Cost estimation and physicians' awareness concerning hypertension management: Experience from primary care centres

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ABSTRACT

Objective: To assess the cost of management of hypertension, and the awareness of primary health care centres' physicians about aspects of its cost.

Methods: A sample of primary health care centres registered hypertensive patients and all physicians working in these centres at Al-Khobar city, Eastern Province, Saudi Arabia was chosen. The direct cost of management of hypertension was calculated using a standard formula. Primary health care physicians' knowledge about prevalence of hypertension, five commonly prescribed antihypertensive drugs and their cost, and the cost of investigations used to assess hypertension, were recorded using a self-administered structured questionnaire.

Results: The total cost of management of hypertension in the primary health care centres was estimated as one million Saudi Riyals per year, of which 67% was contributed for by the cost of consultation and 17% and 16% by the costs of drugs and investigations, respectively. Most physicians exhibited poor knowledge about the prevalence of hypertension, and little awareness about the cost of commonly used antihypertensive drugs, and investigations.

Conclusion: The cost of management of hypertension in the primary health care centres, in Al-Khobar city is high; while working physicians showed little awareness concerning the aspects of cost of the disease.

Keywords: Hypertension, cost, cost awareness, primary health care physicians, Saudi Arabia.

Health care expenditure is increasing all over the world as countries continue to spend an ever-increasing proportion of their Gross National Product (GNP) on health care. Some countries like USA, spend well over 11% of its GNP on health care. The Ministry of Health annual budget has been reduced from 6% of the GNP in 1991/1992, to 4.9% only in 1995/1996 (a reduction of 18%). This stresses the importance of seeking ways to reduce excessive expenditure to use the available resources more efficiently.

The increase in expenditure on health care was one of the most important reasons for the growth of the science of health economics. This science, while initially dealt with the overall health services cost, has recently began to deal with the cost of care of common chronic diseases especially those characterised by life-long course, disability and life-threatening complications. An example of such chronic diseases is hypertension, which was found to have a prevalence ranging from 4.1 to 15.25% among Saudi adults, in various regional studies in the Kingdom. A recent national study however, using a level equal or greater than 140/90 as a definition for hypertension, showed that hypertension among adults (> 40 years of age) may be as high as 20.4% for

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systolic hypertension, and 25.9% for diastolic hypertension. On the other hand, primary health care (PHC) centres are now considered as most appropriate health care facilities for management and follow-up of hypertensive patients. This is because of the high prevalence of the disease, especially among adults, and the ability to provide continuity of care through their provided facilities. With expansion of the PHC system in Saudi Arabia, achieving a total of 1725 centres; and considering the high prevalence of hypertension in the country, the objectives of this study were to assess the cost of management of hypertension in, and the awareness of PHC centres’ physicians about aspects of its cost, in Al-Khobar city.

**Methods.** This is a cross-sectional study that was carried out in the PHC centers in Al-Khobar city, in the Eastern Province of Saudi Arabia. The study population of patients included the registered hypertensive patients in the PHC centers, as well as physicians working in such centers. The total population of Al-Khobar city is approximately 841,024, who are served by 60 PHC physicians working in 9 PHC centres.

A two-stage random sampling technique was used. In the first stage a systematic sampling procedure was used to select five primary health care centres out of the nine PHC centres in Al-Khobar. At the second stage, a systematic sampling of one-in-three was used to select hypertensive patients using their records, within each selected PHC center. The total number of registered hypertensive patients in Al-Khobar during 1996 was 1246. The registered patients in the chosen PHC centres was 919 patients, thus a sample size of 311 patients was selected. This sample size was proportionally allocated from the five primary health care centres. A reserve sample of 5% was also selected to meet non-response cases.

Patients’ data was obtained from patients’ records, and included the number of visits made to the PHC centre, the number of prescriptions and types of antihypertensive drugs dispensed to the patient, and the number and types of investigations performed to assess the disease; all offered during the previous year. The cost of the annual PHC rent and bills for water, electricity and telephone calls for all selected PHC centres during the previous year were obtained from the MOH local authority.

The total cost of management of hypertension, among the sample, was calculated as the sum of consultation cost, cost of drugs prescribed, and cost of investigations requested for the sample of patients. The cost of consultation was calculated using the following formula: Cost of consultation in Saudi Riyals [1 US Dollar = 3.75 Saudi Riyal] = (SDN + AR + B) divided by TNP (where: SDN = Sum of doctors and nurses annual salary and benefits, AR = cost of annual rent for PHC centres, B = cost of annual water, electricity and telephone bills; and TNP = the total number of patients visiting during the same year). The total consultation cost was then multiplied by the number of visits paid by the sample of hypertensive patients during the previous year. On the other hand, the cost of drugs prescribed and investigations requested for hypertensive patients was estimated using the MOH drugs’ price and investigations costs lists.

All physicians (60) in the PHC centres in Al-Khobar were involved in the study. They were asked to complete a self-administered, structured questionnaire to check their awareness about the cost of hypertension treatment. The first part of the questionnaire was about physicians’ personal data. The second part was about their knowledge concerning the prevalence of hypertension in Saudi Arabia, knowledge of the five commonly used antihypertensive drugs in the area (according to MOH local authority official records), prices of drugs, and prices of investigations. It also included questions about the suitable place for management of hypertension (i.e. hospital or PHC centres). On the other hand, there were four questions designed to inquire about physicians’ practice, to test application of their knowledge about the costs of drugs when prescribing them for patients.

Data were checked and entered into a personal computer (IBM-compatible). The Statistical Package for the Social Sciences (SPSS/PC+), version 6, was used for data entry and analysis. Total cost, as well as costs of investigations and consultation were expressed as mean costs. Means were expressed as mean ± standard error of the mean (mean ± SE). Differences between two means and differences between more than two means were tested using the students’ t-test for unequal samples, and one-way analysis of variance (ANOVA), respectively. A p-value less than 0.05 was considered to represent statistical significance.

**Results.** The estimated mean total annual cost of treating a hypertensive patient was 768.07 ± 27.61 (Saudi Riyals). The mean cost of consultation, drugs and investigations were 514.39 ± 16.84, 132.65 ± 12.18, and 121.04 ± 8.29 Saudi Riyals, respectively. When projected to the total registered hypertensive patients in the PHC centres (1246) the total cost would almost reach one million Saudi Riyals; while the cost of consultation, drugs and investigations would be 640,929.94, 165,281.9 and 150,815.84 Saudi Riyals, respectively. These latter estimates represented 67%, 17%, and 16% of the total cost, respectively (Table 1).

Fifty-three physicians (88.3%) stated that they
Table 1 - Mean direct cost of hypertension in PHC centers

<table>
<thead>
<tr>
<th>Type of cost</th>
<th>Cost per patient ($)</th>
<th>Registered patients cost (n=1246)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultation</td>
<td>514.39 ± 16.84</td>
<td>640,929.94 (67%)</td>
</tr>
<tr>
<td>Drugs</td>
<td>132.65 ± 12.18</td>
<td>165,281.90 (17%)</td>
</tr>
<tr>
<td>Investigations</td>
<td>121.54 ± 8.29</td>
<td>150,105.84 (16%)</td>
</tr>
<tr>
<td><strong>Total Direct Cost</strong></td>
<td><strong>768.07 ± 27.61</strong></td>
<td><strong>957,027.68 (100%)</strong></td>
</tr>
</tbody>
</table>

(% = Proportion from total projected direct cost, * In Saudi Riyals)

utilised information from patients’ history to decide on a particular anti-hypertensive drug for the patient. However, only thirty-two physicians (53.3%) considered that the social history was the most important part to help them to decide on the suitable anti hypertensive drug for the patient. On the other hand, about two-thirds (60.0%) of physicians thought that consultations made by hypertensive patients would contribute to a high cost of care for hypertension. Thirty-six physicians (60.0%) indicated that they applied the knowledge about the cost of drugs when they chose an anti-hypertensive drug for their patients.

When PHC physicians were asked about their knowledge of the five commonest drugs used for hypertension in the area, their correct responses were Captopril [Capoten] (95.0%), Atenolol [Tenormin] (91.7%), Nifedipine [Adalat] (88.3%), Methyl Dop [Aldomet] (76.7%), and Frusimide [Lasix] (33.3%). However when the same physicians were asked about the monthly costs of courses of these drugs, only one-tenth or less of them gave correct answers (Table 2).

Most of the physicians did not have enough knowledge about the prevalence of hypertension in the Kingdom of Saudi Arabia, or the cost of investigations commonly performed for assessment of hypertensive patients. Only two physicians (3.3%) were able to give the correct cost of a complete blood count (CBC). Six physicians (10%) were able to give the correct cost of a chest x-ray (CXR), while only five (8.3%) were able to give the correct cost of an electro-cardiogram (ECG). On the other hand, no

Table 2 - Knowledge of PHC physicians (n=60) about five commonly used antihypertensive drugs and their monthly cost

<table>
<thead>
<tr>
<th>Drug's name</th>
<th>Drug Known No. (%)</th>
<th>Cost Known No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Captopril [Capoten]</td>
<td>57 (95.0)</td>
<td>4 (6.7)</td>
</tr>
<tr>
<td>Atenolol [Tenormin]</td>
<td>55 (91.7)</td>
<td>6 (10.0)</td>
</tr>
<tr>
<td>Nifedipine [Adalat]</td>
<td>53 (88.3)</td>
<td>2 (3.3)</td>
</tr>
<tr>
<td>Methyl Dop [Aldomet]</td>
<td>46 (76.7)</td>
<td>1 (1.7)</td>
</tr>
<tr>
<td>Frusimide [Lasix]</td>
<td>20 (33.3)</td>
<td>3 (5.0)</td>
</tr>
</tbody>
</table>

Table 3 - Knowledge of PHC physicians (n=60) about the cost of investigations requested for hypertensive patients.

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Cost Known No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete blood count</td>
<td>2 (3.3)</td>
</tr>
<tr>
<td>Serum area and electrolytes test</td>
<td>3 (5.0)</td>
</tr>
<tr>
<td>Chest x-ray</td>
<td>6 (10.0)</td>
</tr>
<tr>
<td>Electrocardiogram</td>
<td>5 (8.3)</td>
</tr>
<tr>
<td>Serum uric acid estimation</td>
<td>2 (3.3)</td>
</tr>
</tbody>
</table>

(%) = Percentage

more than 5% of physicians were able to give the correct cost of serum urea and electrolytes test, and the cost of serum uric acid estimation (Table 3).

Discussion. The high prevalence of hypertension in Saudi Arabia necessitates that its management and follow-up should ideally be carried out in the PHC set-up. This will curb overcrowding of hospitals if this task was left for them. Bearing in mind that in a catchment area of over 300,000 population the estimated number of hypertensives would range between 9,000-36,000 (assuming that adults constitute 60.0% of the population, and the prevalence of hypertension is 5-20%). However, the number of PHC centres-registered hypertensive patients cited by our study is only 1246, i.e. 0.7%. This under-utilization may be attributed to one or more of the following reasons. First, only half of hypertensives are usually aware of their condition (so the expected recorded number in Al-Khobar should range between 4,500 and 18,000). Secondly, many hypertensives may be still being managed or followed-up in hospitals or in private practice. They may also be unaware of the role of PHC centres in their management and follow-up. This finding may shed light on the importance of enforcing the role of PHC centres in this regard.

The estimated direct cost of management of hypertension in the PHC centres revealed by this study is about one million Saudi Riyals per year. Cost of consultation accounted for the major proportion of the total cost (67%). This is different from the findings of Stason et al,13 who showed that the cost of consultation formed 49% of the total cost. This difference between the two studies may be attributed to over-inflation of other components of the consultation cost, in our study, such as PHC centres rent, water, electricity and telephone bills, rather than the cost of seeing the doctor only. Another possible explanation may be that hypertensive patients were utilising other health services such as the private clinics where they were being investigated and prescribed drugs for some time or another during their follow up. A similar result was shown by Al-Shehry in his study about the
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cost of care of diabetes.\textsuperscript{15} As regards PHC physicians' awareness concerning cost and other aspects of hypertension care, it is surprising that only few physicians had any idea at all about the prevalence of hypertension in Saudi Arabia. This supports the finding of Al-Dharrab.\textsuperscript{16} No doubt this is an important deficiency in basic knowledge about this highly prevalent disease, which may have a noticeable impact on the cost of health care. The knowledge of PHC physicians about the cost of drugs commonly prescribed by them to patients was also found to be deficient. This is similar to the finding shown by other workers.\textsuperscript{17,18} Such finding is significant in that compliance of patients with drugs may be jeopardised if they were prescribed expensive drugs that they would not be able to afford. Similarly, the PHC physicians' knowledge about cost of routinely requested investigations for assessment of hypertension, is rather modest. This is similar to what has been shown by Thomas and Davies,\textsuperscript{18} and Bakerman\textsuperscript{19} who demonstrated that there was over-utilization of laboratory investigations which was backed with a knowledge deficiency of cost, and/or some prevalent beliefs and behaviours among them.\textsuperscript{20} Indeed PHC physicians were found to be very eager to acquire more knowledge about investigations' cost in order to modify their behaviour towards utilisation of these investigations.\textsuperscript{17,21,22} It would be very rewarding if such eagerness would be made use of in case of PHC physicians in Saudi Arabia, in order to educate them about the elements involved in the economics of management of hypertension. These physicians should also be trained to effectively use the patients' social history to decide on appropriately priced antihypertensive drugs that the patient may comply with.

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