is particularly poor in relation to cardiogenic shock, which is treated much less aggressively than recommended in relation to angiography, revascularization, and use of intraaortic balloon pumps. These treatments are used at the same rate in patients with cardiogenic shock as in other patients. This confirms once again that the greater the patient risk the less likely it is that the indicated treatment will be used. It is likely that better adherence to the guidelines would reduce the high mortality.

Although the study by Heras et al does not refer to this point, a high degree of variability can be seen in the PRIAMHO I and II registries in terms of the practice in the selected hospitals, both for drug therapies and the use of different techniques (echocardiography, Swan-Ganz catheter, coronary angiography, etc) in AMI. What is not clear from the available data is whether in the different hospitals, both for drug therapies and the use of different techniques (echocardiography, Swan-Ganz catheter, coronary angiography, etc) in AMI. A study based on the Euro-Heart Survey ACS1 revealed that adherence to the guidelines is particularly poor in relation to cardiogenic shock, which is treated much less aggressively than recommended in relation to angiography, revascularization, and use of intraaortic balloon pumps. These treatments are used at the same rate in patients with cardiogenic shock as in other patients. This confirms once again that the greater the patient risk the less likely it is that the indicated treatment will be used. It is likely that better adherence to the guidelines would reduce the high mortality.
REFERENCES


