Empirical Investigation of the Economics of Telemedicine for Treating Patients Suffering from Parkinson Disease
(Draft Work in Process)

Abstract

We are currently conducting a novel clinical and economic study addressing the overall impact of a recently introduced telemedicine practice for the care of patients with Parkinson Disease. We are the leaders in investigating the impact of telemedicine for Specialist to Patient interaction addressing serious neurological disorders. Chronic care is a huge burden on the health economics accounting for almost 75% of the health care expenditure in the US and most developed economies. It is likely to grow even further with overall aging of the population. Parkinson Disease is a chronic condition and 4.1 million individuals have been diagnosed (2005) with the disease and it is estimated to reach 8.7 million by 2030. The disease accounts for 5-7% of all individuals living in nursing homes. Our initial clinical results have shown that delivering care for the disease through telemedicine is feasible, and that it produces clinical outcomes which are on par, or superior to conventional in-person visits. In this paper, we investigate the impact of telemedicine on patients’ choices and competitive impact of telemedicine. We noticed that most of the current research is focused on feasibility of telemedicine (mostly physician to physician), cost savings for the patients and operating cost reduction at the clinic. In this ongoing study we explore the extent to which telemedicine increases access to those patients who are not being treated currently. We have also identified and analyze several other key factors such as the associated impact of telemedicine on reimbursement rates, patient satisfaction, physicians’ volume mix, treatment compliance, and patients’ overall compliance. Another important issue is the identification of the type(s) of patients who are more likely to prefer telemedicine to a regular office visit, and the intrinsic and extrinsic incentives for third party insurers and specialists to offer telemedicine service.
1. Introduction

Parkinson Disease (PD) is a chronic condition characterized by the cardinal conditions like tremor, slowness in movements, and gait imbalance. All of these features can be readily visualized. Though its causes are still uncertain, approximately 10% of the affected population has an underlying genetic cause. The rest are thought to be due to environmental exposures. Prognosis (Factor, et al. 2003) (Parashos, et al. 2002) includes modest increase in mortality and up to 40% will require nursing home care and the disease accounts for 5-7% of all individuals in nursing homes (Mitchell, et al. 1996). 79% of individuals with long-term chronic care need to live at home and account for 75% of health expenditures (The Institute for Health & Aging 1996). Thus it is a huge burden on the health care expenditure.

Treatments to Parkinson Disease vary from medications to surgery though the former is the most common and surgery is an option for some. Astute manipulation of medications is currently the primary component of symptom management for these patients (Chan, Cordato and O'Rourke 2008). In other words, there is no cure for the disease at present and since there is a manipulation involved, frequent visits to the doctor (typically four in a year) are required to manage the disease. Drug treatment is symptomatic and after every visit, the treatment regime is modified to manage the disease as it progresses.

Barriers to health care can be caused by a wide range of factors, including inaccessibility caused by rural isolation. Even though the number of individuals affected by Parkinson’s disease is widespread and growing (Dorsey, Constantinescu, et al. 2007), there are not enough neurologists, much less PD specialists to satisfy the growing need. In fact there is a huge shortage of physicians and is only expected to grow in the future (Tracy, et al. 2008). Patients living far from major urban centers have limited access to medical specialists who may provide
higher quality care for certain chronic diseases (Hubble, et al. 1993). In Parkinson’s disease, patients wishing to receive optimal assessments and care often depend on the availability of specialty health care providers with expertise in the disease (Cheng, et al. 2007). For many individuals in nursing homes and assisted living centers, especially in rural areas, access to such care is limited due to inability to travel secondary to their disease, high costs, and lack of transportation.

Access to specialists has proven to be an important factor in the quality of care in various fields like cardiology (Ayanian, et al. 1994) (Ezekowitz, et al. 2005), and conditions like asthma (Legorreta, et al. 1998) (Schatz, et al. 2005) and diabetes (De Berardis, et al. 2004). The case is no different in Parkinson Disease (Cheng, et al. 2007). Patients, who see a specialist, are also three times more likely to be satisfied (Dorsey, Voss, et al. ). Telemedicine acts as a gateway to specialists.

* p < 0.05; ** p < 0.01; *** p < 0.001
Telemedicine is the use of medical information exchanged from one site to another via electronic communications to improve the status of a patient’s health (American Telemedicine Association.) Interactive video conferencing, now developed to broaden health care access, allows a physician and patient to communicate with each other from distant sites while simultaneously viewing and listening to each other. Telemedicine helps to bring medical specialists to remote patients who would not otherwise have access to such high quality and disease-specific care.

Despite the initial costs associated with interactive video conferencing technology, there are still substantial savings to be had both in terms of time and money. These patients can receive timely and effective treatment from medical specialists without the cost and burden of travel or overnight accommodations. By decentralizing patient care from the hospital/clinic to the community, more patients are able to take advantage of these services, and ultimately improve quality of life over time.

Even though the term telemedicine may encompass exchange of any medical information via electronic communication, there can be different modes and different levels of interaction. It can be information exchange between hospitals (H2H), consultation between doctors (D2D), Doctor to Hospital (D2H) or Patient to Doctor (P2D). The infrastructure and the detail of information may also vary in each of the above modes. Among the various modes, P2D may be the one that is most looked forward to, as it can prove to be the panacea for specialist access, timeliness, rural reach and many other critical health issues.

Obviously as with any technology, there are limitations as to what extent telemedicine can be employed. In the case of teleradiology, it has been widely employed in numerous medical fields. The adoption of technology is limited by both medical feasibility and economic viability. Some conditions lend themselves easier to medical adoption than others. For example, a condition that
can be assessed by the physician just by visual observations will lend itself easier to be done remotely. This is perhaps one of the reasons why telemedicine made a huge impact in radiology as it was just about reading the images. But with the advent of new technology, bio-sensors and passive monitors these limitations are quickly disappearing.

Economic viability is another limiting factor. There are still reimbursement concerns (American Telemedicine Association n.d.) as to what is covered, for whom it is delivered (rural vs urban) and who actually delivers the service. While the debate over the costs and benefits of such a setup exists, we are not aware of any economic model that analyzes the situation and our work is focused on filling this gap. It is important to understand that such a technology introduction not only benefits the patient, but also has an impact on the providers, the insurers, the nursing homes and the society in general. In addition to the decreased travel costs and decreased discomfort on account of travel, the biggest benefit to the patients is the access to specialists. On account of the better treatment, cost of medication, including emergency room costs (Noel, et al. 2004) and hospitalization cost (Alwan, et al. 2007), reduces and thus the quality of life improves (Dansky, et al. 2001) (Finkelstein, Speedie and Potthoff 2006). Patients suffering from Parkinson Disease fall often (Buchanan, et al. 2002). So, the more they move out of their homes, higher is the risk of falling and associated costs.

For the specialist or the provider telemedicine allows flexible scheduling and also brings in more patients (increased market share or catchment area). With telemedicine the compliance rate of the patient may increase for a number of reasons. Patients may not miss their scheduled appointments and may also develop less complications or discomfort, which is very likely especially if they are suffering from Parkinson Disease.
Like specialists, the hospitals also benefit from increased utilization, as the capacity does not go waste because of missed appointments. Their subscription base and hence the catchment area also increases if the specialist is associated with the hospital. It also frees up their critical resources for other conditions as it has been seen that Parkinson disease patients use emergency and out-patient services more often (Parashos, et al. 2002). Because of the decreased medication costs resulting in increased healthcare (less falls and complications) the insurance payers also benefit. It has been studied that patients take unnecessary drugs (Larsen 1991) if they do not have access to a specialist and hence through telemedicine these unnecessary medication costs could be reduced. The nursing homes benefit too because of enhanced reputation among other positives. The caregivers’ burden reduces too and overall even the society benefits. So, to answer the question on who pays for such a technological advance, it is important to obtain a collective insight. In this paper we focus on two of the aspects we have mentioned: access to specialists and patient compliance.

**Telemedicine is a feasible, and potentially powerful, means to increase specialty access**

Various psychiatric and neurological assessments have been administered effectively via interactive videoconferencing (Hersh, et al. 2006). More so, telemedicine has been examined in Parkinson disease with positive results in efficacy and satisfaction (Hubble, et al. 1993) (Sami, et al. 2006) further demonstrating its potential in Parkinson care.

Delivering PD care through telemedicine is in a number of ways similar to delivering care in-person such as, taking note of patient history, physical examination procedure, care recommendations, prescription disbursement (provided via fax for telemedicine) and clinical effectiveness. Since the physician’s vision is the primary medium for diagnosis, all initial symptoms can be observed (the degree of symptom in some cases, tremor assessment, gait
imbalance, rigidity assessment etc). Therefore, many of the assessments involved in a typical one-on-one visit with a movement disorder specialist can be completed via interactive video conference, and even more can be completed with the assistance of another person at the location.

But, where it differs is in the ease of access to specialists, higher quality of care, decreased hassle for patients to name a few positives. On the negative side, it needs investment in equipment and there remains a non-familiar nature of care delivery. A nurse/assistant is still needed to help the patient and also the doctor in communicating back and forth in case the audibility levels are low. Thus technological advances in conferencing facilities will play a key role as will features like bandwidth and speed of internet. There are concerns about security, privacy and confidentiality but with the advent of technology, those issues can be taken care of. Patients might still need to travel for laboratory procedures and any emergency situations but even then can use the ‘knowledge’ available in a remote facility. Thus if a local community hospital can provide some facilities for preliminary tests, they can complement telemedicine. While it can be argued that there is a lack of face to face contact which can affect the patient-doctor relationship, the very fact that the doctor now ‘comes’ to the patient without the patient needing to go to the doctor is bound to create a feel good factor and reinforce the patient–doctor relationship.

To analyze the extent of feasibility and to get other insights we have formed a partnership with the neurology department and a nursing home caring for patients with chronic conditions like Parkinson’s disease. In a preliminary work it was established that web-based assessments were a reliable and valid means for assessing the motor features of Parkinson disease (Biglan, et al. 2009). The web-based assessments had high validity and test-retest reliability with intraclass correlation coefficients of 0.78 and 0.82 respectively. These results demonstrate that web-based
UPDRS (Unified Parkinson's Disease Rating Scale) assessments provide strong predictive power of current motor features of Parkinson disease.

Thus, to summarize the feasibility of such a technological intervention, delivering care via telemedicine is not only possible for a condition such as Parkinson disease, but could be generalized at least to all conditions that are primarily assessed through audio and visual communications. Some examples would include other movement disorders, many neurological disorders like Alzheimer disease, and epilepsy, most psychiatric disorders, where telemedicine has been applied for about 25 years, dermatological disorders, and many chronic disorders like diabetes (Hersh, et al. 2001) (Monnier, Knapp and Frueh 2003). Currently, 140 million Americans have at least one chronic condition and by 2030 nearly 50% of Americans will have at least one (The Institute for Health & Aging 1996). Our work as currently constructed is probably less applicable to technology/intervention intensive fields, such as surgery (although post-operative care is possible).

Our application and analysis is also very specific to Parkinson’s Disease in a number of ways.

I. The primary assessment is through visual cues and the specialist’s vision is the primary medium for diagnosis. All initial symptoms can be observed (the degree of symptom in some cases, tremor assessment, gait imbalance, rigidity assessment etc) and hence many of the assessments involved can be done visually by a movement disorder specialist.

II. Many patients have a relatively high mobility cost unlike many other health conditions where telemedicine has made a great impact. The mobility cost is not just in terms of monetary cost but also includes the physical discomfort that the patient undergoes during transportation. However, because of the nature of the disease progression, the mobility cost differs across patient groups.
III. Telemedicine cannot completely replace in-person visits as yet. There is also a need for occasional office visits with the MD or the specialist in case of a complication or an unexpected drug reaction. Such situations may not be efficiently handled via telemedicine and might require an in-person visit at the specialist’s facility. This has been factored in our model.

IV. Parkinson’s disease is a lifelong condition, and so far there has been unfortunately no cure for the disease. But, by continuously adjusting the medication regime the disease could be managed to make the patient live better. This necessitates multiple visits to the specialist every year in contrast to some other simpler health conditions which can be solved in one or two visits in total.

Besides these factors, there are certain other conditions that are unique to PD, namely

I. Patients may also use a fair amount of ancillary services such as physical therapy, diet support, and so on which can be additional sources of revenue for the nursing homes.

II. Parkinson’s disease also inflicts mostly the elderly, who tend to move away from city centers to the rural side to cut costs at times of retirement. This puts them in areas with few or no specialists, thus restricting their access and this combined with the evidence that a specialist treating PD produces superior outcomes as compared with a general neurologist, geriatrician or a primary care physician, makes telemedicine a much more attractive option.

III. Patients also suffer from a number of other medical conditions along with PD (co-morbidity) resulting in complications like drug interaction issues. This necessitates visits to multiple specialists and hence consultations among the specialists and a combined management of the patient may be required.
A previous work with The Presbyterian Home of Central New York (New Hartford, NY, population 20,000) established the preliminary value for delivering telemedicine care to nursing home residents (Biglan, et al. 2009) (Dorsey, Deuel, et al. 2009). Four nursing home residents received telemedicine and ten community residents were randomized to receive specialty care via telemedicine (three visits over six months) or through in-person care. Those receiving telemedicine completed 97% (29/30) of their visits. In addition, those randomized to telemedicine had improved quality of life (3.4 point improvement vs. 10.3 point worsening on the Parkinson Disease Questionnaire 39; p=0.04) and motor function (0.3 point improvement vs. 6.5 point worsening on the Unified Parkinson’s Disease Rating Scale, motor sub-scale; p=0.03) compared with those randomized to in-person care (Biglan, et al. 2009). Telemedicine has the potential to be a valuable means of increasing specialty access and improving quality of care. We are now extending the project to its second phase to measure quality of care, clinical efficacy and economic value added.
Economic Investigation

We first recognize that a patient will choose to opt for telemedicine based on costs and comfort. Cost might include copayments, the transportation cost they would incur and the setup costs, if any, for telemedicine and other out of pocket costs (if they are not insured). For the in-person mode, all visits are conducted at the specialist’s office or at the hospital the specialist is associated with and patients travel to the specialist’s place for their visits. For the telemedicine mode most (but not all) visits are conducted remotely via internet-based teleconferencing software. Under telemedicine mode, patients will undergo an initial in-person evaluation by the specialist and typically will be seen once a year in the office for a more thorough physical exam. A recent study also demonstrated that even new patient evaluations for individuals with suspected or diagnosed Parkinson disease and other movement disorders can be completed using telemedicine (Deuel, et al. 2010). All follow-up visits during the year will be conducted remotely.

List of Assumptions

We consider a spatial model with two players (hospitals A and B) serving an initial patient base. One of the two players, without loss of generality, say A, sets up a telemedicine facility in its premises. The key difference to notice here is that hospitals do not compete on price as the price is reimbursed by a third party. Since, we are dealing with elderly patients, the price is paid by medicare and hence hospitals have to compete on other parameters.

Patients obtain a ‘value’ from their treatment, and typically not everybody seeks treatment and only those for whom cost incurred is less than the ‘value’ that they obtain from treatment, seek treatment. For example for very old patients, they might consider it too difficult to travel and seek treatment and hence their perceived value from treatment will be less, as it is too ‘costly’ to
seek medical attention. If the patients’ value from treatment is less than the costs the patient has to incur to receive the treatment, then the individual stays away and does not seek care.

Since, the entire treatment may not be done via telemedicine, we consider only a proportion of visits possible via telemedicine and the remaining has to be completed via in-person visits. We call this the feasibility factor of telemedicine ($\alpha$). Thus, $\alpha$ proportion of the total number of visits needed for the disease maintenance and care can be done via telemedicine, where the patient does not travel. The remaining ($1-\alpha$) proportion has to be done via in-person, where the patient travels to the location of the specialist.

Patients opting for the telemedicine option would incur some setup costs, say internet connection, video facilities and so on, and we assume that these costs can be spread over the total number of visits and can be considered as setup cost per visit. The setup cost may also be used to explain any relative inconvenience cost for the patient in choosing telemedicine over in-person. One example of inconvenience cost may be the lack of in-person contact and face to face interaction that cannot be experienced through telemedicine.

The other cost incurred by the patient is the transportation cost for each visit (zero for telemedicine visits). The transportation cost is not limited to its traditional meaning but also includes the discomfort for the critically ill patients, their care givers and so on. Thus, to a certain extent the in-person and the telemedicine visits can be considered as substitutes and the setup costs play a crucial role in the ‘adoption’ of telemedicine.

In addition to the cost covered by the insurance and transportation cost, there might be out of pocket costs incurred by the patient at the time of visit. For example, in the case of telemedicine, if the insurance company refuses to cover visits via telemedicine for some reason, the patient might still prefer to undergo treatment via telemedicine than traveling to a hospital that is miles
away. In this scenario, the patient thus bears the treatment cost over and above his setup costs described before. In the case of in-person visit, in addition to co-payments being one portion of out of pocket costs, there might be expenses associated with the risks of traveling and moving in a hospital. The individual may be subject to falls, infection and other such complications triggering expenses. Thus in both telemedicine and the in-person options, there are out of pocket costs associated with every visit.

**Economic Results**

Before the introduction of telemedicine, the treatment benefits may not be sufficiently big for everybody and as discussed before depending on the costs some patients may prefer not to seek care. But if telemedicine option is available, some patients may prefer to receive treatment via telemedicine. This new class of patients may emerge from two possibilities. Patients who had previously preferred an in-person visit at a nearby hospital may now want to adopt the telemedicine mode available now. Or, patients who had previously preferred not to seek treatment may now want to adopt the telemedicine mode available and seek treatment.

This emergence of a new class occurs if the setup costs of telemedicine are low enough. The patients for whom the setup costs are relatively lower than their previously incurred transportation cost will then have a tendency to shift to this new mode of treatment. As their costs become lower, their surplus (difference between their costs and their perceived treatment value) gets higher. However, if the initial setup costs for choosing telemedicine are high, then the patients are worse-off choosing the telemedicine mode and hence would stick with their initial preference.

However, we reiterate that setup costs are not the only costs associated with telemedicine mode. Patients would still incur some transportation cost for any emergency visits or lab tests. But, they
would not incur any transportation cost for the telemedicine visits. They might also incur some out of pocket costs (in the case of insurance not covering their telemedicine visits). Thus, only after considering the combined cost and comparing that with their current combined cost would a shift in preference occur. Based on our assumptions we prove the following proposition.

**Proposition 1:** The relative preference of telemedicine over in-person is a non-monotone function of the distance from the hospital which sets up telemedicine and if the transportation cost is convex in distance, then the relative preference function is concave increasing near Hospital A, convex decreasing away from Hospital A and could be convex or concave decreasing near Hospital B.

The intuitive implication is that not all patients will prefer telemedicine and only patients who live far away from the hospital will prefer telemedicine. Thus, telemedicine cannot replace in-person visits completely.
Subsidizing the setup costs

Given the possible increase in market share because of subsidies it is natural to investigate whether hospitals/specialist will be ready to subsidize part of the setup costs of telemedicine. Based on our model we also have the following result.

**Proposition 2:** Whether telemedicine is already adopted by at least some patients or it is too costly for everybody, the hospital or the specialist may not always be keen in subsidizing the setup costs. This is because, the subsidy not only brings more patients into the hospital’s fold but also moves patients from in-person to telemedicine thus losing some revenue on these switching patients. It is only when the margins are sufficiently high to cover this transfer effect that the hospital/specialist decides to subsidize the costs.

**Results Implications**

How do the above changes impact the physical facilities at the hospital? As telemedicine’s market share increases, the patient load is moved from the in-person visit to telemedicine visit. This implies that the physical infrastructure gets relieved of some demand, as patients opt for telemedicine. But, the physicians’ and specialists’ load increases as there are more patients seeking service now. Both of the above have interesting consequences. If the hospital’s load decreases, which more often is a bottleneck, it extends the utilization and enables re-allocation of its key resources. Similarly if the load on physicians increases then it becomes an interesting capacity and scheduling problem. The productivity of the physician may also increase if telemedicine can improve the efficiency of the whole process. In either way the consequences and network effects are multitude in nature and so are the benefits.

People with co-morbid issues or more critically ill patients tend to choose telemedicine more than the healthy people as the relative preference function is directly proportional to the
transportation cost. Hence, if the unit transportation cost is higher, then by switching to telemedicine the total costs might get lowered (even after accounting for the setup costs). But, from the hospital or the physician perspective the impact or the increase in market share is much bigger if they subsidize the setup costs for the healthy individuals than for the critically ill patients. This was a rather counter-intuitive result.

**Future Empirical Work**

Having seen distance to play a crucial role in conditions such as Parkinson’s disease, we explore this factor in greater detail. We find that the average number of visits to a specialist falls as patient’s distance from the specialist increases.

Based on the evolving Electronic Medical Records of patients we will try to explore the nature of patients who opt for telemedicine. We want to identify the patient attributes that are likely to make them opt for telemedicine, and investigate the impact of competitors, or alternative
treatment options in their vicinity. The other aspect that we will try to investigate is the link between compliance and patient attributes. For instance, which patients are more likely to have a no-show at the clinical appointment, thereby negatively affecting their own health, and reducing MD utilization? Are these mostly patients in whom the disease has progressed considerably, who tend to miss appointments, or those patients who are relatively more mobile and feel less threatened for the time being? After all, telemedicine reduces the interpersonal contact, and requires a new ‘visit modality’ between the patient and the medical specialist. The other interesting aspect that could be looked in to is the effect of brands on the patient and the resulting switching cost.

**Summary and Conclusion**

There are three major conclusions from our analysis. The first conclusion is that telemedicine increases access to specialists for patients living far away and thus helps serve more patients. We show how remote medical assistance, especially for critical conditions, changes the scenario in terms of total number of patients getting treated. Telemedicine, in short, relaxes the ‘distance’ constraint, thus opening up access to remote patients. Telemedicine also changes the volume mix of the patients. The patient load shifts from in-person visits to telemedicine visit, as people far off start adopting telemedicine as it reduces their travel discomfort. This implies that the physical infrastructure gets relieved of some demand, as patients opt for telemedicine. Thus, unexpectedly telemedicine can reduce the income for the hospital and increase the revenue for the specialist. However, the physicians’ and specialists’ load might increase as there are more patients seeking service now and hence the service level may go down thus causing negative externalities on the patients already being served.
The adoption of telemedicine is easier when all patients already seek treatment than when only some patients seek treatment and others decide not to get treated. This is also true in the real world where telemedicine has made a much bigger impact in medical fields like teleradiology and paediatrics, while it has found its entry difficult in more complicated fields where the patient population seeking treatment is itself only a fraction of the affected population.

Secondly, telemedicine has only a limited impact on the competitor. Even though the catchment area for the hospital which sets up telemedicine increases at the cost of its neighbors’ market share, we show that telemedicine may not win it all and the competitor might co-exist contrary to prior concerns of the hospital. This is because of two factors: One, hospitals and the specialists have capacity constraints and two, not all patients will prefer telemedicine and only patients who live far away from the hospital will prefer telemedicine. Thus, telemedicine cannot replace in-person visits completely since the relative preference function is non-monotone with the distance from the hospital. Thus, even with the best of technologies, our research indicates that the impact of telemedicine on the competitor will be limited.

The third major conclusion is on the differential impact of telemedicine on the patient population. We analyze how the setup cost subsidy could vary when there are people with different levels of mobility in the populations. From the patient perspective, critically ill patients are attracted more to telemedicine. But contrary to our expectations, the results indicate that it makes more sense to subsidize the adoption of telemedicine by the relatively mobile patients than for those with stricter mobility conditions. The two reasons driving the above result are, first, the relatively mobile patients are more likely to visit the hospital site for initial evaluation and for any unexpected visit that may be required from time to time. The second reason is
competition. Patients who are relatively mobile can be more easily attracted by a competing hospital which offers only in-person clinical services.

We then explore the possibility of the hospital/specialist subsidizing the setup costs. Whether telemedicine is already adopted by at least some patients or it is too costly for everybody, the hospital or the specialist may not always be keen in subsidizing the setup costs. This is because, the subsidy not only brings more patients into the hospital’s fold but also moves patients from in-person to telemedicine thus losing some revenue on these switching patients. It is only when the margins are sufficiently high to cover this transfer effect that the hospital/specialist decides to subsidize the costs. Even though from a social welfare point of view it is optimal to subsidize the setup costs, the specialist might not be interested leading to some serious policy concerns.

As an extension to our model we also demonstrate how even when technology costs are going down, there is a significant first mover advantage in terms of higher market share for the first mover. We also demonstrate how community hospitals can complement specialist care through telemedicine. When there are community hospitals available near the patient’s location, the impact of telemedicine is much larger as shown by the increase in total market coverage and also it is easier for telemedicine to penetrate the market. Thus, medical centers may adopt a hybrid model and co-opetition with community hospitals will benefit both, creating new discontinuous patient subgroups around the local hospitals. Thus, it is a win-win situation for both the major and the local hospitals resulting in partnerships and joint ventures. Even though the physical experiments are specific to Parkinson’s disease, the modeling can be adapted to telemedicine in any field where the physician does not have to be in physical contact with the patient and visual cues and other such remote signals are good enough substitutes.
References


