

## Chapter 4

### Quality of care for cardio and cerebrovascular diseases in Korea

*This chapter reviews the quality of care for cardio and cerebrovascular diseases in Korea. Quality of care indicators suggest an interesting paradox in patient outcomes in Korea, where outcomes for two conditions where countries are generally either relatively good or relatively bad – AMI and stroke – tend to diverge in Korea. In seeking to unpack this paradox, and the extent to which it is influenced by the health care system and health policies, it is argued that acute care is usually delivering high quality cardiovascular care, though variations in quality exist across the country. Consistent with recommendations for improvement across the health system, the focus of efforts to improve quality of care should be prior to and after hospital admission. In particular, preventing cardiovascular disease, supporting patients in managing their health in primary care and improving ambulance services are worthwhile reforms. Similarly, establishing formal rehabilitation processes for AMI and stroke would also be a high value for money investment in Korea.*

Cardiovascular diseases are the leading cause of death in almost all OECD countries, accounting for 35% of all deaths in OECD countries in 2009. While being one of the major killers, mortality rates associated with cardiovascular diseases have decreased dramatically in all OECD countries over the past three decades. This reflects advances in understanding and monitoring risk factors for cardiovascular disease and improved medical care in the acute phase of the disease. Improvements in survival rates have, however, led to an increase in the disability burden following stroke and heart attack.

Cardiovascular diseases have also become a considerable financial burden on health systems in general, with circulatory diseases accounting for between 12% to 28% of total hospital inpatient spending in selected OECD countries (OECD, 2009). Given their substantial burden on population health and health systems, national and international policy makers are increasingly focusing on reducing mortality rates caused by cardio and cerebrovascular diseases.

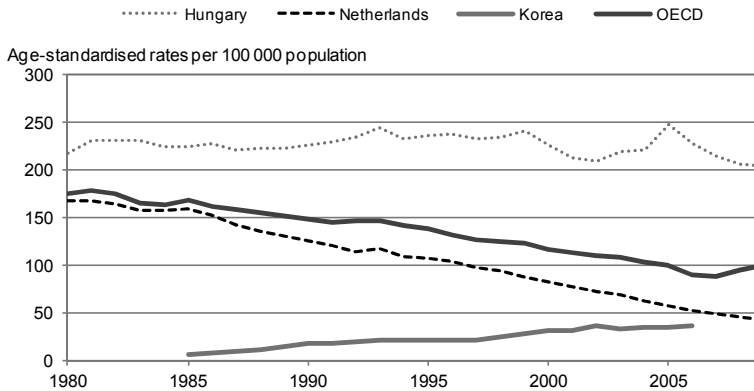
This chapter reviews the quality of care for cardio and cerebrovascular diseases (CVD) in Korea. For the purposes of this chapter, CVD will refer broadly to a wide range of diseases related to the circulatory system, mostly heart attack and stroke (OECD, 2009). It will consider the quality of care in CVD as measured by mortality rates, but also take into consideration other factors such as appropriateness of care, disability, quality of life and life expectancy.

#### 4.1. CVD outcomes in Korea

##### *Mortality and case-fatality for ischemic heart disease and stroke: the Korean paradox*

Korea has not experienced the same trend decline of mortality rates for ischemic heart disease as has occurred in other OECD countries. While the mortality rate – the number of deaths in a population over a period of time – for ischemic heart disease in Korea is one of the lowest amongst OECD countries, they have been rising. In 2007, mortality from ischemic heart disease peaked at 29.5 per 100 000 persons in 2007 compared to only 16.2 per 100 000 persons in 1998 (Statistics Korea, 2007). At the same time as low but rising rates of mortality for ischemic heart disease, mortality rate for stroke in Korea (73 per 100 000 male) ranks amongst the highest among OECD countries (OECD, 2011).<sup>1</sup>

**Figure 4.1. Trends in ischemic heart disease mortality rates, selected OECD countries, 1980-2005**

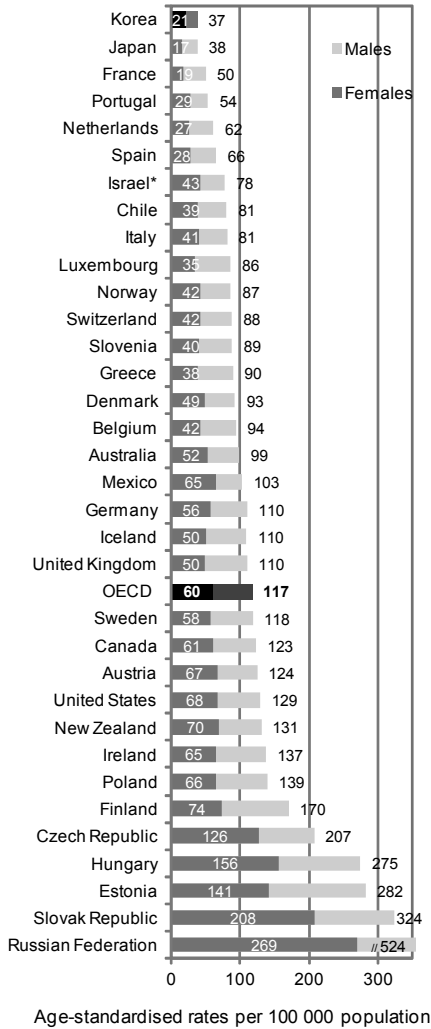


Source: OECD Health Data 2011.

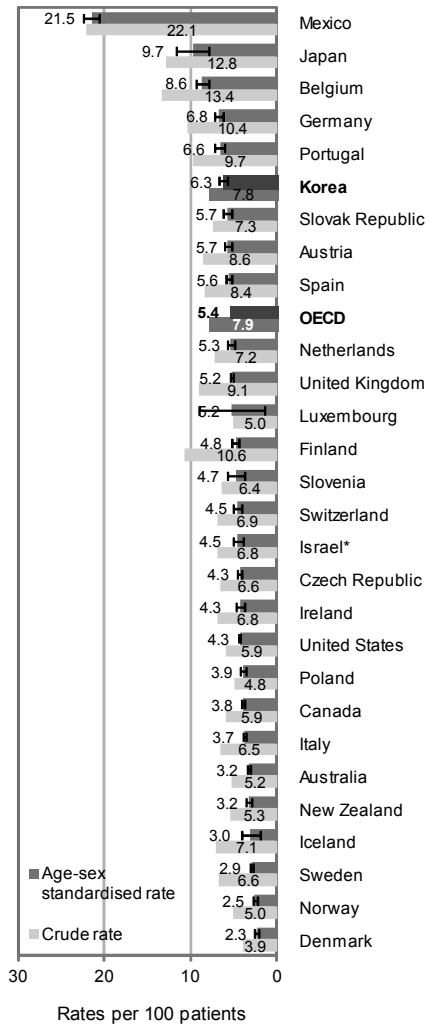
In reflecting deaths across a population at large over a period of time, mortality rates can signal a range of factors such as lifestyles, social and economic conditions and levels of health education. Influencing mortality outcomes for CVD is likely to require a range of policies, many of which are likely to be outside the influence of health service providers. In this regard, in assessing the quality of care, a useful indicator is case fatality rates following hospital admission for advanced vascular conditions. While the impact and incidence of a disease across the population are likely to affect the number and intensity of patients that present at hospitals, governments and health service providers have more scope to influence case fatality rates through good quality of care in hospitals. Evidence from international literature suggests that the effective use of thrombolysis, aspirin and beta-blockers following stroke and AMI can help improve the chances of a patients' survival. When placed alongside each other, an interesting paradox emerges between population wide mortality outcomes and fatality from CVD in Korean hospitals.

While Koreans are less likely to die of ischemic heart disease compared to people in other OECD countries, they are more likely to die once admitted into hospital for acute myocardial infarction (AMI) than patients in other OECD countries. The mortality rate from ischemic heart disease in Korea is the lowest amongst all OECD countries for which data was available, with 37 deaths per 100 000 males in 2009. In the same year, the average across OECD countries was 117 deaths per 100 000 males (Figure 4.2).

**Figure 4.2. Ischemic heart disease, mortality rates in selected OECD countries, 2009 (or nearest year)**



**Figure 4.3. Admission-based in-hospital case-fatality rates (same hospital) within 30 days after admission for AMI in selected OECD countries, 2009 (or nearest year)**



H represents the 95% confidence intervals, which show the range or boundary of precision for a particular figure.

\* Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

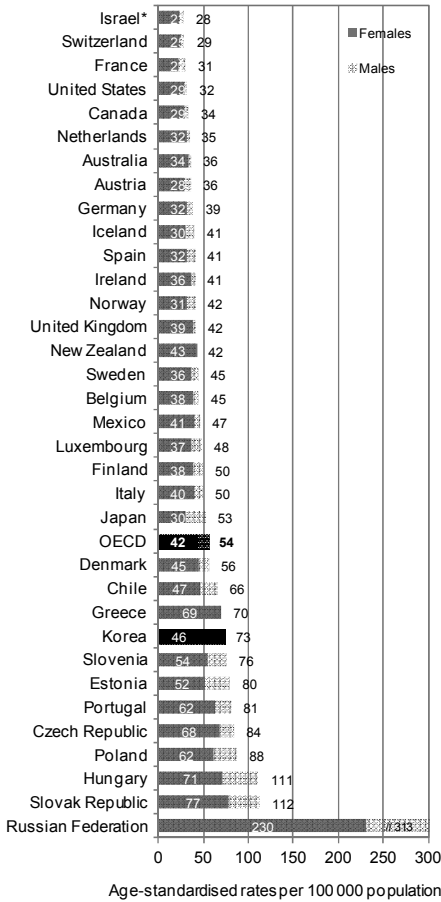
Source: OECD Health Data 2011.

At the same time, Korea has high in-hospital case fatality rates when compared to other OECD countries. Korea's in-hospital case fatality from AMI is 6.3 per 100 admissions in 2009, compared to an OECD average of 5.4 per 100 admissions in the same year (Figure 4.3). The concurrence of the figures on overall mortality and in-hospital 30-day mortality could suggest that those persons presenting at hospital with AMI may represent advanced or particularly complex cases amongst a smaller group of people across the population that are dying from ischemic heart disease.

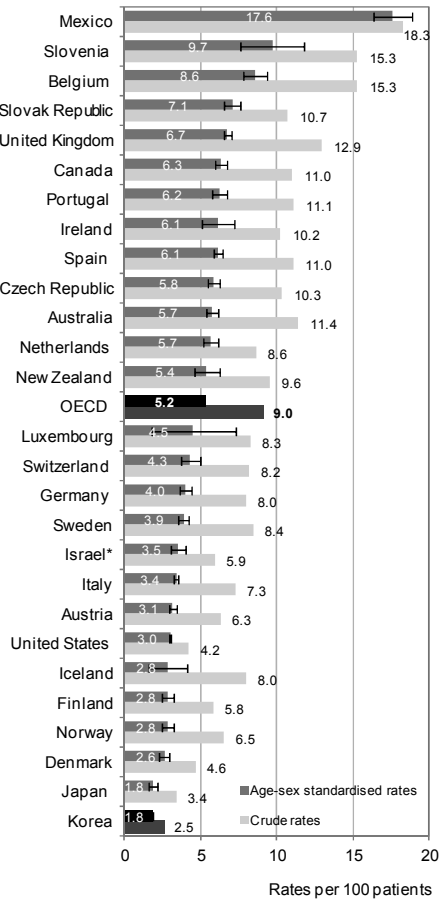
The situation for stroke is the opposite of that for ischemic heart disease and AMI. While in-hospital 30-day case mortality from stroke has decreased dramatically in recent years, Korea's overall mortality rates for stroke remain one of the highest in the OECD. In 2009, 73 per 100 000 males died from stroke compared to an average across OECD countries of 54 makes per 100 000 (Figure 4.4). Yet while population wide mortality from stroke is high, case fatality rates from stroke once in hospital are low in when compared to other OECD countries. Improvements in hospital infrastructure and organisation across OECD countries (in particular, the creation of separate stroke units in tertiary hospitals) are widely credited for having improved the treatment and recovery of stroke patients and driven considerable improvements in quality of care delivered in hospitals. Data collected as part of the Health Care Quality Indicators (HCQI) project at the OECD indicate that in 2009, 30-days case fatality rates for both ischemic and hemorrhagic stroke in Korea were respectively 1.8 and 9.8 per cent of admitted patients, which is now amongst the lowest in OECD countries (OECD, 2011). These figures suggest that quality of care delivered in hospitals in Korea following a stroke episode is amongst the best in the world.

Korea's seemingly inverse outcomes – both when comparing mortality and case fatality rates and when comparing stroke to ischemic heart disease and AMI – are unusual. In most OECD countries, levels of in-hospital fatality rates across the two acute manifestations of underlying vascular conditions – AMI and stroke – are similarly either relatively good, or relatively bad (for example, Denmark, Norway and the United States report amongst the lowest rates of OECD countries for both conditions). Population-based mortality *trends* for both conditions also tend to be similar. Indeed, countries with high population-based mortality rates will also often have high case-fatality rates.

**Figure 4.4. Stroke, mortality rates in selected OECD countries, 2009 (or nearest year)**



**Figure 4.5. In-hospital rates within 30 days after admission for ischemic stroke in selected OECD countries, 2009 (or nearest year)**



H represents the 95% confidence intervals, which show the range or boundary of precision for a particular figure.

\* Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

Source: OECD Health Data 2011; IS-GBE (2011).

Considerable care is required when analysing this data, especially in inferring that high-case fatality rates are a principle *cause* of high population-based mortality rates. Population-based mortality is an indication of overall population health, dependent on social and economic health determinants, preventive care and access to secondary care. While case-fatality rates of patients admitted with an AMI or stroke are intended to indicate the quality of hospital care, hospitals admitting a higher proportion of complex and more advanced disease cases will – possibly – have worse outcomes. Furthermore, the preceding step of ambulance care will determine which patients will be admitted alive to receive the necessary services. In the absence of a proper international method for adjusting for differences in case mix, it is difficult to precisely unpack this paradox in Korea's indicators of quality of care for CVD.

Nonetheless, a reasonable inference for ischemic heart disease and AMI is that while hospital care for CVD has improved in recent years, policies to reduce the incidence of CVD outside the hospital sector are an area of weakness in Korea. A lack of supervision and monitoring in primary care settings of adults with high levels of risk factors might result in admission of patients with exacerbated underlying CVD conditions and in turn, high case fatality rates. Ineffective and insufficient primary and preventive care, especially for older adults, can result in deterioration of general health status and exacerbate the potential threats of CVD risk factors. This is particularly relevant in the case of disadvantaged populations, which might have limited access to health care. To further compound matters, it has been shown that these populations are more at risk of obesity, uncontrolled diabetes and high cholesterol (Sobar and Stunkard, 1989; Everson *et al.*, 2002; McLaren, 2007).

In the case of stroke, low in hospital case-fatality rates indicate that most deaths from stroke might occur outside of the hospital sector: *i.e.* at the place of onset of stroke, during the ambulance transportation, or at the emergency care units. The combination of high mortality and low case fatality could also suggest that while improvements of medical care in the acute phase has led to good quality of care in hospitals, timely transfer to hospitals might be inadequate and deficient, especially in the case of rural populations. The concurrence of high mortality and low case fatality should also suggest that policy makers should look beyond hospital settings to how hospitals work with other health facilities and levels of public awareness surrounding stroke in the community.

### ***Health risk factors and the likely increase in the burden of cerebrovascular diseases (CVD)***

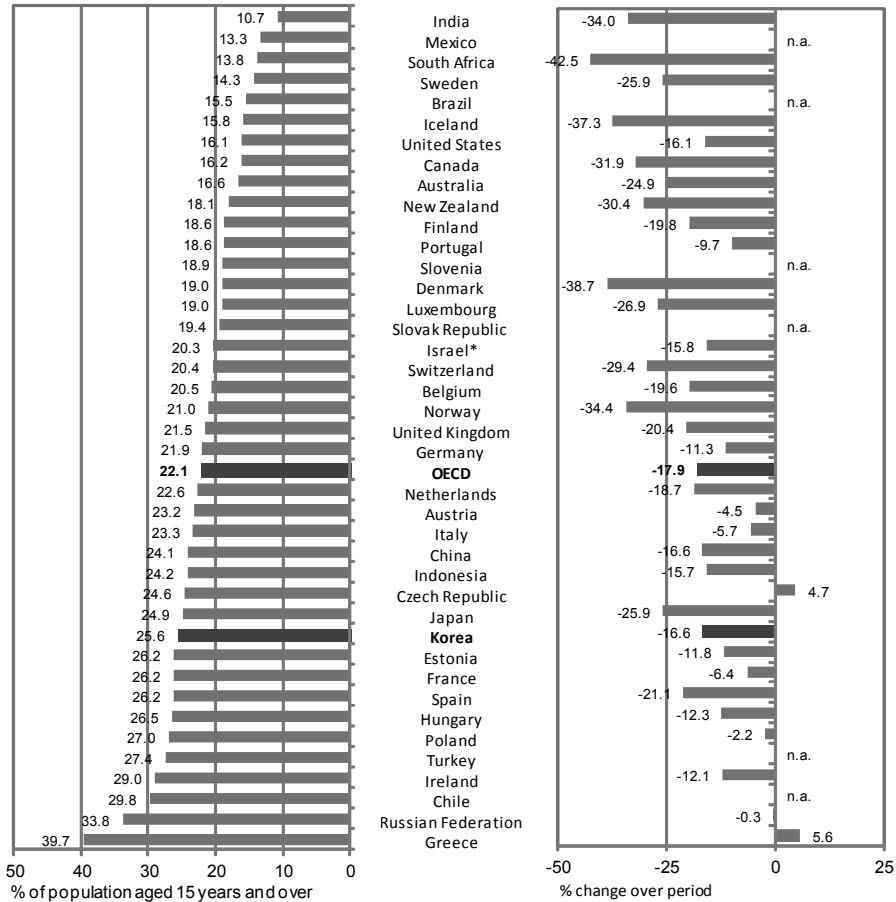
Governments across OECD countries are increasingly recognising the impact of nutritional patterns, physical exercise and smoking patterns on the burden of CVD. As a consequence, prevention strategies across OECD countries have increasingly focused on lifestyle and behavioural changes to improve the monitoring and control of risk factors associated with CVD. The major risk factors for stroke are older age, hypertension and smoking tobacco. In addition, risk factors for heart attack also include high cholesterol levels and diabetes (which is usually associated with obesity). A previous episode of AMI is also one of the main risk factors for future heart attacks. As in many other OECD countries, Koreans have experienced dramatic changes in lifestyle habits with regard to physical exercise and dietary changes.

#### ***Smoking***

Smoking rates in Korea are well above the OECD average, with 25.6% of the adult population smoking regularly (see Figure 4.6). Behind this sits a considerable disparity in smoking rates between Korean men and women, with 44% of Korean men smoking compared to 7% of Korean women. However, it is interesting to note that smoking rates have decreased by 16.6% from 1999 to 2009 (OECD, 2009), indicating that policies to prevent smoking instituted in recent decades could have a considerable impact in having reduced the risk of CVD in Korea.



**Figure 4.6. Percentage of adult population smoking daily, 2009 and change in smoking rates across OECD countries, 1999-2009 (or nearest year)**



\* Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

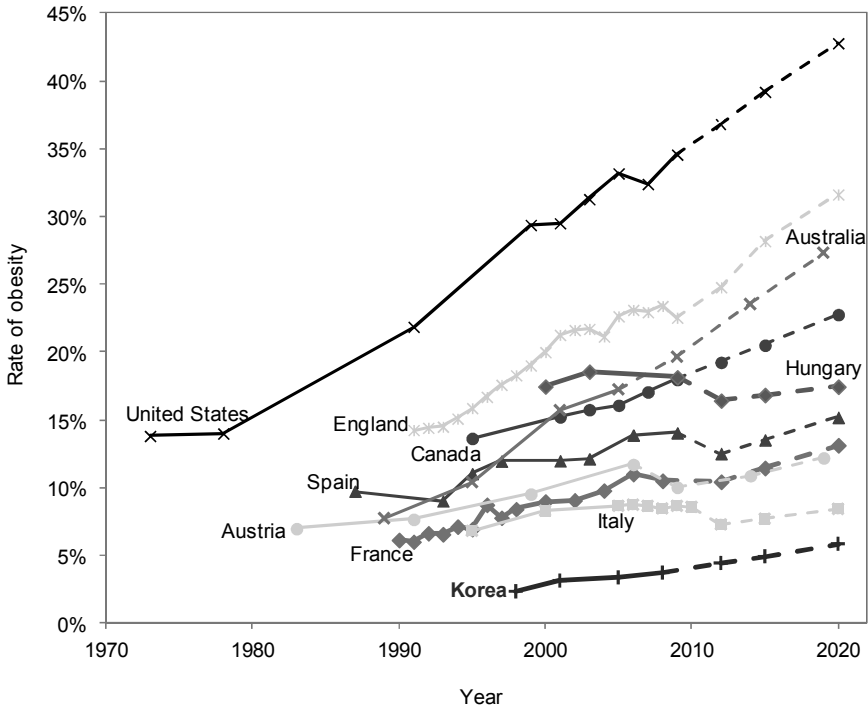
Source: OECD Health Data 2011; national sources for non-OECD countries.

## Obesity

Although obesity has become a major public health concern in most OECD countries, it receives less attention in Korea. Overweight and obese adults are more likely to experience health conditions such as hypertension, high cholesterol and diabetes, which are risk factors for CVD. Korea has one of the lowest obesity rates amongst OECD countries,

with only 3.8% of the adult population considered to be overweight or obese, a fifth of the average across OECD countries. However, recent projections suggest that obesity is set to steadily increase in Korea, reaching an estimated 6.5% of the population in 2019 (OECD, 2009). Nonetheless, this rise in obesity is not nearly as alarming as in other OECD countries (for instance, in the United States, where the obesity rate among adults is expected to reach 45% by 2020). It is also worth noting that overweight rates have been rising more quickly amongst children. This is likely to reflect changes in both nutritional habits (more food containing trans-fats is being consumed) and more sedentary lifestyles. Being overweight<sup>2</sup> at a younger age could potentially increase the likelihood of a CVD in the future.

**Figure 4.7. Rising obesity across OECD countries**

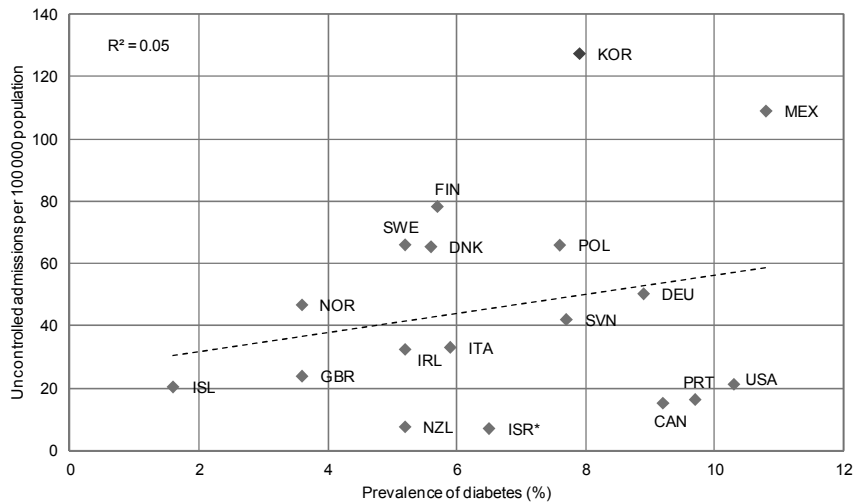


Source: OECD (2010), *Obesity and the Economics of Prevention: Fit not Fat*, OECD Publishing, Paris.

## Diabetes

The increase in the prevalence of diabetes (which is a main risk factor for CVD) in Korea over the past few years is of considerable concern. Estimates on the prevalence of diabetes in Korea suggest some of the highest levels amongst OECD countries, with 7.9 cases per 100 000 people compared to an average amongst OECD countries of 6.5 per 100 000 people (Figure 4.8). Data on unplanned hospital admission rates for uncontrolled diabetes also suggest that detection, treatment and follow-up of patients with diabetes might be an area of weakness in Korea. In 2009, hospital admissions for uncontrolled diabetes in Korea were the third highest in OECD countries, behind Hungary and Austria (OECD, 2011).

**Figure 4.8. Uncontrolled diabetes hospital admission rates and prevalence of diabetes across OECD countries, 2009**



*Note:* Prevalence estimates of diabetes refer to adults aged 20-79 years and data are age-standardised to the World Standard Population. Hospital admission rates refer to the population aged 15 and over and are age-standardised to 2005 OECD population.

\* Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

*Source:* International Diabetes Foundation (2009) for prevalence estimates; *OECD Health Data 2011* for hospital admission rates.

### *Older age*

Korea's ageing population is the most concerning risk factor for CVD. Ageing leads the heart to undergo physiological changes (even with the absence of illness) and can increase the risk of CVD. In the case of existing conditions (such as coronary heart disease), these changes can have important impacts on the well-functioning of the heart and increasingly lead to heart attacks. Today, 10.7% of the Korean population is aged over 65 years (compared to an OECD average of 15%) but this is set to increase to 37% of the population by 2050, due to longer life expectancies and dramatic falls in fertility rates in Korea (OECD, 2007).

## **4.2. Policies to improve the quality of care for CVD in Korea**

The combination of rising risk factors for CVD in Korea suggests that good prevention and primary care will be important – both to improve outcomes today and to help the Korean health system address future challenges. This will require proactive policies that can identify patients at risk, monitor their conditions and provide the appropriate follow up services. The starting point for developing such systems is data on health outcomes and the quality of care. The data collected in Korea today is largely focused on the acute care sector, and suggests that the quality of care delivered in Korean hospitals is amongst the best in the OECD.

The following section examines the key policies underpinning CVD care in Korea today, and provides recommendations to improve the quality of care. At a broad level, improving CVD care outside of hospitals ought to be the policy priority to help improve cardiovascular care outcomes for Koreans. Current prevention policies in Korea mainly revolve around two screening programmes organised by the National Health Insurance Corporation and the Ministry of Health and Welfare. While this forms a solid basis for identifying patients, there is a need to build on these programmes by establishing formal mechanisms to help coordinate care and deliver case management to those patients at risk in the long run. Supplementing this, efforts ought to be made to minimise intervention time and the lag between the onset of stroke or AMI and the arrival of a patient to hospitals. Establishing formal rehabilitation processes for cardiovascular conditions would also be a high value for money investment in Korea.

### *Measuring quality of care for CVD*

Measurement of the quality of care for CVD disease in Korea is on par with best practice amongst OECD countries for the acute care sector, but lacks capacity beyond hospitals. In large part, this situation reflects the importance given to monitoring health services funded under health insurance relative to monitoring health outcomes and performance across the system at large (as detailed in Chapter 1).

HIRA currently sits at the centre of measuring the quality of CVD care delivered in Korea as a result of its claims databases and recent efforts to develop measures on the performance of health services. HIRA undertakes yearly measurement across three main assessment areas: inpatient, outpatient and long term care. A broad suit of structure, process and outcome indicators are collected on AMI, stroke and coronary artery bypass graft (CABG) from all tertiary and general hospitals (see Table 1.5 in Chapter 1). The indicators measured include: appropriate and timely diagnostic testing, numbers of patients who received thrombolytic treatment within 60 minutes of arrival to the hospital, use of aspirin for patients with symptoms of AMI within 24 hours upon arrival to the hospital, and the number of patients who died within one year of discharge from hospitals.

In addition to HIRA's efforts, the Korean Centre for Disease Control (KCDC) is also involved in data collection and measurement of quality of care as part of the Comprehensive Plan for CVD launched by the government in 2006. Data collection (mainly outcome indicators) on care in the acute phase, disability and reduction in complications (and recurrence of episodes of AMI or stroke) is performed using population-level data. Data on the impact of primary and secondary prevention is also collected (treatment of patients with important risks factors and reduction in overall prevalence of hypertension, obesity, smoking, physical activity). However, these efforts at expanding data collection beyond acute care are currently in their infancy.

These two main data collection processes – through HIRA and the KCDC – only partially reflect the entire care process of patients with CVD, as they mainly focus on hospital care (leaving quality of primary care or care in smaller hospitals undocumented). This is likely to reflect a lack of governance in the primary care sector, which is dominated by the solo practitioners and small hospitals where co-ordinating the implementation of data collection is a more difficult task. As part of overall efforts to strengthen primary care, Korea would benefit from a greater focus on collecting systematic information on the quality of care and health outcomes across the country. Today, these efforts are limited to hypertension control, diabetes and quality measures of prescriptions. In particular, the ability to

distinguish differences in performance across regions in Korea could provide a valuable tool to help policy makers target their efforts.

At a macro-level, the data collected by HIRA and the KCDC reinforce a picture of high quality care for CVD in large hospitals and shortfalls in community and primary care services. High achievement rates for process indicators from HIRA are consistent with the data collection carried out by the KCDC. For instance, the number of deaths per year from stroke was reduced by 20% between 2001 and 2008 (HIRA, 2010a). A particular area of shortfall is the monitoring of patients at risk in the management of their condition. The few indicators available suggest poor processes indicators for diabetes: only 42.9% of patients with diabetes go through a renal exam and 35.9% receive an ocular fundus exam – an indication of poor management of a condition that is relevant to CVD.

### ***Health promotion, prevention and primary care***

Public awareness about the importance of a healthy lifestyle plays an important role in the prevention of CVD. Many countries have facilities and programmes in place for health promotion that seek to modify risk factors and help patients living with CVD. The institutional locus of efforts on health promotion and prevention in Korea is the Ministry of Health, which together with the KCDC undertakes public campaigns targeting obesity, smoking and physical exercise. At a community level, public awareness campaigns are supported by services delivered in a network of local public health centres across Korea. Around 16 037 private institutions (mainly clinics) and 145 public health centres offer screening services related to cancers and CVD. The work of public health centres is monitored through a joint assessment by central government and local government. Together, these national and local institutions seek to deliver health promotion and prevention programmes in Korea.

In analysing prevention programmes for CVD, a useful distinction to make is to assess their effectiveness across different types of interventions. Prevention programmes for CVD typically include the following interventions:

- Raising public awareness and detect risk factors for CVD (primary prevention).
- Monitoring and control of patients at high risk to CVD – for example with hypertension (secondary prevention).
- Treating and monitoring patients with previous episodes of AMI or stroke (tertiary prevention).

Primary and secondary prevention in Korea is largely performed through the routine adult health screening programme and the life-turning point health assessment programme, both of which are conducted by the NHIC and planned by the Ministry of Health and Welfare. The health adult screening programme is directed at the working population (and dependants) and includes preventive interventions such as tests for hypertension, diabetes, hyperlipidemia and abdominal obesity. The screening process takes place once every two years. Those identified at risk are offered a consultation on screening results and tailored health education to further raise awareness on risks factors in relation to CVD and ageing in general. A life-turning point health assessment is offered twice to all health subscribers at ages 44 and 66. It includes more in-depth mental and physical health examinations and tests on hypertension, diabetes, hyperlipidemia or depression and well-being. Again, adults identified at risk for chronic conditions can have a second screening and tailored consultation with a physician. In 2010, 35% of those screened received a second screening. The screening rates for the health adult screening programme and the life-turning point health assessment programme in 2010 were respectively 68.15% and 65.17% (HIRA, 2011). In their scope and design, these two programmes are comprehensive and form the critical foundations for diagnosing risk factors for CVD, especially amongst the working population.

Following the screening process, those identified as being at risk are offered follow-up care ranging from case management with home visits and telephone counselling to health promotion and books and brochures. In 2010, efforts were made to more broadly offer follow-up care, resulting in 22.6% of those screened who received at least some form of follow-up care (compared to only 8.2% in the previous year) (HIRA, 2011). The different types of follow up care available following screening is detailed in Table 4.1 below.

In addition to screening and follow-up care, an important recent development is the creation of *registers* in several cities by the KCDC (Daegu City, Gwang Myeong-si, Namyangju-si and Ansan-si) to facilitate management of adults identified with hypertension and diabetes. This project links the private hospital sector with clinics by setting up a patient-centered management system to share information about treatment dates, treatment compliance, individualised health care and reduced treatment costs for senior citizens. A survey shows that the register system as part of a broader “disease management process” (see Box 2.1 in Chapter 2), in Gwang Meong-si has been considered as a success by patients, doctors and also pharmacists: 98.2% of patients, 90.6% of participating doctors and 90.4% of participating pharmacies have expressed satisfaction with regards

to the registration and management programme. While currently a small project with limited impact across Korea at large, this is a desirable step towards increasing follow-up of patients identified at risk following the screening process.

**Table 4.1. Post-screening activities offered in Korea’s public health centres**

	Subject	Activities
Post-screening follow-up care (focused care group: case management)	Those who are diagnosed with hypertension or diabetes mellitus after second screening but left untreated or under-treated (less than 300 days of medication)	Home visit and telephone counselling, Personalised assessment and problem listing, Intervention plan based on the problem list, Intervention and assessment, Counselling on medical care
Post-screening follow-up care (risk group)	Those who are diagnosed with IFG (impaired fasting glucose) or pre-hypertension after second screening. Those who are suspected of hypertension or diabetes after first screening or those who are suspected of general disease but have hyperlipidemia	Telephone counselling (maximum four sessions), health literature/books (disease-specific information, health information, lifestyle guidelines)
Post-screening follow-up care (general group)	Those who are obese (with BMI higher than 27 after first and second screenings).	Books or brochures via mail
Health Promotion Center	Those who are diagnosed with IFG (impaired fasting glucose) or pre-hypertension after second screening. Those who are suspected of hypertension or diabetes after first screening or those who are suspected of general disease but have hyperlipidemia.	Consultation with doctors, Personalised preventive programmes including exercise and nutrition

*Source:* HIRA (2011), “Response to the OECD Questionnaire on Quality of Care in Korea”, Section 4: Health care quality and cardio/ cerebrovascular diseases, Health Insurance Review and Assessment Service, Seoul (unpublished).

While screening programmes are comprehensive in their service offering, and well dispersed throughout the country, it is unclear whether they are serving as a constructive gateway to follow up services for secondary prevention. Despite recent efforts to implement registers in some cities, there is little evidence on how follow-up care after screening is delivered in practice. For instance, individuals can decide to enrol in a complete stop-smoking programme or individualised targeted exercise programmes following the identification of their condition, but these highly cost effective services are not covered by National Health Insurance. Take-up of such activities is at the expense of patients, though some local governments are operating sporadic health promotion programmes.

Public health facilities where screening is undertaken often do not have the institutional capacity and the resources to deliver monitoring and patient



counselling for patients at risk in the long run, and there are few systematic methods by which these screening services act as a gateway that cultivates a relationship between a patient at risk and an identified primary care professional that can be responsible for their care. This is reflected in high unplanned admission rates for uncontrolled diabetes compared to other OECD countries (as detailed earlier). Korean policy makers should seek to embed basic primary preventative measures in its community health services. This could firstly be undertaken by the further inclusion of cost effective post-screening activities in the benefit basket of National Health Insurance. The considerable screening infrastructure already in place provides a useful mechanism by which to identify those patients most at risk, and maximise value for money for further government investments in this area. Particular attention ought to be given to services that are cognisant of emerging risks amongst young people in Korea.

In addition to screening programmes, a wide health promotion programme has been established under the Health Promotion Act. Financing of the programme comes directly from earmarked taxes imposed on tobacco, that are collected in the Health Promotion Fund (around KRW 1 976.2 billion). The programme mainly focuses on funding anti-smoking education, lifestyle modification programmes, diet management, oral health management, and disease prevention in public health centres.

In seeking to further improve health promotion and prevention for CVD, policy makers should focus on the developing a more supportive primary care system, in particular to bolster the capacity for secondary and tertiary prevention. Primary care is generally the cornerstone for monitoring risk factors for CVD in other OECD countries. Secondary preventive services are typically associated with risk factor modification in people with established diseases (hyperlipidemia, hypertension, angina etc). These people may not have had a catastrophic event (AMI, transient ischemic attack, stroke etc.) but they are at higher risk. Therefore for this group, risk modification and secondary preventive measures are almost always appropriate. For people in a third category – those that have had a catastrophic event such as AMI, stroke, CABG or even Percutaneous Coronary Intervention (PCI) – rehabilitation and delivering risk modification and ongoing medical care (beta blockers, ACE inhibitors, statins, calcium channel blockers etc) is desirable.

Given the considerable challenges involved in delivering such services with Korea's relatively under-developed primary care sector, policy makers should focus on high risk patients, where the greatest value for money is likely to lie. While registration projects like those that have already been undertaken at a small scale in selected Korean communities are likely to be advisable in the long term, a quick win could be delivered by using

information already available to offer proactive follow up services to those people that have already been admitted for a potentially preventable admissions, CABG, PCI, stroke, AMI and uncontrolled angina. This group of people could serve as an effective cohort for commencing broader registration of patients at risk. Over the longer term, this registration system could be expanded to include those who have an established disease but poor risk factor modification and those identified by community-based screening programmes for having a risk profile for CVD (fat, smoke, hyperlipid, hypertensive, etc.). Policy makers ought to be sensitive to ensuring that broader development of registries using hospital-based data does not come at the expense of primary care-based risk registers.

### ***Ambulance services***

With time to reaching appropriate medical support often making a critical difference in the outcomes of an acute CVD condition, ambulance services can play an important role in the quality of cardiovascular care. While Korea has effective technological and logistical systems in place, there are concerns over exceptionally long transfer times to hospitals.

As with most other countries, a patient's path through emergency services is in theory clearly defined from patient's call to the emergency call centre. In Korea, the emergency call centre works closely with a communication satellite centre to identify the location of the patient and of the nearest emergency vehicles, which are then sent to the patient. Emergency vehicles are all linked to a national information system to share the most-up-to-date information on the patient's health status, such as electrocardiogram readings or vital signs. They also receive information on the closest emergency hospital for rapid transfer of the patient. The Emergency Medical Information Centre also makes sure that hospitals receive full information before taking over. Korea's use of satellite technology to precisely locate patients and co-ordinate the different levels of services is a remarkable technological innovation in this patient pathway. Korean ambulance services operate in close relation with hospitals, in order to reduce transfer times and maximise survival chances. Several general pre-hospital practices (proper diagnosis, hospital pre-notification) have been shown to have a positive impact on the quality of acute stroke care upon arrival at the hospital (Mosley *et al.*, 2007).

There have been some concerns about the operation of ambulances in Korea in recent years. According to the Emergency Medical Service Act, Korean ambulance services are not subject to a separate accreditation system, and can be operated by either local government, hospitals, persons who have obtained a business license for transferring emergency patients, and other not-for-profit organisations (that have been agreed by the Minister

of Health and Welfare). An external review of the quality of ambulance services was commissioned by the Ministry of Health and Welfare in 2008. The first results of the external review showed that the interval times between the onset of AMI and stroke and the transport to the appropriate hospital were respectively 228 and 358 minutes (HIRA, 2011). These high average interval times are likely to reflect a number of factors specific to people and their circumstances when they seek medical support, but also the poor allocation of emergency vehicles and centres, especially in rural and remote areas.

These surprisingly long transfer times are especially concerning as in Korea, the ambulance services' function is almost exclusively to transport patients to the hospitals. This function is clearly stated under the Emergency Medical Services Act, which underlines that the purpose of ambulance use is to transport emergency patients, blood and objects for medical diagnosis and equipment and transfer of the dead to medical institutions. Aside from first-aid assistance, ambulances are not allowed to further provide medical care to patients. For instance, thrombolysis can only be performed in hospitals. This is despite international literature that demonstrates that the administration of thrombolysis by paramedics in ambulance care reduces delays of care at the hospital and in turn can reduce mortality rates for patients with symptoms of ST-elevation myocardial infarction (Bjorklund *et al.*, 2006; Van de Werf *et al.*, 2003). Long transfer times in Korea, compounded by the lack of medical care beyond first-aid assistance can lead to lower survival chances before reaching hospital doors.

The most critical time for survival chances of patients with AMI and stroke is the very early phase. In Korea, it has been shown that interval times between onset of stroke or AMI and transfer to hospitals can be particularly long. These long transfer times are likely to reflect two shortcomings. Firstly, patients might not be aware of the symptoms of stroke and AMI and only seek help in late and advanced stages of the acute episode; reflecting an overall problem of public awareness and poor follow-up and education of patients, especially those identified at risk. Secondly, these figures are also likely to reflect the fact that ambulance care is inefficient in providing timely transportation services, resulting in patients dying during transportation or upon their arrival at emergency care units prior to hospitals. These factors could provide part of the explanation for high in hospital case fatality rates in the case of AMI (with patients arriving at the hospital with exacerbated conditions) and also low in-hospital case fatality rates for stroke (patients dying prior to their arrival to the hospital).

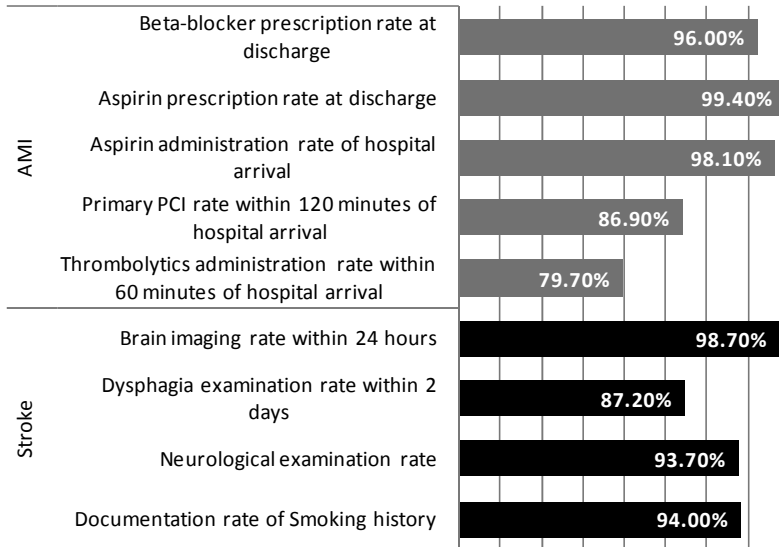
Based on these elements, additional efforts should aim to increase prevention and public awareness on the symptoms of stroke and AMI and enhance the quality and speed of ambulance services. Quality assurance

mechanisms for ambulance services should focus on more equitable allocation of ambulance and emergency centres (particularly to deliver better coverage for rural areas), bolstering training and medical awareness of ambulance workers, exploring possibilities for provision of more advanced medical care (*i.e.* thrombolytics) during ambulance transportation, potential accreditation of ambulance services and better supervision of ambulance services, especially during the transportation of a patient following an episode of AMI or stroke.

### ***Hospital services***

Korea's strategy for improving the quality of CVD care is currently strongly oriented around care delivered in hospitals. Data collected by HIRA (as shown in Figure 4.9) on process indicators suggest that patients do receive appropriate CVD care following their admission at the hospital (*e.g.*, aspirin administration upon arrival, neurological examination, brain imaging within 24 hours, etc). Surprisingly, the thrombolytics administration rate within 60 minutes of hospital arrival seems be lower than in other countries, with almost one in five patients not receiving thrombolytics drugs quickly upon arrival. Other quality indicators show that upon arrival and discharge from the hospital, appropriate drugs and interventions are performed. For instance, respectively 96% and 99.4% of patients suffering from AMI are also prescribed beta-blockers and aspirins at the time of discharge (HIRA, 2011).

In addition to process indicators of care, quality assurance mechanisms for the use of advanced surgical procedures are in place in Korea. Procedures such as CABG, heart transplantation or implementation of implantable cardioverter defibrillator (ICD) are subject to licensing of specialists and accreditation of facilities authorised to perform advanced surgical procedures. The safety of ICD device quality is also assessed by the Korean Drug and Food Administration quality assurance process. However, volumes of elective PCIs, CABGs and ICD implementation are increasing and less is known on the exact outcomes. With the increase in procedures it seems advisable to critically monitor the outcomes per hospital and discuss results with the professional associations to assure the appropriateness and quality of care.

**Figure 4.9. Results of performance indicators in CVD collected by HIRA**

AMI: Acute myocardial infarction; CVD: Cerebrovascular diseases.

Source: HIRA (2010), “Comprehensive Quality Report of National health Insurance: 2009”, Health Insurance Review and Assessment Service, Seoul.

The utilisation of stroke units is an area of concern in the quality of CVD care in Korea. Separate stroke units within hospitals are known to generate better survival chances and long-term quality of life compared to general wards (Indredavik *et al.*, 1998; Svendsen *et al.*, 2011). Patients in stroke units are usually administered early computed topographic scan or magnetic resonance imaging and early antiplatelet therapy; which could lead to higher quality of care and in turn, higher quality of life (Svendsen *et al.*, 2011). Similar evidence was found for the pooling of medical and nursing expertise in the case of AMI (coronary care units). Upon arrival to the hospital, a patient with AMI or stroke is transferred to emergency services or to a separate stroke or AMI unit. Many hospitals in OECD countries are equipped with coronary care units and/or stroke units although different arrangements exist on how the first steps of patient admission to the hospital are organised.

In Korea, only a handful of general hospitals are equipped with separate stroke units (Table 4.2). Around 54% of Korea’s tertiary hospitals are equipped with stroke units, but 9.6% of (smaller) general hospitals are

reported to have stroke units. Between 2005 and 2010, the number of stroke units increased from 2 to 39 across the country (HIRA, 2011). Stroke units are a major innovation in improving the quality of cardiovascular care over past decades and do not have high technological requirements that should unnecessarily burden hospitals. The relatively low level of take up of stroke units in Korea's hospitals – which often have relatively high levels of take up of sophisticated technologies used in CVD care – is a clear area for policy improvement in CVD care in Korea.

**Table 4.2. Operation of stroke units within tertiary and general hospitals in Korea**

	2005			2009			2010		
	Total	Tertiary hospitals	General hospital	Total	Tertiary hospitals	General hospital	Total	Tertiary hospitals	General hospital
Total	187	42	145	194	43	151	201	44	157

Source: HIRA (2010), "Reports on Quality Assessment for Acute Stroke", Health Insurance Review and Assessment Service, Seoul.

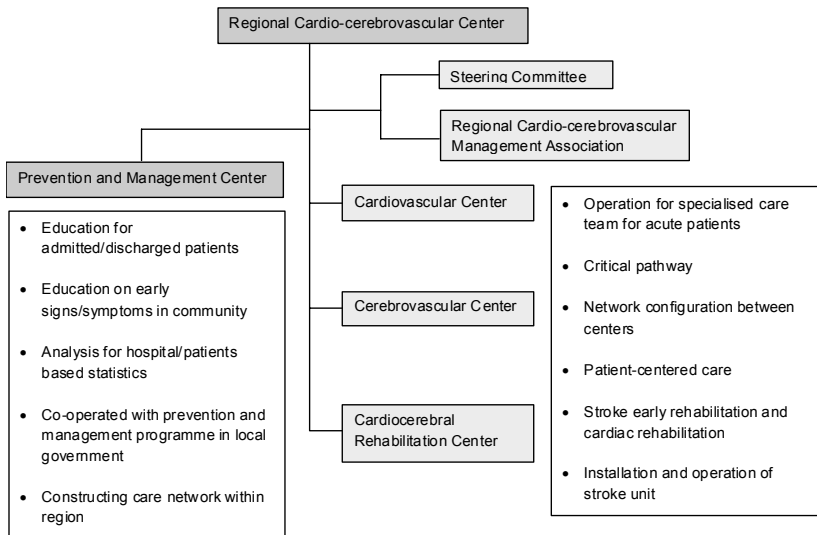
Efforts should also be undertaken to measure quality assurance surrounding the use of stroke units. Clinical guidelines for diagnosis and treatment of CVD have been developed by Clinical Research Centres since 2006. The indicators reported above on stroke care and AMI care show that key elements are already recorded. However, less is known about the actual level of expertise of the physicians and nurses involved and how exactly their co-operation is organised in stroke units and coronary care units. It would be advisable if external quality assurance mechanisms such as the accreditation programme for hospitals would encompass the functioning of acute AMI and stroke care.

### ***Comprehensive Plan for CVD and vertical programmes***

The Comprehensive Plan for CVD was developed by the MIHWA in 2006. It aims at addressing shortcomings in quality of care for CVD in Korea by strengthening prevention and management of risk profiles for CVD in primary care and also the quality of acute care. To this end, as part of the Comprehensive Plan, a key policy was the creation of regional cardio and cerebrovascular centres throughout the country (whose functions are summarised in Figure 4.10). To date, there are nine centres, including three in local university hospitals; all located outside of Seoul. Appointments are based on estimation of potential risks and needs of the population area (with regards to CVD), performance of hospital, and on defined plans to create new services developed by the competing hospitals (HIRA, 2011).

The Comprehensive Plan funds vertical programmes in general and tertiary hospitals on a five-year basis for “establishment” and “operation” projects. Institutions have to compete to become regional centres. Designated regional centres then receive funding every year to upgrade facilities with medical equipment for rapid diagnosis, higher quality medical care and intensive treatment. In addition, the plan also financially assists hospitals in the provision of medical care in the case of CVD. For instance, one specific focus of the plan was to assist facilities with the creation and operation of a 24-hour medical care system with specialist teams. For these two work streams (establishment and operation), facilities on average receive respectively KRW 5.8 and KRW 1.2 billion (but operation and establishment should be financed with at least 30% of hospitals’ own funds).

**Figure 4.10. Summary of the main functions of regional CVD centres in Korea**



*Source:* HIRA (2011), “Response to the OECD Questionnaire on Quality of Care in Korea”, Section 4: Health care quality and cardio/cerebrovascular diseases, Health Insurance Review and Assessment Service, Seoul (unpublished).

Although the Comprehensive Plan and the creation of regional centres include prevention and health promotion in principle, the actual interventions undertaken are very heavily hospital-focused. An interesting intervention was the definition and implementation of critical pathways for stroke and AMI and the creation of rehabilitation units specific to CVD.

While focusing on hospitals, the impact of the Comprehensive Plan for CVD is also limited to addressing shortcomings in quality of care in a limited number of hospitals rather than seeking improvements across all hospitals. Only a selected number of institutions have received financial and technical assistance to develop stroke units and enhanced facilities under the Comprehensive Plan for CVD. Efforts have been made to support hospitals located outside of Seoul that have seen nine institutions (including three university hospitals) designated as regional centres since 2008. With a significant dispersion between those living in rural areas across the country, the small number of centres that have benefited from the Comprehensive Plan for CVD is unlikely to have made major progress in helping reduce significant disparities that exist between rural and urban areas. Proximity to a regional centre is likely to be a major determinant of quality of health care in some remote rural areas. Beyond equipping hospitals with up-to-date infrastructure, the implementation of critical pathway in regional centres is a positive development to emerge the Comprehensive Plan for CVD, and such pathways should be encouraged across the system at large. This would help address inequalities between regions and between tertiary and general hospitals.

### ***Rehabilitation***

Rehabilitation care in Korea is funded through financial support for services delivered in long-term care hospitals under National Health Insurance and those qualifying for long-term care insurance. In general, rehabilitation care in Korea is at an early stage of development and there are few institutional facilities that provide rehabilitation services exclusively for patients who survived an AMI or stroke. Long-term care insurance also partly covers activities supporting physical activities and home care for patients with activities of daily living (ADL). The establishment of specialised rehabilitation hospitals in Korea from 2011 can be a welcome development in helping expand these critical services when embedded properly in the broader health care system. The Comprehensive Plan for CVD seeks to further set up rehabilitation structures within regional cardiovascular centres, but there is little information on the creation of such services through the plan.

Establishing formal rehabilitation processes for cardiovascular conditions would be a worthwhile investment in improving CVD care in Korea. Providing comprehensive rehabilitation care is fundamental to the recovery of patients who have suffered a heart attack, a CABG operation or a stroke. By assisting patients in exercise, education and psycho-social health, rehabilitation can help prevent secondary complications, reduce mortality and improve patients' health outcomes. The effectiveness and cost effectiveness of cardiac and stroke rehabilitation is undisputed. Results from published studies also consistently show that rehabilitation has a marked



impact not only on improving the patient's health and general well being but also in reducing expensive and unnecessary hospital readmissions (Briffa *et al.*, 2005; American Heart Association, 2005; Canyon and Neshgin, 2008). In one study which looked at home-based rehabilitation, the reduction in the readmission rate was 30% (Sinclair, 2005). The same study also noted that patients who had received home-based rehabilitation and who were subsequently hospitalised, spent less time as an inpatient when compared to patients who had not received rehabilitation.

These findings are highly relevant to the Korean context where rehabilitation services are in their infancy and where risk factors for CVD are poorly controlled. For example, data from the Korean National Health and Nutrition Examination Survey (KNHANES) shows that for people aged 30 and over, the prevalence of hypertension has only reduced from 29.1% in 1998 to 27.9% in 2005 (Korean Ministry of Health and Welfare Affairs, 2005). The reduction in elevated lipids for the same age group had a similarly low reduction, changing from 8.6% to 8.2%. At the same time stroke prevalence among people in their forties has nearly doubled over the same period and for people in their fifties or sixties, the rate has increased by over 50% (Kang, 2011). As well as highlighting the fact that cardiovascular risk factors are poorly controlled these statistics also indicate that high risks exist amongst Koreans from younger age groups, who potentially have the most to benefit from effective rehabilitation services.

Korea's rehabilitation services will need to strike a balance between those provided in the hospital setting and those provided within the community. Information relating to access for rehabilitation services varies across OECD countries. However, overall, take up rates suggest room for improvement, even among countries that have well developed services. In the United Kingdom for example, the percentage of patients receiving cardiac rehabilitation who had had either an AMI, PCI or CABG was 26%, 18% and 72% respectively (Bethell, HJN *et al.*, 2007). In the United States, the situation is not dissimilar. A range of factors contribute to low take up of rehabilitation including poor patient motivation, a lack of awareness about the need for and effectiveness of rehabilitation both on the part of the professional and the public. The development of a community focus to cardiac and stroke rehabilitation will provide Korea with an improved opportunity to overcome obstacles to access and may also serve to further reinforce the need for more community-oriented care programmes more generally. In countries that have successfully implemented community-based rehabilitation programmes, specialist rehabilitation nurses usually serve as the overall care co-ordinator and provide rehabilitation care directly. Provided proper training opportunities are put in place, this may present another opportunity for expanding the role of advanced practice

nurses who work in primary care clinics. Better rehabilitation services can also have a powerful bearing on the success or otherwise of cardiac surgery.

Policy makers should consider building upon support for services delivered in long-term care hospitals by seeking to provide financial support for community-based rehabilitation (especially home care services for especially patients who have to live with the consequences of stroke) by a broad range of health professionals. Efforts to ensure that community-based and specialist rehabilitation services are accessible to patients who have suffered from an acute cardiovascular condition would represent a value for money investment in improving CVD care in Korea. This will help reduce readmission rates and holds the potential to reduce expenditure on expensive cardiac interventions such as CABG and PCI.

### 4.3. Conclusion

The quality of cardiovascular care in Korea in many respects mirrors the broader challenges for quality of care facing the Korean health system. To the extent that hospitals are highly available and generally provide good hospital care, they are too often the centrepiece of health care services. The institutional structure is unlikely to be delivering value for money for Korea's substantial investment in health care services. Effective health promotion, prevention and primary care can be influential in helping people manage their risk factors, and reduce unnecessary hospitalisations. Establishing stronger rehabilitation structures – to support those patients who are amongst the most likely to require re-admission – could also increase quality of life and decrease the chances of occurrence of another acute episode.

## Notes

1. All rates from OECD (2011) presented in this chapter are age and sex standardised.
2. The body-mass index (BMI) > 25 for overweight population and BMI > 30 for obese population. OR BMI between 25 and 30 are defined as overweight, and those with a BMI over 30 as obese.

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