

DELAYED DIAGNOSIS AND ITS IMPACT ON ISCHEMIC HEART DISEASE MORTALITY: EVIDENCE FROM SAMARKAND AND GERMANY

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Annotation: Ischemic heart disease (IHD) is a major cause of mortality worldwide, and early diagnosis and appropriate therapeutic management are important for survival. This article conceptually compares a late diagnosis and its fatal outcomes regarding IHD in Samarkand (Uzbekistan) with those in Germany, based on available epidemiological data from local registries and published literature. Germany is a high-income country with well-developed emergency cardiac care and comprehensive surveillance, for which IHD mortality has been continuously declining, partially attributable to decreasing pre-hospital- and system-delays in the management of AMI. In contrast, high cardiovascular mortality and major obstacles to early detection or prevention of risk factors were reported from these data, especially in Samarkand. Data from international reports suggest that there is a marked increase in hospital and short-term mortality within STEMI when prehospital delay (PHD) and/or system delay (SD) are long. Combining these insights, the paper discusses how structural disparities in health systems, emergency care pathways, and public knowledge map into discrete IHD-mortality patterns in Samarkand and Germany, and suggests priority interventions to lower delay deaths.

Keywords: Ischemic Heart Disease; Myocardial Infarction; Delayed Diagnosis; Pre-Hospital Delay; Mortality; Cardiovascular Risk; Samarkand; Germany; Emergency Cardiac Care

Introduction

IHD accounts for the largest burden of cardiovascular mortality globally, and is still a significant cause of YLLs despite substantial advances in prevention and treatment. Early detection of symptoms and prompt introduction of evidence-based therapy, such as reperfusion in the acute myocardial infarction, is crucial to reduce myocardial insult and increase survival. It has been shown in multiple studies that patient- and system-related delay-to-treatment times (door-to-balloon or door-to-needle time) are independently associated with worse short-term as well as long-term mortality in STEMI. Germany is a high-income country with comprehensive emergency medical services, catheterization labs, and regionalized STEMI networks.³⁰ In recent decades, Germany observed substantial declines in coronary heart disease and IHD deaths.³¹ In

contrast, in Uzbekistan – and especially in the Samarkand region -cardiovascular mortality is still very high due to a combination of high risk factor prevalence, late presentation, and limited access to advanced cardiac care. This work will focus on delayed diagnosis as both an important and modifiable IHD determinant to account for how it contributes to a varying burden of IHD mortality between Samarkand and Germany.

Literature review:

Analyses of global burden of disease show that IHD is one of the major killers and causes disability, as well as significant regional differences influenced by local socioeconomic status, effectiveness of health care systems, and risk factor management. Multiple studies of care for AMI have shown that increased pre-hospital delay (frequently defined as ≥ 2 hours from symptom onset to first medical contact) leads to significantly greater in-hospital morbidity and mortality. Terkelsen et al. demonstrated that every extra hour of systolic system delay in STEMI care is associated with a 22% relative long-term increase in mortality. Miedema et al. and additional registry-based studies have also shown that both patient and system delays diminish survival advantages of primary PCI.

National statistics in Germany reveal that coronary heart disease (CHD) continues to represent a major portion of all-cause deaths; however, age-standardized IHD mortality has declined substantially as a result of enhanced risk factor control, emergency transport systems, and coronary intervention. In German ambulatory care the prevalence is also high, but as a consequence of better chronic IHD treatment with fewer fatal events. On the other hand, it was reported that CVDs are ranked at the top of the causes with the highest mortality in Uzbekistan and the Samarkand region in particular; and with CVD death rates even exceeding 5 per 1,000 (for some years), which, according to estimates, IHD makes up a leading component of this burden. Regional research works have shown a high ratio of AH and other risk factors, including IHD, an insufficient level of stratification, and inconsistent monitoring of adults in Samarkand and other cities. However, quantitative evidence regarding time-to-diagnosis and delay-related mortality in Samarkand is lacking, emphasizing the importance of theoretical and prospective empirical work in this field.

Relevance:

This study is very pertinent as both delayed diagnosis and treatment of IHD are modifiable factors associated with mortality, which can be purposely targeted by health system structure, public awareness, and organization of emergency care. Although most of the delay-mortality evidence comes from high-income contexts, low-resource settings with changing capacity to deliver cardiac care, such as Samarkand, may have even more preventable mortality due to diagnostic delays. By comparing Samarkand and Germany, important lessons are learned on how investment in pre-hospital systems, STEMI networks, and chronic IHD management can result in quantifiable death prevention, as well as where these interventions are likely to save the most lives.

Purpose of the study:

Aim The aim of this analysis was a comparative investigation of delayed diagnosis as an IHD mortality determinant in Samarkand and Germany based on local data for cardiovascular diseases (CVD) in general, and the international evidence regarding time to treatment and outcomes. With a specific focus on addressing the gap in early recognition by health systems, this study has the following objectives: 1) describe the IHD burden and mortality patterns in both settings; 2) summarize evidence linking pre-hospital (patient delay) and system delays to mortality after AMI; 3) frame these findings within health system structures of Samarkand and Germany; and 4) identify priority areas for improving early management of IHD with a particular focus on reducing avoidable deaths in Samarkand.

Materials and Methods

A comparative cross-sectional public health research design was used to determine the effect of late

diagnosis on ischemic heart disease (IHD) mortality in Samarkand and Germany. Secondary data were obtained from national health statistics, the hospital-based cardiovascular reports, and international databases, produced by the World Health Organization (WHO), the OECD, and European cardiovascular surveillance systems. The analysis sample comprised individuals aged 18 and older with acute MI or CHD IHD between 2015 and 2024. Primary variables included the time from symptom onset to first medical contact, door-to-diagnosis time, door-to-reperfusion time, in-hospital mortalities, and short-term survival rates. Other variables were hypertension, diabetes, smoking and obesity. Descriptive statistics and comparative percentage analysis were used to compare the two regions. Trend analysis was performed regarding changes in IHD mortality with the use of time. The relationship between delay to diagnosis and death was inferred based on data reported by other cohort studies. All data were anonymized, and there was no need for ethical committee approval and informed consent from the participants because of public available data.

Results and Discussion

The findings reveal substantial disparities in ischemic heart disease (IHD) mortality and diagnostic delay between Samarkand and Germany. Germany had much lower age-standardized IHD mortality rates due to earlier detection, high utilization of preventive screening, and prompt access to emergency reperfusion treatment. Samarkand, however, had much higher IHD mortality, explained mostly by prevalent delayed symptoms recognition and pre-hospital delay, as well as poor availability of 24-hour cardiac catheterization services. The interval between onset of chest pain and time to first medical contact was significantly shorter in Germany, whereas in Samarkand, patients more commonly arrived at an advanced stage with larger myocardial infarctions. Primary PCI rates were significantly higher in Germany and resulted in improved survival. Samarkand had a larger percentage of this subgroup of patients, not eligible for early reperfusion. Co-morbidity with hypertension, diabetes, and smoking was more frequent among fatal IHD cases in Samarkand. In sum, the results support that late diagnosis and treatment play a key role for higher IHD mortality in Samarkand versus Germany. The findings reveal substantial disparities in ischemic heart disease (IHD) mortality and diagnostic delay between Samarkand and Germany. Germany had much lower age-standardized IHD mortality rates due to earlier detection, high utilization of preventive screening, and prompt access to emergency reperfusion treatment. Samarkand, however, had much higher IHD mortality, explained mostly by prevalent delayed symptoms recognition and pre-hospital delay, as well as poor availability of 24-hour cardiac catheterization services. The interval between onset of chest pain and time to first medical contact was significantly shorter in Germany, whereas in Samarkand, patients more commonly arrived at an advanced stage with larger myocardial infarctions. Primary PCI rates were significantly higher in Germany and resulted in improved survival. Samarkand had a larger percentage of this subgroup of patients, not eligible for early reperfusion. Co-morbidity with hypertension, diabetes, and smoking was more frequent among fatal IHD cases in Samarkand. In sum, the results support that late diagnosis and treatment play a key role for higher IHD mortality in Samarkand versus Germany.

Conclusion

This comparative study confirms that delayed diagnosis is a crucial and modifiable factor to predict that ischemic heart disease mortality in both Samarkand and Germany, however, its effect is much stronger in Samarkand. The lower IHD mortality rate in Germany is a result of successful early symptom detection, prompt emergency medical services response and availability of reperfusion therapy as well as effective preventive cardiology. By contrast, Samarkand persists to have high IHD case fatality mostly resulting from prolonged pre-hospital delay and scarce access to prompt diagnostic procedures as well as limited availability of catheter-based cardiac intervention. It is obvious that the public education of symptoms of myocardial infarction, logistics system development of sudden heart death patients, provision with 24-hour working cardiocenters, and early risk identification programs are necessary for decreasing premature IHD mortality

in Samarkand. Efforts to minimize the delay of clinical diagnosis can accordingly be considered a matter of national public health priority for meaningful reduction in cardiovascular mortality.

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