

“Adding Years to Life”: Physiatry, Neurorehabilitation, and Knowledge Translation

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Dr. Mark Bayley

This article shares the transcript of a recent interview with Dr. Mark Bayley, Medical Director of the Brain and Spinal Cord Rehabilitation Program at Toronto Rehab and a specialist in rehabilitation. Dr. Bayley is also an assistant professor in the faculty of medicine at the University of Toronto and holds the Saunderson Family Chair in Acquired Brain Injury Research. As Medical Director, Dr. Bayley treats people with strokes and other

brain injuries and does research in the field of brain recovery. Specifically, he focuses on identifying, measuring and standardizing the most effective approaches to neurological rehabilitation.

UTMJ: Physical Medicine and Rehabilitation (PM&R) is a specialty that medical students and most individuals have very little exposure to – that said, could you tell me about what is unique about PM&R and the role of physiatrists as part of the neurorehabilitation team?

MB: Physical medicine and rehabilitation is a relatively new specialty that arose around the time of the World Wars where people were returning from war with many types of injuries. – there were physical, musculoskeletal, neurological, spinal cord injuries, and amputations. So the specialty arose because there was recognition that taking care of people who were recovering and who were returning to usual life required a specific set of technologies and understanding of rehabilitation. The second part of PM&R is the physical medicine part of it, which involves a recognition that not all individuals come in with problems that are exactly musculoskeletal or exactly neurological, so a lot of what a physiatrist does is that they look at problems in a holistic way. Thinking, is this a musculoskeletal problem or a neurological problem or is it a little bit of both? The physical medicine side

of the specialty involves conducting detailed physical examinations to determine exactly what the problem is. The role of the physiatrist in a neurorehabilitation team is to play a coordinating role in the inter-professional team of providers such as physiotherapists, occupational therapists, speech pathologists, [and] pharmacists. That role is to help provide an input as to the understanding of the underlying pathology of the diagnosis and other complications, as is necessary. There is also an emerging science around use of medications and recovery, so we are often considering which medications to use. In managing complications of stroke [for example], a patient may have shoulder pain, spasticity and a component of neuropathic pain – all of which require treatment in order to help the person to maximally recover with the input of the other therapists. So we play an important role not only in coordinating and understanding the prognosis, but also in facilitating diagnosis and treatment of complications of strokes and brain injuries.

UTMJ: Many people have often not heard of physiatry and they confuse it with psychiatry or physiotherapy.

MB: The term physiatry comes from the ancient words for “physical doctor” and refers to the physical aspects of recovery and rehabilitation. So a lot of people confuse it with psychiatry because that is the only other specialty with “-iatry” at the end. So we are trying to raise awareness of that. The other thing is that people ask me “do you do physiotherapy?” But my answer is that I don’t do the actual therapy, but I work with therapists collaboratively to create a program of care. We examine the patient and work with the team, provide treatment and interventions for things such as pain management, medications for recovery, and management of complications that should help the therapists do their job better.

UTMJ: What drew you to physiatry and specifically neurorehabilitation?

MB: I was really drawn to physiatry first because I like the fact that physiatry was related to recovery and it had a very positive impact on people. I found that you were taking over care of people often at their worst, and helping them to get better. That aspect was combined with my interest in training and exer-

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cise physiology, as I have been a long distance runner and participated in sports all my life. I enjoy the fact you could set goals and you could train within the context of normal physiological states, but I was also interested in that aspect of training in pathological states. I was interested in helping people who had an injury recover using training, exercise and technology. That said, when I first went into physiatry I actually thought I would be more of a sports-oriented physiatrist. But what happened was that I found that the neuro-physiatry was much more fascinating. While far less is known about the brain and the mechanisms of recovery, I found it far more interesting than musculoskeletal rehabilitation. That is what led me to neurorehabilitation.

UTMJ: How would you describe the lifestyle of a physiatrist?

MB: In general, we are very fortunate in PM&R because the patients we often see are in a sub-acute phase of recovery and thus from a lifestyle point of view we tend to have a quite predictable schedule and relatively predictable on-call issues because patients are generally improving. If a patient does become truly unstable and they need the service of acute care, they are typically handled by specialists in acute care. Thus the lifestyle tends to be very good in terms of hours of work and expectation of call. Financially, it is very similar to a lot of the other specialties in medicine, perhaps even a slight advantage because of access to daily fees for patients while they are in recovery, as well as opportunities for third party funding through insurance companies for patients involved in motor vehicle accidents.

UTMJ: Do physiatrists perform any procedures?

MB: A lot of physiatrists are engaged in nerve conduction and EMG. Emerging techniques for physiatrists involved in Neurorehabilitation include a lot of interventions along the lines of botulinum injections or other focal treatments for spasticity. We also do joint injections, nerve blocks and other focal treatments such as trigger point injections and strive to better understand their role in pain management.

UTMJ: What are your favourite aspects of your job and a career in PM&R in general?

MB: From a clinical point of view, I really enjoy working with patients and helping them recover. During this process, I help explain to them what is going on, help manage their complications and see that a treatment plan is put in place so that they are able to return, as much as possible, to a functional life. But that would be a very narrow view of PM&R because I also really like the research work I do in terms of understanding how recovery works. Understanding more about what is the optimal treatment for people and how we can

implement it is really interesting to me. One of my particular interests is in the field of implementation science that looks at how we change clinician practice and take the best evidence and get it into practice. I have been interested in ensuring that all people in Ontario and Canada get access to the best possible care. I have been engaged in studying strategies to implement through best practice guidelines, decision algorithms, quality based funding procedures that reward best practice and other knowledge translation tools. Overall, it has been very rewarding to develop these strategies and observe the impact of implementation using stroke report cards and other health system evaluation reports.

UTMJ: What are your least favourite aspects of your job?

MB: I think it would be fair to say, that the least favourite aspects of the career is the administrative part of the day-to-day work which is just collecting data, managing data, trying to do the paperwork and do the reports that are necessary. It has also been challenging to help raise awareness about this specialty. That is, making sure that people are aware that we are available to help. I think that has been a big issue for us, so it is frustrating when I see a patient that would have benefited from consultation with a physiatrist or any rehabilitation professional and they have not been offered the opportunity.

UTMJ: So what have you been trying to do to promote the profession?

MB: First of all we are doing a lot of work to highlight the importance of rehab in the best practice guidelines. I have been involved in guidelines for concussion, traumatic brain injury (TBI), and stroke. This ensures that rehabilitation has a prominent location in each of those guidelines, when rehabilitation is appropriate and evidence based. We also have raised the importance of rehabilitation with stakeholder groups, such as the Heart and Stroke Foundation, Ontario Neurotrauma Foundation, and other patient/consumer groups.

UTMJ: How often and how quickly are these guidelines actually adopted?

MB: Now that is what is scary. Research suggests that the time from a publication to uptake of the article ranges anywhere from 17-30 years in many cases. So clinical practice guidelines are one way to synthesize all that knowledge that is coming out so it is easier for clinicians to use. Even with facilitation it can take several years to get practice to be widespread.

UTMJ: What is being done to speed up the process of knowledge translation?

MB: We are using a number of strategies. One of these things is doing an audit of current practice and feeding it back to people. We have generated report cards on stroke care that have been published for each of the Local Health Integration Networks (LHINs) to promote awareness of where the problems are and to promote implementation initiatives. We have also implemented the guidelines in projects we have done. For example we did a project called SCORE which stands for Stroke Canada Optimization of Rehabilitation by Evidence where we had 20 sites in Canada implement the guidelines. 10 of them were facilitated with a facilitator and 10 of them had a passive dissemination. The results showed that the group that had the more active dissemination had better uptake. We are also developing new technologies such as smartphone apps to help communicate best practice guidelines. The idea is that when you are a clinician at the front line you can input some basic data about the person's stroke, and then what type of recovery they have had so far, and it will generate a list of suggested treatments and allow you to pick from them. We believe that this will make it easier for clinicians to tailor the evidence to the person in front of them.

UTMJ: All that being said, how often do your patients with moderate to severe brain injuries recover to the point that they can function independently and/or return to work? What is typically done to help them out?

MB: The good news is that if you had a severe brain injury. Even those with severe TBIs, 60-80% of them will be able to become functionally independent with respect to their self-care and be able to return home. [In] some other forms of brain injury, such as subarachnoid hemorrhage and anorexic brain injury, the prognosis is not as good. However, in general, we are very able to get people to a state of independence and self-care. Where we struggle in our work is to help people to be able to return to work, [because] only about 20% of people with severe injuries will return to work. Similarly, only about half of injured patients will become completely independent in the community in terms of banking and budgeting. While I think we are challenged to return them to their highest function, we have very positive results in returning people to the community.

UTMJ: With this in mind, has there been research showing the specific benefits of seeing a physiatrist?

MB: Most of the research in the field looks at whether a patient gains access to a comprehensive rehabilitation team and not necessarily a physiatrist. That said, research involving randomized control trials in stroke, including observational studies in brain injury, con-

sistently show that rehabilitation results in improvements in function. We are currently doing research in patients' trajectories of care and studying whether access to physiatry improves outcomes – however, I don't really have the results for that yet. In general it is hard to separate a physiatrist's impact from that of the interprofessional rehabilitation team because physiatry is very much team-oriented. Nevertheless, I do believe there is a clear benefit to having access to a rehabilitation consultation.

UTMJ: For those interested in neurorehabilitation, what is the difference between taking the PM&R route versus the neurology route and then doing a fellowship in rehabilitation?

MB: The PM&R is unique in many ways. Similar to taking a route through neurology we have a core basis in internal medicine of one and a half years, and we do have some training in neurology, rheumatology, and orthopedics. The difference in PM&R is that you then get to see people as they progress through neurorehabilitation in the program. So during training, we do core rotations in brain injury, spinal cord injury, stroke rehabilitation, and neuromuscular rehabilitation, and I think that prepares you better for the complex problems that patients will come to you with. So the difference is that in neurology you may take a look at only the neurological elements, whereas in physiatry when we take care of a traumatic brain injury patient, a significant proportion (30-50%) will also have musculoskeletal injuries and other physical complications that we are very well trained to manage. Similarly, some individuals may require treatment for bracing and orthotics, which is part of the training in PM&R. Other people have peripheral nerve injuries that are concomitant with their musculoskeletal injuries; that is also part of the physiatrists' training. Thus, PM&R provides you with a comprehensive understanding of the complications patients may experience. The next major learning component focuses on the physiology of exercise, which helps provide an understanding of how training and rehabilitation works. This is something that you normally would not get exposure to in a traditional neurology or rheumatology program. In contrast, neurologists are frequently looking at diagnostics around headache, movement disorders, and other types of neurological disorders. So their focus is on diagnostics and medical treatments, whereas our focus is to look at not just the medical treatments. The physiatry toolkit also includes other things such as physical techniques, assistive technology, bracing, prosthetics, educational/self-management approaches, and cognitive compensatory strategies.

UTMJ: How do you foresee the future of physiatry and the role of technology in facilitating rehabilitation?

MB: I think the future of physiatry is bright in that there are so many emerging technologies that will help rehabilitation. Some people say that genomics and pharmacological agents will put rehabilitation out of business. But I don't believe that because even if we do discover growth factors, genetic treatments, or [if] cancer becomes a chronic disease, these people will end up living with chronic disease and require rehabilitation to maximize their function. For example, if you administer nerve growth factors post-stroke and now they get a new set of nerve cells, one still needs to train those nerve cells how to function. That said, I believe the future of rehabilitation is very bright. There are numerous technologies that are coming out that are very exciting. Genetics and genomics will be very helpful in determining predictive factors for outcomes. For example, early research has shown that certain people who have the Val-Met variant of Brain-derived Neurotrophic Factor (BDNF) recover differently from others.

I think the other new technology that is emerging in rehabilitation in addition to the neurological and pharmacological treatments is robotic technology. Such technology can be good assistive devices for people in various stages of recovery. Why have a physiotherapist to guide a repetitive exercise for a patient when you can get a robot to provide that same care without fatigue and very consistently? These robots can also help deal with the 'intensity of training' problem, as these machines do not need to take coffee breaks or even sleep at night. Robots therefore have a role in both compensatory and therapeutic uses.

We are also seeing the emergence of stimulation technology. Some examples include: Transcranial Magnetic Stimulation (TMS) for the brain, Functional Electrical Stimulation (FES) for the limbs, or even brain-computer interfaces – all of which can be used to improve patient recovery/compensatory outcomes. Instead of not being able to walk, you could potentially use cognitively induced evoked potentials to control a mechanical set of legs. Overall, I feel there are a number of different things coming out, driven by a better understanding of recovery due to the advent of non-invasive functional neuroimaging.

UTMJ: Building on that last question, in an era where many newly minted specialists are having trouble finding a job, is there a demand for physiatrists in urban centers? Is it different for those interested in sports medicine versus neurorehabilitation?

MB: In general, there are still many positions available in urban centers. We expect the demand for physiatrists to grow as the population ages and people realize that there is a benefit to having a physician who understands rehabilitation from a holistic point of view. At present many centers within a very short drive of Toronto do not have a physiatrist. So realistically, there will be work for physiatrists for many years to come.

UTMJ: Finally, what is the state of brain rehabilitation in Canada and how do we compare to the United States and to European countries with respect to helping individuals recover? What are things we do particularly well and what are things that need to be improved?

MB: [One] of the challenges across the country is variability in access. People in Ontario and Toronto have access to fairly high-quality rehabilitation programs in stroke and brain injury. However in other centres such as in rural communities, access is far more limited. Nevertheless, the access to rehabilitation in Canada is better than in many other countries in the world, including developed countries. We have very good access to stroke and brain injury care. Where we are lacking however is that our system is not as organized around intensity of treatment as the literature recommends. The problem stems from constrained budgets that cause people to cut back on physiotherapy and occupational therapy time, when those therapies are the very things patients need to recover. So we have variability in the intensity of treatment, and that is something that we are actively working on addressing.

UTMJ: That concludes the interview questions. Thank you Dr. Bayley.

MB: My pleasure.