

Neuro-Imaging Facilities in Pakistan

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Introduction

The modern neuro-imaging techniques form the cornerstone of the practice of present day neurology and neurosurgery. Computerised Tomography (C) and Magnetic Resonance Imaging diagnosis of neurological disease but have also improved our understanding of the disease processes and the patho-physiology underlying these diseases. The imaging is now moving from simple anatomical imaging to imaging of function and analysis of tissue composition. Functional MRI (fMRI) and Magnetic Resonance Spectroscopy (MRS) are already everyday tools of a neuro-radiologist. Despite the wide availability of these techniques in the developed world they are still relatively scarce in Pakistan and are concentrated in a few urban centres. Availability is unfortunately not the only issue. Cost of these procedures is beyond the reach of a large proportion of the patients. This brief paper looks at these two issues. Data used has been provided by the equipment suppliers and colleagues in personal communications and interviews.

CT Scanners

CT scanning was developed in the UK in the 70s and 80s. The largest numbers of these scanners are now installed in the United States of America and Japan. The first CT scanner in Pakistan was installed in Lahore at the Lahore General Hospital. This was a dedicated head scanner. The first whole body CT was installed in Karachi at the Liaquat National Hospital in 1984. At the present time there are an estimated 80 CT scanners in Pakistan. This number is increasing with a recent spate of new installations. Over half of these are concentrated in the urban centres of Karachi, Lahore and Rawalpindi/Islamabad. The majority of these are in the private sector with less than a third of all CT scanners being in government and semi-government institutions, including the armed forces. Again the majority of the scanners are of the older conventional (non spiral) variety, although a growing number of the scanners are of the most modern multi-slice configuration. Of the 80 installed scanners 34 are spiral scanners including 6 multi-slice spiral scanners. Only 26 of these 80 scanners are in public sector institutions (including the armed forces).

All CT scanners including the old conventional (non spiral) units are capable of producing satisfactory images of the brain. The volume acquisition facility of the spiral scanner gives little benefit as neither respiratory movement nor length of contrast bolus is of significance. The conventional scanners are however not able to perform the more advanced procedures such as CT angiography and perfusion CT. To the best of my knowledge there is no CT scanner in Pakistan capable of performing Perfusion CT of the brain.

The cost of a CT of the head varies greatly. It ranges from free scans offered by some of the government institutions to approximately Rs.5000. The average cost of a non contrast scan is between Rs1000-1500. Contrast administration typically adds Rs750 for ionic and Rs1500 for non ionic contrast.

MR Scanners

The first MRI scanner in Pakistan was also installed at the Liaquat National Hospital. At the present time there are an estimated 19 MRI scanners. The distribution and demographics are broadly similar to those of the CT scanners, with the majority being in Karachi, Lahore and Islamabad and in the private sector. Because of the very high cost of the super conductor (SC) units which on the average cost over three quarters of a million US dollars a piece, there is a growing number of low field strength permanent units. These units tend to be somewhat limited in their capabilities (compared to the SC units) but offer a more cost effective solution. Twelve of the 19 MRI scanners in Pakistan are SC units. To the best of my knowledge 4 are capable of Diffusion/perfusion imaging. The cost of MRI scanning also varies greatly. Ranging from Rs. 2000 for "Limited" studies (single sequence studies) to Rs.12000 for complete studies with contrast enhancement.

Discussion

Pakistan has an estimated population of 147.6 million. With 80 CT scanners this works out to one CT scanner for every 1.845 million people and one MRI scanner for 7.77 million people. This compares to one CT scanner for 1.74 million people in India and one CT scanner for 47000 people in the USA. The average cost of CT of the head in the USA is approximately USD250. (USD1=PKR59). These figures highlight the marked disproportion in the global distribution of healthcare facilities in general and high technology equipment in particular. These differences remain significant even if the relative wealth and economies of these countries are taken into consideration. The Gross Domestic Product (GDP) is a widely used measure of the economic performance. Pakistan has a GDP of USD2100 compared to the GDP of USA which is estimated at USD36300. This is only a 17 fold difference as compared to the 17 fold difference in the number of scanners. I accept that these comparisons are simplistic but still are of value as they underline the stark differences. Although the numbers and cost of neuro-imaging equipment compares favourably with other developing countries, it still falls far short of the requirements. This deficiency is most marked in the rural areas. The urban centres of Karachi and Lahore have a large proportion of these facilities. Karachi the largest city also has the largest installed base of these scanners with 22 CT and 7 MRI scanners, whereas the entire province of Baluchistan has one CT and no MR scanners. The private sector has led the way in provision of these expensive machines. This has put a limitation on the cost of scanning. The only units providing free services are in the public sector institutions but are constantly plagued by problems such as the lack of trained technical staff and frequent prolonged break downs.

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