Experience improves economical compliance of home blood pressure monitoring

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Abstract

Background: Home blood pressure monitoring (HBPM) is a valid way of assessing blood pressure. It has been shown to reduce antihypertensive treatment cost and the number of drugs needed. However, the proper economical commitment of the patients has not been clarified.

Methods: From a pool of 40000 Finns a sample of one thousand hypertensive people who had access to e-mail and who had performed HBPM was randomly selected. Their opinion about an acceptable price for a HBPM device was asked by using an electronic questionnaire. Altogether 640 people answered the questionnaire.

Results: Majority of the study patients without own experience of HBPM considered 60 € as an upper level for HBPM device. Nearly 40% saw 30 € as a maximum price for a HBPM device. Among patients who own a HBPM device the situation was different. Quite few valued the HBPM devices below 30 €. The price level of 61-90 € was the most acceptable. Family income level did not play any major role in the valuation of HBPM devices.

Conclusion: The financial BP home measurement compliance of the patients without own HBPM device was low. Main reason for the measurement undervaluation is probably the low appreciationm of the concept of measuring BP at home. On the contrary, patients who had already a HBPM device and hence experience of its influence on the BP treatment had a tendency to pay higher prices for the device. As HBPM has been shown to decrease the cost of hypertension treatment the reimbursement of HBPM devices should be considered as already antihypertensive treatment is reimbursed.

Keywords: Blood pressure, home blood pressure monitoring, cost effectiveness, patients' opinion
Results

Out of the one thousand selected subjects with hypertension and HBPM, a completed questionnaire was received from 640 individuals (295 men and 345 women). Nearly all subjects (93%, n=596) disclosed their social data, annual family income data and opinion about the economic aspects of HBPM devices and they are called the study patients. The mean age of the patients was 55.6 (18.9) years. The age distribution of the study patients is shown in detail in (Table 1). About half of the subjects suffered only from elevated blood pressure. Besides hypertension other diseases were reported by 45.3% of the patients (Table 1). About one third of the study patients had their household income in excess of 50000 € and quite equal shares had it between 50 000 and 30000 or less than 30 000 €. Patients’ educational background was also evenly distributed between the used four categories (low educational background, blue collar workers, high school level and university level). The study patients’ opinion about the economic aspects of HBPM devices is shown in (Tables 2a and 2b).

Majority of the study patients (82%, 78% and 78%, respectively) in all three family income levels and with no own HBPM device considered 60 € as an upper level price for it. Only few patients (8%, 6%, 7%) were willing to pay more than 91 €, and none would have spent 151 € or more (Table 2a). Nearly 40% (38%, 35% and 39%, respectively) saw 30 € as a maximum price for a HBPM device. The annual family income level did not affect readiness of the patients to invest in HBPM device (Table 2a).

Among patients who had already an own HBPM device the result was different. Quite few valued the HBPM devices under 30 €. The price level of 61–90 € was the most acceptable. A clear shift towards higher prices was observed compared to the patients with no own HBPM device (Figure 1). As in the patients with no own experience of HBPM the annual family income level did not affect readiness of the patients in HBPM device (Table 2b).

Discussion

The core aim of the present study was to disclose the opinion of the patients about an acceptable price level for a home blood pressure measuring device. Accordingly the result of the present study can be interpreted as a cost-effectiveness analysis of HBPM devices from the patients’ point of view. Patients valued HBPM devices higher if they already owned one which is most probably a consequence of positive effects gained using the device.

Study patients were asked to valuate only the device itself. It seems that patients who did not own a HBPM device have neglected subjective and non-monetary values in HBPM, like for example the freedom to measure BP regardless of place or time. In our previous study [4] we showed that Finnish hypertensive patients had vague ideas about the fundamental benefit of BP treatment and they did not measure their BP at home as suggested in the European guidelines [1]. The economical comprehension of these patients concerning HBPM appears to be in line with this observation. Patients who already had a HBPM device and hence at least some experience of its influence on the BP treatment had a tendency to prefer higher prices for the device. This indicates the consideration and valuation of the non-monetary measurable effects. Results might have been even more suggestive if patients were
Although a considerable sum of money, 90 € can be spent
Thus the reluctance to invest in HBPM equipments is quite
monitoring device according to annual family income level
(n=432).

| Income Level | <30 000 € | 30 000 to 50 000 € | >50 000 € |
|--------------|-----------|--------------------|-----------|
| <30 €        | 15        | 8%                 | 10%       |
| 31–60 €      | 53        | 42%                | 53        |
| 61–90 €      | 41        | 33%                | 60        |
| 91–120 €     | 14        | 13%                | 26        |
| 121–150 €    | 1         | 1%                 | 2%        |
| >150 €       | 1         | 0%                 | 0%        |

Table 2b. The amount how much patients with HBPM
device already at home consider as a suitable price for a
monitoring device according to annual family income level
(n=432).

Figure 1. The amount (€) how much patients with no own
HBPM (A, B and C) and with own HBPM (E, F and G) are
willing to pay for a HBPM device according to their annual
family income level* (n=596). * = A and E – annual income
level <30 000 €, B and F – annual income level 30 000 to 50 000, 
C and G – annual income level >50 000 €.

instructed to evaluate the effects of HBMP more detailed.

Minority of the patients without own HBPM device was
willing to spend more than 90 € and more than one third
only maximum of 30 € for it. This low economic valuation of
HBPM device underlines how much the patients valuate the
preventive effects of blood pressure care on subjective level.
Although a considerable sum of money, 90 € can be spent
very easily in daily life. By 90 € you can bye for example about
50 litres of petrol or four boxes á 24 cans of beer in Finland. It
is very common that people follow the principle that small
benefits right now easily run over better benefits in the future.
Thus the reluctance to invest in HBPM equipments is quite
understandable as benefits of a proper antihypertensive
care are often statistical and realize after a long period. This
somewhat poor economical HBPM compliance of patients
without own HBPM device may very well associate with failing
BP treatment compliance. It seems that the more patients are
involved in BP care the better is the economic compliance and most probably also the BP care.

Imai [5] stated in his review based on earlier studies [6,7]
that the introduction of HBPM has resulted in a decrease in
annual medical expenditure of about one trillion yen. Also the
number of antihypertensive drugs has decreased [8,9]. Imai
states that HBPM should be considered the gold standard for
the diagnosis of hypertension. HBPM equipments are not always
cheap. At present the market price range for HBPM devices in
Finland is between 27 and 266 € with mean price of 85 € and
median of 73 € [10]. Due to great benefits seen in those
studies concerning both the economy and morbidity in
hypertension it would be beneficial that the HBPM equipments
were reimbursed as the antihypertensive drugs.

Neither economical status nor education seemed to
influence the economical compliance with the HBPM
equipments. Nearly indentical proportion of families with
annual income in excess of 50000 € or less than 30000 € would
have regarded a price tag of 90 € or more as an acceptable.
It appears that the opinion about the economical cost
effectiveness of the HBPM depends more on the attitude
towards antihypertensive treatment and its consequences
than the financial resources available.

The patient material in the present study was collected
using a population pool of a private Gallup survey company. The method used enabled to communicate with the patients
directly, without the influence of health care. On the other
hand this method is susceptible for various biases like age,
capability to use computer and perhaps also economical
status. We also lack information about the antihypertensive
medication, the detailed cardiovascular risk factor status of
the patients and achieved BP values. Nevertheless, we believe
that we have received real opinions of the hypertensive
individuals. The present approach is better for collecting data
about financial aspects of the home BP monitoring compared
to situation where health care professionals interview patients
and fill in questionnaires. Electronic questionnaire is quite
straightforward and easy to complete and send back. Probably
easiness explains why our answering percentage (64%) was
considerable compared for example to 34% seen in the study
of Tyson et al., using mailed questionnaire [11].

It is, of course, possible that data derived from hypertensive
pool of the private survey company, although chosen randomly
from all parts in Finland, is not applicable with the whole
Finnish hypertensive population. Because in this survey
BP data was not collected we cannot judge our material in
relation to the severity of the hypertension. On the other
hand the cardiovascular risk factor profile of the patients in
our material was quite similar when compared with national
cross-sectional BP studies [2]. Age distribution in our study
was comparable with the home BP study by Niiranen et al.,
[13] but when compared with the population in a larger cross-
sectional BP study by Varis et al., [2], the present material was
somewhat younger. This increases the validity of the present
paper as among the elderly physical activity or its absence affects the factors behind elevated BP [16].

Finland has very homogenous population and some enrichment of genetic diseases. Recent studies suggest that genetic factors like the calcium/calmodulin dependent kinase IV (CaMKIV) and signalling molecules, for example the G-protein-coupled receptor kinase (GRK) may play role in vascular tone regulation and hence in hypertension [17,18]. Although genetic factors may hamper the comparison or implementation of BP treatment or controlling results from different countries or nations, we believe that results from the present study can be applied to HBMP world-wide. Future BP treatment result studies considering the genetic factors are very warranted in this country.

Conclusion
The financial BP home measurement compliance of the patients without own HBPM device was low. Main reason for the measurement undervaluation is probably low appreciation of the concept of BP home measurement, like for example the freedom to measure BP at any time and thus guide their antihypertensive treatment. On the contrary, patients who had already a HBPM device and hence experience of its influence on the BP treatment had a tendency to pay higher prices for the device. As HBPM has been shown to decrease the cost of hypertension treatment the reimbursement of HBPM devices should be considered as already antihypertensive treatment is reimbursed.

Competing interests
The authors declare that they have no competing interests.

Authors’ contributions

| Authors’ contributions | JPV | IMK |
|------------------------|-----|-----|
| Research concept and design | -- | ✓ |
| Collection and/or assembly of data | -- | ✓ |
| Data analysis and interpretation | ✓ | ✓ |
| Writing the article | ✓ | ✓ |
| Critical revision of the article | ✓ | ✓ |
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| Statistical analysis | ✓ | ✓ |

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