Medical tourism: Outsourcing surgery

William Bies\textsuperscript{a,\ast}, Lefteris Zacharia\textsuperscript{b}

\textsuperscript{a} Katz Graduate School of Business, University of Pittsburgh, Pittsburgh, PA, USA
\textsuperscript{b} Department of Medicine, University of Pittsburgh, Pittsburgh, PA, USA

Received 28 November 2006; accepted 14 March 2007

Abstract

A trend emerging in recent years has been travel from industrialized nations to developing countries such as India and Thailand for purposes of undergoing medical procedures, a phenomenon we call medical tourism. Medical tourism offers the prospect of greatly reduced expenses for health care as well as other advantages such as reduced waiting times, but there are risks associated with seeking health care overseas. In order to determine whether medical tourism should be encouraged, and if so in what form, we develop an ANP model. We find that self-selected medical tourism is preferred over employer- or government-sponsored programs and over the status quo.

\textsuperscript{\ast} Corresponding author. Tel.: +1 412 606 3950.
E-mail addresses: webies@katz.pitt.edu, william.bies@gmail.com (W. Bies), zacharial@dom.pitt.edu (L. Zacharia).

\textcopyright 2007 Elsevier Ltd. All rights reserved.

Keywords: Medical outsourcing; Medical tourism; ANP models

1. Introduction

The purpose of this project is to determine whether medical tourism, an emerging form of medical outsourcing, is worth promoting in the US, and in what form.

Medical tourism [1–6] is simply the outsourcing of medical services, primarily expensive surgeries, to low-cost countries, such as India and Thailand. Medical tourism is becoming increasingly popular. Even though in the US medical tourism is not very popular, in other countries such as the United Kingdom it is becoming so important that medical services from the British National Health Service are subcontracted to India. The reasons behind medical tourism in the UK are that the patients sometimes cannot wait for treatment from the National Health Service, and they cannot afford to see a private physician either. As a result some patients elect to follow medical tourism, combining medical treatment with exotic vacations.

Even though third-world countries are the destination of medical tourism, this does not necessarily imply inferior medicine. In India, for example there are a handful of hospitals, such as the Apollo Hospital Enterprises, that provide state-of-the-art medicine in all disciplines, in luxurious hospitals. Furthermore, many of these doctors have been trained in the US. It was estimated that the Apollo Hospital has treated over 60,000 patients between 2001 and 2004. Medical tourism in India is increasing at a rate of 30\% per year, and a study by McKinsey \& Company estimates that...
it will bring $20 billion to India by 2012. Considering that the charges in India are around 80% of the costs in the United States, this means that considerable hospital revenue will be lost to US hospitals, which, however, for the time being is not substantial enough to have a large economic impact on the US medical system, with total yearly revenues of about $1.5 trillion.

The most common medical procedures outsourced are heart surgeries, knee and hip replacements, elective and cosmetic surgeries and others. The most common reasons individuals from the US to elect medical tourism are either cost or long waiting times. In fact, the cost of having a surgery in India versus the United States is only a fraction anywhere from a third to a tenth of the cost. Additionally, individuals choose to go to India to have a surgery performed that has a long waiting time in the US, or a cosmetic surgery that the insurance does not cover.

Why do we choose to investigate whether it is worth promoting medical tourism from the US? As already mentioned, many factors are involved, mainly social, economic, and medical. Social factors range from psychological factors, well-being, and social class. Economic factors include costs and medical factors include quality of health care and seriousness of the condition. All these factors have associated benefits, opportunities, costs and risks, making the decision whether medical tourism is worth pursuing not immediately clear. For this reason, we set out to use ANP to analyze each of these factors in order to determine whether it is worth promoting medical tourism.

2. Method

For this analysis we used the SuperDecisions software (version 1.6.0). An ANP model was built with a goal, strategic criteria and Benefits, Opportunities, Costs and Risks. All cluster and node comparisons were made using the questionnaire. On executing the model we took particular attention to make sure that inconsistencies were no larger than 10%. A sanity test was performed at the end to check for completeness of the model. Ratings were determined on a scale from poor, average, above average and excellent.

3. Alternatives

Medical tourism is a growing phenomenon. This leads to potential questions: should the US encourage medical tourism to India? Should people consider medical tourism to India as part of their overall health care package? Is it worth promoting medical tourism to India?

We suggest four possible alternative courses of action. The first is to have employers encourage medical tourism. This is already happening to some extent. Doing so can lessen the burden on employers of supporting medical expenses for employees. When this is done, some of the savings can be passed on to employees.

Second, individuals could be left to select medical tourism for themselves. This option is particularly important for the uninsured or for those who want to undergo elective surgery for conditions not covered by their current health plans.

Third, the government could encourage medical tourism through Medicare. This approach would realize the benefits of medical tourism for society as a whole, in the form of reduced taxes to pay for government-covered health care.

Finally, fourth, we could remain with the status quo, in which the great majority of people do not take part in medical tourism. Currently, Americans spend about $2 billion a year on medical tourism, which is a vanishingly small fraction of the $1.5 trillion spent on health care every year in this country. The status quo will appeal to those concerned about the risks associated with medical tourism, such as substandard care and declining availability of emergency care in the US.

4. Model

The structure of the ANP model we developed is displayed in Fig. 1. The strategic criteria used to evaluate the four alternatives were designed to reflect the main advantages and disadvantages that medical tourism has to offer. The contribution of each to the goal of deciding whether medical tourism should be encouraged fell under three strategic criteria: (1) quality of health care, (2) universality of access of health care and (3) the condition of the domestic health care system, which could be affected if medical tourism were widely practiced. Under universality there were two subcriteria: ease of access and cost. With respect to the condition of the domestic health care system, two subcriteria had to be considered: access to needed procedures and the size of the waiting list likely to result.
The strategic criteria are applied in combination with the result of an analysis of the benefits, opportunities, costs and risks associated with each of the alternatives (BOCR). A subnet was constructed for each factor: benefits, opportunities, costs and risks. For each of these, we considered social, economic, medical and (in the case of risks) political control criteria. For each control criterion, a separate subnet was constructed.

4.1. Benefits

For instance, under benefits there were three control criteria: medical, economic and social. With respect to the medical benefits subnet (Fig. 2), the value of the four alternatives clearly depends on whether one has insurance or not; hence, we introduced a cluster for kind of patient, insured or uninsured. The desirability of each alternative also clearly depends on how serious the medical condition in question is; thus, we included a cluster for seriousness of condition, elective, mandatory or emergency. Finally, the benefits that each alternative has to offer depend on the quality of medical care one receives under each, poor, average or excellent. The importance of each level of care is influenced by the other clusters, viz., the kind of patient and the seriousness of the condition. Someone who is insured or choosing an elective procedure has more of an interest in securing an excellent level of medical care than someone in an emergency situation, who must make do with whatever care is available.

For the economic benefits subnet (Fig. 3), we believe that the importance attributed to the four alternatives depends on social class of the patient and an assessment of the features of the medical care package that are desired. Accordingly, we introduced a cluster for social class (with nodes for the poor, the middle class and the upper class) and a cluster for product/service features that could affect the decision as to whether to engage in medical tourism (quality, cost, ease of access and luxury). The clusters are obviously interdependent; for example, someone in the upper class would care more about luxury than a poor person.

The social benefits subnet (Fig. 4) had two clusters designed to reflect how the alternatives might be ranked with respect social benefits, namely, psychological factors and societal factors. The psychological factors considered were waiting time, stress and relaxation (i.e., the possibility of combining a trip overseas for purposes of medical care with a vacation of the usual kind). The societal factors we considered were equity (how equally distributed the benefits are under each scenario), justice (the perceived fairness of the arrangement) and well-being (the greatest good of the greatest number).
Fig. 2. Medical benefits subnet.

Fig. 3. Economic benefits subnet.

4.2. Opportunities

Opportunities were grouped under the headings of social (Fig. 5) and economic (Fig. 6). In the social opportunities subnet we considered how the alternatives are related to overall social goods that might be achieved with the use of medical tourism. There was a cluster for social class, as above, and clusters in which were treated the improvement of the effectiveness of the health care system and prosperity. The improvement of effectiveness was considered with regard to necessary surgery, elective surgery and cosmetic surgery. Under prosperity, the opportunities offered by medical tourism were twofold: (1) a chance to reduce the number of bankruptcies caused by excessive medical expenses and (2) the increase in personal accountability (i.e., how much say the average person has over his health care options).
The economic opportunities that medical tourism has to offer are related to cost savings and the state of the world medical system. In the cost savings cluster we list the opportunities for improved individual insurance premiums, for employers’ cost savings on health care coverage, for insurance companies to be able to afford more coverage, and finally for the government through Medicare.

With respect to the state of the medical system, we saw two economic opportunities: an increase in diversification/specialization (that is, comparative advantage in specific procedures) and an increase in choice (e.g., more available surgeries).
We included a cluster for social class in order to break down the differential impact of the above-listed economic opportunities on the various social classes.

4.3. Costs

The costs we foresee are all economic in nature (Fig. 7). The alternatives must be analyzed with regard to their impact on two clusters: (1) damage to the US health system and (2) personal costs. The US health system could
be damaged by medical tourism in two ways: first, there will be a loss of revenue to US hospitals when people go overseas for care, and second, there is the possibility of a loss of infrastructure in US hospitals as they adapt to foreign competition by specializing in certain areas and scaling back coverage of others.

The personal cost cluster incorporates the impact of two eventualities: (1) emergency surgery will still have to be covered in the US and (2) even in the case that one goes abroad to receive a medical procedure, follow-up care will still need to be provided in the US.

4.4. Risks

The risks associated with encouraging medical tourism come under two headings: medical (Fig. 8) and political (Fig. 9). The medical risks have to do with quality of service and unexpected expenses. With respect to quality of service, there is the possibility that foreign hospitals will be less well equipped than US hospitals would be; second, by encouraging medical tourism one risks a loss of corresponding service in the US. Third, there is a greater risk of malpractice in the scenario of medical tourism because many foreign countries have less stringent laws against
medical malpractice than does the US, meaning that there is less legal recourse in the case of malpractice in these countries. Fourth, risk arises from the potential lack of accreditation of foreign hospitals. Hence, there is less of a guarantee that the standard of care there will measure up to that in the US. These four risks were grouped into a cluster in the medical risks subnet called quality of service.

A second cluster in the medical risks subnet allowed for the risk of unexpected expenses. These were of two kinds. First, one could discover that one’s condition had worsened, requiring more extensive surgery. Second, in every medical procedure there is the risk of encountering complications and the need for post-operative care, which would have to be undergone in the US after one returned from a medical tourism trip.

We also believe that there are political risks associated with medical tourism. These have to do with US–Indian international relations. There is the risk that US–Indian relations will be adversely affected by a loss of comparative advantage for the US in the hospital business. Moreover, one risks a loss of reputation and prestige for the US health care system. Third, there is the risk that medical tourism could affect the immigration of foreign doctors to the US. If medical tourism becomes well enough developed, they may prefer to stay in India.

5. Connections

In the subnet associated with each control criterion discussed above, we had to consider the connections among clusters. Two clusters were connected if the nodes in one had a bearing on those of the other with respect to the control criterion in question. The strategic criteria formed a simple hierarchy with two levels of subcriteria.

Thus, for instance, the importance of the four alternatives for medical benefits are affected by the kind of patient. The uninsured stand to gain much less under the alternative of self-selected medical tourism than under government-encouraged medical tourism. Accordingly, there is an arrow from the kind-of-patients cluster to the alternatives cluster. Conversely, in each alternative one can rank how much the insured gain compared to the uninsured—hence, there is an arrow in the reverse direction as well.

Likewise, one can rank the importance of quality of care and seriousness of condition for the insured and uninsured, respectively. Thus, there are arrows connecting kind of patient to these two clusters. The quality of care clearly matters differently for the various levels of seriousness, so there is an arrow connecting seriousness of condition to quality of care. The question in the other direction is whether conditions of varying degrees of serious are more or less important for the given levels of quality. Finally, excellent care evidently matters more for self-selected medical tourism than for government-sponsored medical tourism, so there is an arrow connecting the alternatives to the quality-of-care cluster (but not conversely).

The clusters in all the other subnets were likewise compared and connections drawn among them. Care was taken to ensure that there were no sinks and that the influence flowed from the alternatives to the various clusters and back again. There is no need to discuss all of this in detail. The interconnections among the clusters in each subnet can be read from Fig. 2(a)–(d).

6. Judgments

The following points were taken into consideration when forming the judgments that went into each subnet of the ANP model.

6.1. Benefits

- Economic: surgeries in foreign countries are significantly less expensive than the same procedure performed in the US (about 80% less in India, for example).
- Often, no waiting is needed, whereas there is a long waiting list for such procedures in the US.
- When people are able to get needed surgery more quickly, stress is reduced.
- The doctors performing surgery in foreign countries are sometimes US-trained; the surgery can be life-saving.
- There is the potential for a free evaluation of one’s medical history without any commitment.
- India has good infrastructure and good hospitals, such as the Apollo chain.
- Medical standards are the same as in the US or UK.
- It is possible to combine a medical procedure with a vacation.
6.2. Opportunities

- The practice of ‘medical outsourcing’, in which subcontractors provide services in place of those offered by the overburdened medical care systems in western countries, relieves the medical system.
- For elective surgery, there is no need to do it in the US when it is can be done much more cheaply in India.
- Medical tourism offers an affordable path to health care for people who cannot afford insurance, or for procedures not covered by insurance.
- Note that half of all US bankruptcies are a direct result of catastrophic medical events and their associated costs.
- Medical costs in the US are rising rapidly, with no end in sight.
- Patients may seek treatments that are routinely performed in India, but not approved in the US (for instance, robot-assisted joint replacement).
- Many patients want to have personal accountability for their health care decisions, and to make the best choice among global, rather than local, options.
- Many waiting-listed patients suffer from chronic pain or disability that could be more quickly relieved with a trip abroad for medical care.
- Medical tourism offers an opportunity to US employers who want to save money on health care costs.
- Having the option to go abroad for medical care alleviates one of the most difficult problems with health care in contemporary America: how to provide quality medical care at an affordable price.
- Medical tourism offers a social opportunity by making it possible for the uninsured to get needed surgery cheaply, possibly combined with a vacation; this applies to elective surgery as well.
- Employers see an opportunity to lower their insurance premiums if medical tourism is promoted.

6.3. Costs

- For serious conditions, such as the aftermath of an accident, it is necessary to get health care in the US.
- Those traveling overseas for health care face the psychological costs of encountering a third-world country.
- US insurers are not keen on sending clients overseas, possibly because such programs could upset the US hospitals that insurers currently use.
- Medical tourism has the effect of introducing competition to the American health care system. A large impact is anticipated once employers can send even a few patients overseas to obtain quality health care at reasonable prices. (Some economists, such as Uwe Reinhardt of Princeton University, believe that the growth in medical tourism will not be large enough to make an impact.
- Basic medical insurance and Medicare, even sometimes extended medical insurance, often do not pay for a medical procedure, meaning that the patient is forced to pay in cash.
- There is little follow-up care with medical tourism. The patient usually stays in the hospital only a few days, then goes on the vacation part of the trip or returns home.
- Economic cost: lost revenue to US hospitals
- Lost infrastructure in US hospitals when it becomes expected that patients will have to travel overseas to receive medical care, reducing demand for such procedures in the US.

6.4. Risks

- Complications, side-effects and post-operative care become the responsibility of the medical care system in the patients’ home country.
- Most of the countries that offer medical tourism have weak malpractice laws, so the patient has little recourse to local courts or medical boards in case something goes wrong.
- It is not clear as yet that employers will embrace medical care abroad for their workers. Aside from questions about safety and liability, employers may be scared off by regulatory hurdles.
- Not all hospitals used by companies arranging tours are accredited, although about one hundred hospitals abroad have been accredited by an affiliate of the company that reviews American hospitals. Even when the hospital is
accredited, things can go wrong because doctors overseas may receive quite different training from that of US doctors (although some of the hospitals claim to have US-trained surgeons).

• The profit-making activities of hospitals abroad in private-sector medical tourism might draw medical resources and personnel away from serving the local population.

• There are no follow-ups and hospitals abroad might be less well equipped than in the US.

• The US risks losing hospital business if it encourages medical tourism.

• If medical tourism becomes more popular, there is the risk of no longer being able to get the surgery one needs in the US.

• The medical condition might turn out to be more serious than expected, requiring more expensive surgery.

6.5. Ratings

The alternative with the highest priority for each of the benefits, opportunities, costs and risks subnets was rated with respect to the strategic criteria, as shown in Fig. 10. For benefits it was self-selected medical tourism; for opportunities, employer-encouraged medical tourism; for costs, government-encouraged medical tourism; and for risks, self-selected medical tourism.

7. Results

The results for the priorities of the four alternatives for the benefits, opportunities, costs and risks subnets are displayed in Fig. 11. As expected, the alternatives involving some form of medical outsourcing had greater benefits than the status quo, with self-selected medical tourism being the highest.

Employer-encouraged medical tourism offered the greatest opportunity, followed by self-selected medical tourism. The most likely reason for this is the social factors. Employer-encouraged medical tourism allows for more equity and justice than does self-selected medical tourism, which is available only to those who can afford it. Interestingly, government-encouraged medical tourism offered little more opportunity than the status quo.

Government-encouraged medical tourism had the most cost, marginally more than employer-encouraged medical tourism. Self-selected medical tourism had significantly lower cost, because the costs in this case are borne by the individual rather than by companies or society as a whole. The status quo had the least cost, because in the absence of any medical tourism there will be no adverse effects on the US health care system.

Again, as expected, the three alternatives involving medical tourism had higher risks than the status quo, mainly because of the medical risks factored in. Since the medical risks did not depend on the form in which the medical tourism is paid for in the US, the three alternatives had approximately the same level of risk.

The priorities from the benefits, opportunities, costs and risks subnets were synthesized according to the usual procedure in ANP to obtain overall signed priorities for the four alternatives. This was done both multiplicatively (i.e., BO/CR) and additively (i.e., bB+oO-cC-rR). The results are given in Fig. 12.

The two methods agree in determining that self-selected medical tourism is the most preferred alternative. In the multiplicative synthesis, it has almost exactly the same priority as the status quo, while in the additive synthesis self-selected medical tourism is found to have somewhat higher priority and employer-encouraged medical tourism is rated as the second-best alternative. The result of the additive synthesis should be favored because it is technically the more correct procedure.
Fig. 11. Priorities of the four alternatives under benefits, opportunities, costs and risks.

Table 1
Synthesis of the priorities for the four alternatives

<table>
<thead>
<tr>
<th></th>
<th>Benefits</th>
<th>Opportunities</th>
<th>Costs</th>
<th>Risks</th>
<th>Synthesis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Idels</td>
<td>Normals</td>
<td>Raw</td>
<td>Idels</td>
<td>Normals</td>
</tr>
<tr>
<td>Employer-encouraged medical tourism</td>
<td>0.693783</td>
<td>0.259911</td>
<td>0.671491</td>
<td>0.930482</td>
<td>0.381036</td>
</tr>
<tr>
<td>Self-selected medical tourism</td>
<td>1.000000</td>
<td>0.374629</td>
<td>0.967869</td>
<td>0.374629</td>
<td>0.374629</td>
</tr>
<tr>
<td>Government-encouraged medical tourism</td>
<td>0.575135</td>
<td>0.215462</td>
<td>0.556655</td>
<td>0.215462</td>
<td>0.215462</td>
</tr>
<tr>
<td>Status quo</td>
<td>0.400391</td>
<td>0.149998</td>
<td>0.387526</td>
<td>0.149998</td>
<td>0.149998</td>
</tr>
</tbody>
</table>

In both cases, government-encouraged medical tourism was the least preferred option. The reason for this outcome can be investigated by putting all of the above results into a single summary table (see Table 1).
Self-selected medical tourism is the most preferred alternative because it has the highest benefits, moderately lower opportunities, lower costs and risks comparable to the other two alternatives involving medical tourism. Employer-encouraged medical tourism is rated second because its relatively lower benefits are compensated for by higher opportunities, but its costs are much higher than self-selected medical tourism. This, we believe, is because costs in the case of employer-encouraged medical tourism are borne by the employer, while in the case of self-selected medical tourism only those with the resources to pay avail themselves of the option. Government-encouraged medical tourism came in last because its benefits and opportunities are lower, while its costs are higher and its risks are about equally high as the two other alternatives involving medical tourism. The status quo was rated better than government-encouraged medical tourism because its benefits and opportunities were about the same, but it involved significantly lower costs and risks. However, it was not rated as well as either self-selected medical tourism or employer-encouraged medical tourism because its benefits and opportunities were significantly lower than these. This makes sense, in as much as doing nothing cannot of course lead to any gains with regard to benefits or opportunities. The overall result of our model is that in the cases of self-selected and employer-encouraged medical tourism, the benefits and opportunities outweigh the costs and risks associated with these alternatives.

8. Sensitivity analysis

In order to assess how robust the results of the previous section are, we perform a sensitivity analysis. The priorities of the four alternatives were computed with respect to variation of the weight assigned to the benefits, opportunities, costs and risks subnets.

From the sensitivity plot in Fig. 13 we see that self-selected and employer-encouraged medical tourism always have the highest priority when benefits are weighted above a certain amount (the lower end of this graph is not relevant since one would not be interested in medical tourism in the first place if its benefits were so low). Interestingly, government-encouraged medical tourism fared worse than the status quo when benefits were weighted below about 0.6. In our model the benefits of government-encouraged medical tourism were slightly higher than the status quo, but not as high as either self-selected or employer-encouraged medical tourism. Therefore, we find that the results are not sensitive at all to the weight placed on benefits.

In Fig. 14 we find that employer-encouraged medical tourism usually has the highest priority and self-selected medical tourism is second. Again, government-encouraged medical tourism was lower than the status quo except when the weight placed on opportunities exceeded 0.85. From this sensitivity analysis we can conclude that as far as opportunities are concerned the result is not very sensitive to the weight placed on opportunity.
The sensitivity analysis in Fig. 15 shows that the status quo has the highest priority whenever costs are weighted above 0.24. This outcome is what we would have predicted; there are no costs associated with the status quo, so it should be preferred whenever costs are given the most weight. It also indicates that self-selected medical tourism usually has a priority almost as high as that of the status quo. This is what we should expect, since the costs in the case of self-selected medical tourism are borne by the individual concerned.

The most important sensitivity analysis is the one with respect to risks. Clearly, any of the three alternatives involving medical tourism will have some benefit associated with it; the only question is whether the benefit outweighs the risk.

Fig. 16 shows that the status quo is always preferred whenever the weight attached to risk is high (higher than 0.3). The three alternatives involving medical tourism have about the same priority under this scenario, as we should expect since the medical risks (e.g., malpractice or less well-equipped hospitals) associated with medical tourism are
Fig. 14. Sensitivity analysis with respect to opportunities.

not affected by the manner in which the medical tourism is paid for. The results in Fig. 16 are somewhat surprising when the weight attached to risk is lower than about 0.3. We find that self-selected and employer-encouraged medical tourism become the preferred alternatives, but government-encouraged medical tourism remains less preferred than the status quo. This is because its benefits and opportunities are not much greater than the status quo, but its costs are higher.

The overall result of the sensitivity analysis is that the outcome predicted by our model is fairly robust with respect to variations in the parameters of the model.

9. Conclusion

In conclusion, we find that self-selected medical tourism is the most preferred among the four alternatives. The reasons for this are that it involves lower cost, while still enjoying all the benefits of increased choice of medical
Fig. 15. Sensitivity analysis with respect to costs.

procedures and reduced waiting time. With self-selected medical tourism the individual has control over his health care program. Employer-encouraged medical tourism was rated second because it enjoys similar benefits as well as better social opportunities with regard to equity and justice (the benefits are more widely distributed than under self-selected medical tourism because they are available to everyone who has a job, regardless of how much he might have in personal savings for health care). However, costs for employer-encouraged medical tourism are higher than for self-selected medical tourism. The reason for this is that employers have to cover emergency surgery and follow-up care in the US. Government-encouraged medical tourism was rated the lowest among the four alternatives because it had high costs (because the responsibility for covering emergency surgery and follow-up care in the US would fall on the government) and it did not offer much in the way of opportunity (because, we presume, it would be more difficult to ensure access to elective and cosmetic care through a government-administered program). However, if one is risk-averse the status quo is preferred.
Fig. 16. Sensitivity analysis with respect to risks.

References