

# A proposal for an undergraduate stroke rehabilitation curriculum appropriate for South African occupational therapy

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## ABSTRACT

The incidence of stroke will likely increase in the next few decades as the expected health of sub-Saharan Africans is predicted to deteriorate as a result of increasing infectious and poverty-related diseases. In addition, studies have shown that the risk factors for vascular disease as well as the increasing age of the population will add to this problem. Effective curriculum planning regarding stroke rehabilitation in tertiary educational institutions training occupational therapy students should be a pertinent topic in South Africa. This paper explores the opinions of clinicians and experts in the field of neurology about the occupational therapy stroke rehabilitation curricula. It also aims to clarify and evaluate opinions regarding occupational therapy stroke rehabilitation curricula, by raising awareness of the issues pertaining to the current educational curricula. Two combined methods were used which included a curriculum audit and a panel discussion. Specific information was extracted from the audit regarding the requirements for training in stroke rehabilitation, revising the number of stroke rehabilitation theories taught, the use of updated and uniform terminology across all universities, and lastly the need to teach and use standardised assessments to measure effectiveness of stroke rehabilitation techniques. Several common topics arose from the panel discussion, including the need for a suitable stroke rehabilitation theory, the difficulties in supervising students due to outdated and conflicting use of stroke rehabilitation terminology, and the importance of focussing the curricula on the needs of the South African community.

**Keywords:** Stroke rehabilitation, curriculum, occupational therapy training, South Africa

## INTRODUCTION

Stroke has been identified as an important cause of death and disability worldwide. Recently the impact of this condition on lower income countries has drawn significant attention<sup>1</sup>. The incidence of stroke is said to increase in the next few decades as the expected health of sub-Saharan Africans is predicted to deteriorate as a result of increasing infectious and poverty-related diseases<sup>1</sup>. Morbidity will likely increase due to demographic transition which leads to an increase in factors that are associated with an escalation in risk of stroke, such as unhealthy lifestyles, increased stress, lack of proper nutrition, and the loss of family and close community support. These factors are characteristic of more rural areas<sup>1</sup>. Stroke is also associated with HIV infection<sup>2</sup>, as 10% to 20% of HIV infected patients show neurological symptoms as their first manifestation, up to 40% of patients with AIDS develop clinical neurological dysfunction and up to 75% to 90% of autopsies indicate neurological involvement in persons with advanced AIDS. Sub-Saharan Africa faces an enormous burden of infectious diseases including HIV/AIDS, and therefore this directly impacts the increase in number of stroke patients who would need rehabilitation<sup>1</sup>.

Due to the disabling effects of stroke, occupational therapists are required to treat this population of patients by facilitating and improving motor control and hand function in the hemiplegic upper limb, maximising the patient's ability to perform occupational performance tasks, helping the patient manage cognitive, perceptual and behavioural changes due to the stroke, and preparing the patient for return to home and work environments<sup>3</sup>. Occupational therapists aim to facilitate task performance by improving relevant body functions and performance skills or through teaching compensatory techniques to overcome the loss of functional skills<sup>4</sup>. The burden of care of stroke survivors is also placed on caregivers and family members. Therefore, decreasing the burden of care as well as improving the quality of life of stroke survivors and their caregivers is an essential role to be fulfilled by occupational therapists<sup>4</sup>.

Occupational therapists' patient load will be affected by the increased incidence of stroke in South Africa, and it is important

that they are adequately trained to manage stroke patients effectively. It is important to explore whether the current occupational therapy stroke rehabilitation curricula are adequately preparing occupational therapists practising in this field to meet the demands of practice in this country.

## LITERATURE REVIEW

### Aligning the curriculum with clinical practice needs

The primary objective of universities offering occupational therapy training programmes is to generate competent, autonomous, and knowledgeable occupational therapists. This is achieved by providing professional education that teaches fundamental theoretical and clinical skills through academic and practical study<sup>5</sup>. The World Federation of Occupational Therapists (WFOT) minimum requirements for obtaining an occupational therapy degree reflect what is required of an occupational therapy graduate in terms of assessing and evaluating patients with physical dysfunction<sup>6</sup>. These minimum standards for education and entry-level competencies for occupational therapy require that entry level occupational therapists should be competently trained in all conditions based on the local health needs of a community<sup>7</sup>. As stroke is one of South Africa's most significant causes of illness and disability<sup>8</sup>, it requires the appropriate attention in an occupational therapy training programme, as most of an occupational therapist's workload in a general practice with physically dysfunctional patients is comprised of the management of stroke patients<sup>9, 10</sup>.

The guidelines provided by McCluskey<sup>11</sup> are broad enough to give curriculum developers flexibility in terms of the content and emphasis of a stroke rehabilitation course. In South Africa, the stroke rehabilitation curricula are not standardised across the training centres offering occupational therapy programmes. These variations in curricula, programme design and educational references in the different universities could result in discrepancies in terminology, skills and techniques in stroke rehabilitation.



With the current wide range of therapy interventions that exist, curriculum developers and researchers could consult occupational therapists in the field regarding methods they find effective and appropriate in clinical practice, and they could consider these opinions in curriculum development<sup>12</sup>. The curriculum design and content of university courses would usually also consider, amongst other factors, the work required of an entry-level occupational therapist<sup>9</sup>. Decisions regarding the development of suitable stroke rehabilitation curricula may therefore be shaped by academic as well as experienced occupational therapists practising in this area. A disparity between occupational therapy education and practice has been found, and one way to close the gap is to align curriculum content to clinical practice<sup>12</sup> by better collaboration between academics and clinicians.

Academics are often perceived to only value evidence and theory, and clinicians argue that they need to react to difficult and complex situations immediately and spontaneously, and skills and techniques they were taught might not always be applicable in reality<sup>12</sup>. In the opinion of the author, the ideal curriculum should therefore consider what the latest research has developed in terms of skills and knowledge, but it should also be sensitive to, and incorporate, the needs and available resources of the occupational therapists and patients. Most importantly, the curriculum should consider the health needs of the community, as also reinforced in the WFOT minimum requirements for training.

In other countries such as the USA, the challenge of aligning the content of a curriculum with the requirements of clinical practice has been continuing since a study in 1979. A study has found discrepancies between the treatment activities therapists had been taught during their academic courses and activities they were using in clinical practice<sup>9</sup>, but no literature is currently available regarding the situation in South Africa. One reason for the disparity between training and practice may be that many of the techniques and skills that students are taught are developed and researched in countries other than South Africa. The available research on stroke rehabilitation has been completed in developed countries such as the United Kingdom (Neurodevelopmental therapy<sup>13</sup>) and Australia (Motor relearning theory<sup>14</sup>) and Norway<sup>15</sup>, making it difficult to translate to local interventions. This could be due to the differences in resources, patient profiles, comorbid disease profiles and available time for rehabilitation. Occupational therapists in South Africa should be careful not to accept what is prescribed by research in western countries without proper interrogation of the applicability and appropriateness in the South African context<sup>16</sup>.

The average South African stroke patient may present differently from the average British or Australian patient, as the majority of South Africans still face challenges such as extreme poverty, lack of basic resources (e.g. running water and electricity) and the effect of HIV/AIDS on stroke presentation and prognosis<sup>8</sup>. Addressing functional activities such as collecting water from a distant source is a different challenge to a stroke patient in England learning how to drive again. Patients are often unable to attend out-patient therapy due to the lack of public transport for disabled persons, and due to the low socio-economic situation of disabled persons, private transport is most often not an option in the South African context. Vast distances may further complicate their ability to reach the nearest rehabilitation centres<sup>17</sup>. Co-morbid conditions associated with poor nutrition, poor sanitation and overcrowding also affect the recovery rate of stroke patients, which then require more intensive therapy. This is not always possible due to the restriction of access to therapy and the therapists' heavy patient-load<sup>8,16,17</sup>. Stroke rehabilitation is therefore a complex process, and requires a high level of experience and problem solving skills to influence the patients' ability to function as independently as possible.

An appropriate starting point for developing or revising a curriculum should be with the priorities of the stroke rehabilitation practices and the problems clinicians find most important to address. Training should then align with the health needs and available resources of the patient population.

In a previous study carried out in Australia regarding collaborative curriculum development in neurology, occupational

therapy clinicians elaborated on the components they felt stroke rehabilitation training should include<sup>11</sup>. They specifically highlighted the importance of teaching thorough assessment skills in stroke rehabilitation, choosing appropriate stroke rehabilitation theories to include in the curriculum and building confidence in occupational therapy students by giving sufficient opportunities for practising the management of stroke patients during their training<sup>11</sup>.

### Assessment in stroke rehabilitation

It has also been felt that there is a need to use standardised assessments to ensure rehabilitation goals are related to activity and participation<sup>18</sup>. These goals must be specific, measurable and attainable, realistic, and relevant to the individual person<sup>3</sup>. From previous reviews, it is clear how important standardised assessments are to show effectiveness of techniques and the value of occupational therapy<sup>3,18</sup>. There should therefore be exposure to appropriate and relevant standardised assessments during the training of occupational therapy students. Educators should scrutinise assessment tools based on the areas in which occupational therapists will practise, the resources available and the population being assessed<sup>18</sup>. As universities aim to train competent occupational therapists, part of their competence should be to assess stroke patients thoroughly. This will be credible within the multi-disciplinary team, within the occupational therapy profession and, most importantly, in the best interest of the patient<sup>11</sup>.

Examples of standardised measures for assessment of areas of occupation in stroke rehabilitation include the Functional independence measure (FIM)<sup>19</sup>, Barthel index<sup>20</sup> and the Assessment of Motor and Process Skills (AMPS)<sup>21</sup>. Several standardised assessments for evaluating perceptual functions after stroke are available, and a commonly used one is the Rivermead Perceptual Assessment Battery (RPAB)<sup>22</sup>. Some of the common visual perceptual disorders seen in stroke patients are agnosia, figure-ground, depth perception and body scheme disorders, and unilateral neglect<sup>23,24</sup>. These disorders affect the ability of the patient to move normally in order to perform tasks in all areas of occupation. Assessments available for measurement of cognitive, memory and executive functioning abilities are the Mini Mental State Examination (MMSE)<sup>25</sup>, the Cognitive Assessment of Minnesota (CAM)<sup>26</sup>, the Rivermead Behavioural Memory Assessment (RBMA)<sup>27</sup> and the AMPS<sup>3</sup>. Several standardised assessments are available to measure the neuromusculoskeletal and movement related functions. The most commonly used assessment to test for an increase in muscle tone is the Modified Ashworth scale<sup>3</sup>. Manual muscle testing, grip and pinch strengths can be measured using the Oxford scale and a dynamometer<sup>3</sup>. Assessments commonly used to evaluate the return of movement in the limbs and hand is the Fugl-Meyer Assessment of Motor Recovery after stroke<sup>3,28</sup> and the Motor Assessment Scale<sup>29</sup>. There is no single upper limb assessment method that is universally accepted<sup>3</sup> therefore results of assessments recording the patient's ability to move must be correlated with the patient's ability to perform functional activities.

### Stroke rehabilitation theories

Another factor that has been highlighted is the need to teach appropriate stroke rehabilitation theories, which focusses on motor retraining, particularly of the upper limb<sup>11</sup>. The occupational therapy clinicians in the McClusky<sup>11</sup> study identified Proprioceptive Neuromuscular Facilitation (PNF) theory, the Neurodevelopmental theory (NDT), and the Motor Relearning Theory (MRT) as suitable theories to be included in a curriculum<sup>11</sup>. Although, previous studies have not included the MRT in the curricula, this study from Australia supported its inclusion<sup>11</sup>. However, the study also showed that occupational therapy clinicians are of the opinion that a curriculum should not teach several theories, but rather focus on a smaller number of theories. The saying "Jack of all trades, but master of none" may become true. If occupational therapists are trained in multiple stroke rehabilitation theories; they may run the risk of knowing a little of everything, but due to the time constraints in a full curriculum, there may not be enough time to adequately comprehend each theory<sup>11</sup>. Novice occupational therapists practic-



ing in this field may also feel overwhelmed by the large number of theories that inform practice.

The NDT theory is a popular approach used by occupational therapists worldwide, as well as all the members of the neurological rehabilitation multidisciplinary team<sup>13,30,31,32</sup>. The original NDT theory developed by Bobath and Bobath in the 1940s included the use of manual techniques to eliminate spasticity and dysfunctional movement patterns and to retrain normal patterns of coordination in the affected trunk, arm, and leg. The Bobaths have presented their methods and theories in two well-known books published in 1974 and in 1990<sup>33,34</sup>. NDT is based on current neurophysiology, muscle, and motor learning to promote specificity and individuality in assessment and treatment<sup>35</sup>. The main goal for treatment is normal functioning, to minimise impairments and to prevent disabilities. The therapist uses principles of movement science to address quality of movement, and this includes direct handling, including facilitation and inhibition, to optimise function<sup>36</sup>. There is however limited research indicating the effectiveness of this theory in the rehabilitation of stroke patients<sup>31,37</sup>, and it has not been shown to be superior to other methods of intervention<sup>30,38</sup>.

The MRT by Carr and Shepherd suggests that active practice of context specific motor tasks with appropriate feedback would promote motor learning and motor recovery. The MRT is based on the dynamic systems theory of motor control, the neuroplasticity of the CNS, and the maladaptive biomechanical changes that occur after CNS injury<sup>14,39</sup>. Principles of motor learning guide the therapist in structuring the therapeutic environment to maximise the patient's recovery of motor function<sup>39</sup>. The emphasis is on training for control of the muscles and preserving the integrity of the musculoskeletal system, as well as on promoting the learning of the relevant actions and enabling active participation by the patient<sup>14</sup>.

The Brunnström theory is another theory well known in South Africa. This theory encourages treatment that progresses developmentally from evocation of reflex responses to willed control of voluntary movement, to automatic, functional movements<sup>40</sup>. Emphasis is placed on the importance of voluntary willed movements, and a patient will be more successful with familiar movements with a goal, and repetition of the correct movement is essential for motor learning. There are limited studies available to support the effectiveness of this theory, and some of the basic research of this theory seems to be outdated.

The Rood theory is also a theory used in stroke rehabilitation by occupational therapists. This theory uses facilitation techniques to facilitate muscle activation, and this includes tactile, thermal, proprioceptive and special senses. A therapist trained in the Rood theory will use facilitation techniques to elicit muscle activity, and inhibitory techniques are used for the treatment of hypertonicity<sup>41</sup>. Some of the techniques address the neural component of hypertonicity (spasticity), and the visco-elastic components (hypertonicity and secondary impairments). These facilitation and inhibition techniques must be used in conjunction with goal directed action for the purpose of developing movement related abilities<sup>41</sup>. Again, there is very little evidence to support the effectiveness of this method of intervention.

It is crucial that occupational therapy stroke rehabilitation curricula are continuously reviewed to ensure that occupational therapists qualify with basic and essential knowledge and skills to manage stroke patients in South Africa, understanding the complexities of the condition, but also understanding the complexities of the South African population and its health needs. Occupational therapists should also not follow theories blindly after their training, but should continually evaluate their patients' progress through reliable and valid assessments to ensure that their intervention is effective.

### Course requirements for training confident occupational therapists

As the field of neurology is complex, it is a difficult area of practice in which occupational therapists have to build confidence. This factor was identified by the occupational therapy clinicians in the Australian study as essential in assessment and treatment of patients with neurological dysfunction<sup>11</sup>. In order to gain confidence, stu-

dents should build a sound theoretical base by ensuring that they read, understand and discuss current literature in neurology<sup>11</sup>. It is also essential that students gain knowledge and confidence through supervised practice of skills. Students need actual hands-on experience of handling patients with neurological dysfunction<sup>11</sup> and it is crucial that students are supervised by occupational therapists with sound foundational knowledge, good assessment and treatment skills, and excellent justification for their use of specific theories. Supervisors with sound evidence based practice knowledge and skills and who are role models in their practice of stroke rehabilitation theories should be selected to be involved in student training.

## METHODOLOGY

The methodology will be presented in two parts. The first part relates to the curriculum audit and the second part to the panel discussion. The audit was done as part of a M.Sc. (Occupational Therapy) study. The recommendations from this study led to the researcher seeking to further discuss the issues regarding the training of occupational therapists in the field of stroke rehabilitation. A panel discussion was held at the occupational therapy association of South Africa's (OTASA) conference held in Kwa-Zulu Natal in July 2012 to elaborate on the topic.

### Methodology of survey

A cross-sectional descriptive survey was used to audit the stroke rehabilitation curricula of the occupational therapy training centres in South Africa. Lecturers responsible for the teaching of stroke rehabilitation at all eight occupational therapy training centres were invited to participate in the study. This was done by providing the necessary information regarding the content of the curricula at the centres. The study sample consisted of seven of the eight occupational therapy training centres in South Africa that gave permission to participate in the study (the universities of the Witwatersrand, the Free State, Pretoria, the Western Cape, Stellenbosch, Kwa-Zulu Natal and Cape Town). One lecturer from each centre submitted the information for the audit.

The research measuring instrument used to obtain information for the curriculum audit was an electronic, self-administered form. Curricular structures were different at each university; therefore the researcher asked specific questions and requested documentation in order to make a comparison between the courses. The curriculum audit form was purpose-designed for the study, based on a questionnaire used in studies done in the UK, Australia, New Zealand, Canada, and South Africa<sup>5</sup>. A pilot study was done with the curriculum audit form and adaptations were made according to the recommendations that arose from the pilot study. The audit consisted of two sections where the researcher requested information regarding the content of the curricula in the first part, and specific closed-ended questions were presented in the second part.

The curriculum content specifically focussed on the structure and the objectives set for the course.

The information requested in the second part included:

- ❖ The specific requirements regarding the number of patients with neurological dysfunction, and the estimated number of patients with neurological dysfunction the students would assess and treat during the four year course.
- ❖ The stroke rehabilitation theories taught to the students during the four year course.
- ❖ The stroke rehabilitation assessments (standardised and non-standardised) taught to the students during the four year course.

The researcher collected all the information electronically from the respective lecturers.

Descriptive analysis was done to ascertain the content of the different courses. The data were processed and presented in tables and figures.

### Methodology of panel discussion

Participants for the panel discussion were invited prior to the OTASA conference in July 2012. The researcher invited all registered attendees of the conference to participate as panelists in the panel discussion. The



invitation was sent through the conference organisers. Four panelists were selected by the researcher to participate. The panelists were selected if they were occupational therapists practising in the field of stroke rehabilitation and the researcher ensured that they were from diverse backgrounds. The panel included two lecturers from different training centres, one newly qualified occupational therapist and an occupational therapist experienced in the field of stroke rehabilitation. Each panelist was asked to prepare a five minute presentation on (i) perceived current assets to enable effective practice and training in stroke rehabilitation (ii) perceived current frustrations and barriers preventing effective practice and training in stroke rehabilitation (iii) perceived problems with the current curricula (iv) perceived strengths of the current curricula, and (v) suggestions for the future of stroke rehabilitation training in South Africa. The audience was able to ask questions and give their comments to the panel. The panelists and audience members gave informed consent to participate and to be audio recorded. The panel discussion was recorded and transcribed by the researcher. The main points from the panel discussion were summarised, and organised based on the answers from the curriculum audit, i.e. the requirements of the courses, the stroke rehabilitation theories taught and the assessments taught.

## RESULTS

The results from the curriculum audit and the main points from the panel discussion are presented under the following headings: The stroke rehabilitation curricula content, the specific requirements, the stroke rehabilitation theories and the assessments taught.

### The stroke rehabilitation curricula content

The typical route for qualifying as an occupational therapist in South Africa is through a four year degree at any one of the eight training centres. The training centres have differently structured programmes. The students will have some exposure to patients in the first three years, but the final year of the course consists mainly of clinical fieldwork practice under the supervision of qualified occupational therapists. Students only have exposure to stroke patients when they are in a setting for the treatment of patients with physical dysfunction, or a community setting where they would manage patients with a variety of physical and psychiatric conditions.

The researcher found differences in the requirements of assessment and treatment of stroke patients at the training centres, due to the different structures of the occupational therapy courses. Some training centres teach clinical skills in occupational therapy applied to physical dysfunction, psychiatric dysfunction and applied to paediatrics in one course, and theoretical foundations in another. At other training centres, physical dysfunction, psychiatry, and paediatrics are taught theoretically and practically in different courses. Comparison of the stroke rehabilitation courses is therefore difficult due to these differences in the curricular structures.

Modes of teaching were unique to each setting and curricular structure. These methods ranged from problem based learning, traditional teaching, case based teaching, and a hybridisation of different methods. Training centres were similar in their structure of clinical fieldwork. Occupational therapy students were exposed to clinical fieldwork practice with patients in all junior years, and they have an opportunity to manage stroke patients in a variety of settings in the final year of study.

### Specific requirements in stroke rehabilitation courses

None of the training centres indicated that there are stipulated requirements regarding the number of stroke patients assessed and treated during the four year course. The lecturers noted that the number of stroke patients managed during the four year course depends on where the student is placed during clinical fieldwork. All the centres reported that the students have the opportunity

to practise assessment and/or treatment skills with at least one stroke patient during the four years of training. Thus, an occupational therapist may graduate after assessing and/or treating only one stroke patient and still meet the minimum requirements for training in occupational therapy.

A concern raised in the panel discussion was the insufficient amount of time in the curriculum to teach and practise stroke rehabilitation clinical skills. While some training centres are equipped with state-of-the-art clinical skills laboratories for students to use independently and in their study time, the current frustration is that students do not seem to utilise this facility optimally. The students still require some instructions and guidance due to the complexity of stroke rehabilitation.

Results from the panel discussion indicated that there does not seem to be a shortage of appropriate patients for students to practise their skills, and there are sufficient placements for students to do clinical fieldwork. There are also sufficient opportunities for students to be exposed to stroke patients, but students sometimes lack correct guidance from supervisors or are exposed to supervisors who practise differently due to diverse training.

Panelists discussed the difficulty of separating undergraduate skills and requirements from postgraduate requirements, as stroke rehabilitation is complex. The audience also emphasised the difficulties of expecting unrealistic knowledge, skill and experience from newly-qualified occupational therapists. A high level of skill is often expected after only minimal contact with stroke patients in training. The complexity of stroke rehabilitation was noted, reminding occupational therapists and lecturers of the high level of skills and knowledge that are required to manage stroke patients effectively; which only comes with postgraduate training and several years of experience.

### Stroke rehabilitation theories taught at an undergraduate level

As can be seen in *Table 1* the NDT theory is taught at all the centers in the sample (n=7). Only three centers are providing training to the students in the MRT and Brunnström theory. Only two centres are including the Rood theory in their training.

**Table 1: Summary of theories taught at each of the training center's (n=7)**

	Total number of theories included in curriculum	NDT theory	MRT	Rood theory	Brunnström theory
Centre 1	1	X			
Centre 2	4	X	X	X	X
Centre 3	1	X			
Centre 4	4	X	X	X	X
Centre 5	1	X			
Centre 6	1	X			
Centre 7	3	X	X		X
<b>Total</b>		<b>7</b>	<b>3</b>	<b>2</b>	<b>3</b>

During the panel discussion it was noted that the NDT theory is seen as the most superior theory to use in South African stroke rehabilitation. This was also raised by the audience as a concern in terms of the status attached to NDT training and the expectation that all occupational therapists working in stroke rehabilitation should be trained in NDT in order to be competent. A point was raised that there was insufficient evidence to show that this theory is the most effective theory to use in the South African context.

### Assessments taught at an undergraduate level

#### Non-standardised assessments

All the training centres in the sample taught assessment of the commonly affected body functions: balance, muscle tone, postural control, coordination and range of motion as part of the undergrada-



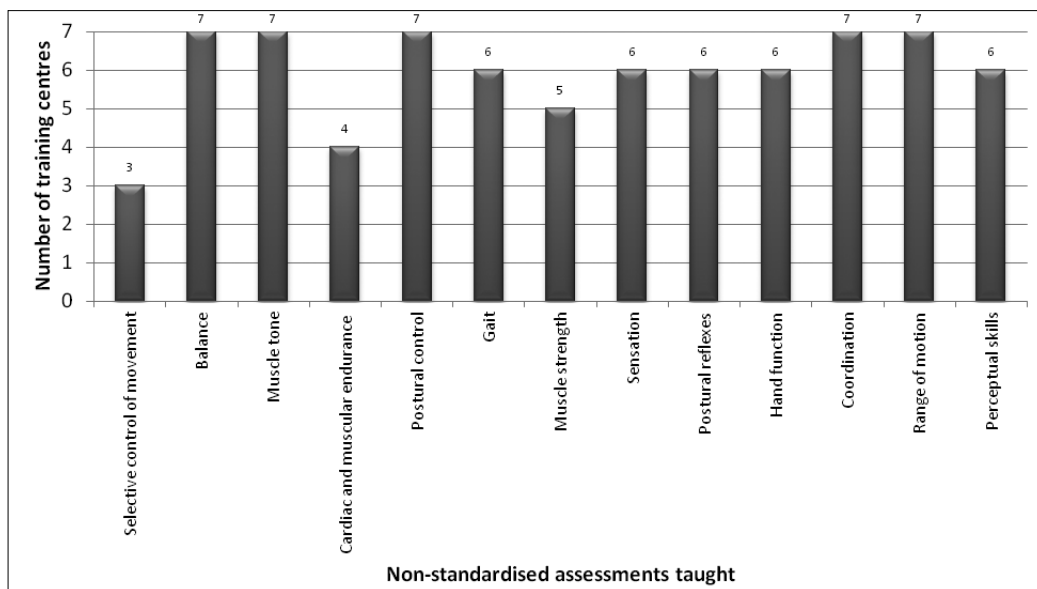
ate training (see Figure 1). Commonly affected body functions such as cardiac and muscular endurance are only taught at four centers (57.1%), and selective control of movement is taught at only three centres (42.9%). At five centres muscle strength assessment is taught, although it was not determined if this is taught in relation to neurological conditions specifically, or in general (i.e. as part of the musculoskeletal conditions).

(AMAT)<sup>44</sup>, Motor Assessment Scale (MAS)<sup>29</sup> and the Assessment of Motor and Process Skills (AMPS)<sup>21</sup> are not taught at any of the centres.

## DISCUSSION

### The stroke rehabilitation curricula content

The diverse structures of the occupational therapy courses across the universities in South Africa will limit university departments'



**Figure 1: Non-standardised assessments taught at the training centres in the undergraduate degrees (n=7)**

There was also a discussion by panelists and the audience around curricula being outdated in terms of terminology. There seems to be an outdated focus on treatment of certain body functions and performance skills such as spasticity, and the lack of teaching of skills in muscle strengthening and alleviating secondary impairments caused by stroke. The view of the panelists was that students become frustrated when they are supervised by clinicians from different universities, as some clinicians avoid muscle strengthening, while others believe firmly in normalising muscle tone.

### Standardised assessments

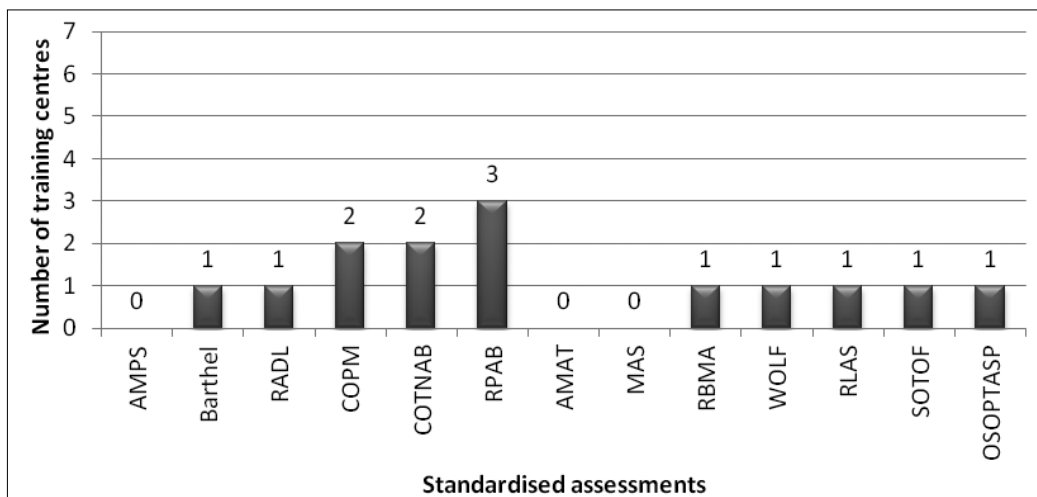
A wide range of options were given in the survey, and the participants had to select the standardised assessments taught at their training centres (see Figure 2). The Rivermead Perceptual Assessment Battery (RPAB)<sup>22</sup> is taught at three centres (42.9%) and the Canadian Occupational Performance Measure (COPM)<sup>42</sup> and the Chessington Occupational Therapy Neurological Assessment Battery (COTNAB)<sup>43</sup> are taught at two centres (28.57%). The Arm Motor Ability Test

ability to standardise the stroke rehabilitation curricula. A solution would be for university lecturers and curriculum developers to join with experienced occupational therapists working in the field of stroke rehabilitation to align the curriculum with the situation in the clinical field, so that the stroke rehabilitation course is appropriate for an entry level occupational therapist. It is suggested that curriculum developers at the training centres should review the exact core competencies or basic skills required of entry-level occupational therapists in the field of neurological rehabilitation. A reduction in the amount of information given in a course could allow for more time to practise essential clinical skills. Further research is required regarding

this topic, and a method of data collection to extract more in-depth information should be developed.

### Course requirements for stroke rehabilitation

The survey and panel discussion highlighted that there are no set requirements regarding the assessment and treatment of stroke patients, particularly the number of patients seen during the four year undergraduate training course. The lack of set basic requirements is of concern as a novice's confidence in treating patients can only be developed through sufficient opportunities to practise. A study in the United Kingdom regarding graduates' perceptions of their preparation for clinical roles indicated that they felt ill-prepared for more specific evaluation procedures and that they needed more practical knowledge in their curricula<sup>5</sup>. It is recommended that training centres collaborate to revise the minimum requirements of training by agreeing on the minimum number of stroke patients a student should assess and treat during their clinical fieldwork experiences. As seen from the panel discussion, there is a great concern that students only being exposed to one stroke patient are unlikely



**Figure 2: Standardised assessments taught at the training centres in the undergraduate degrees (n=7)**

to be competent in this field. The requirements for qualification should also state clearly that students should practise skills in both assessment and treatment. The Australian study stated that occupational therapists will only qualify with the necessary skills and confidence when the curriculum structure has allowed for sufficient practice opportunities with stroke patients<sup>11</sup>.

A recommendation made by the panelists was that educators could optimise students' learning experiences with teaching tools in addition to formal clinical placement opportunities to interact with and manage stroke patients. These tools could



include videos, practical skills laboratories and patient simulations. Students could also have access to a variety of learning material available through electronic-learning, through lecturers and clinical supervisors developing electronic audiovisual resources to enrich the students' experiences.

Clinical skills laboratories are an ideal solution to the problem of limited time doing clinical fieldwork to ensure students are competent in stroke rehabilitation. A suggestion was made that the student could be given outcomes and measurable evaluations to test whether their skills are sufficient; quizzes and computerised skills tests could be used to indicate to them whether they had become competent. These self-evaluations would encourage more effective use of their self-study time.

### **Stroke rehabilitation theories taught at an undergraduate level**

One study suggested that training in the NDT theory, MRT and PNF should be given<sup>11</sup>, and another in the United States of America found that the occupational therapists and physiotherapists were most commonly trained in the NDT, Brunnström and PNF theories<sup>31</sup>. Therefore, the findings from the current study are congruent with that of other countries, as the NDT theory is also taught most frequently at the training centres in South Africa.

The NDT theory has historically been the most popular stroke rehabilitation theory amongst occupational therapists and physiotherapists<sup>13,30,31,35,45,46</sup>. Often the decision to use NDT is based on initial education and previous experience, and not necessarily on evidence based research findings<sup>30</sup>. Clear research stating that any one of the stroke rehabilitation theories is superior to the others is yet to emerge<sup>13</sup>.

The confusion regarding which theory to use in practice might however be overstated. Recent studies showed that any stroke rehabilitation theory an occupational therapist uses will be effective<sup>45</sup>. Therefore, the theories selected for inclusion in the curricula should rather be based on the latest research on neuroplasticity and the recovery of the central nervous system after a neurological lesion. It is recommended that the use of evidence based practice principles be first considered before deciding on the content of stroke rehabilitation curricula<sup>11</sup>. However, the most important consideration is whether the theory allows for intervention with clients in the South African context. As mentioned in the panel discussion, the majority of stroke patients live in rural communities, and occupational therapists can usually not undertake intensive rehabilitation on a one-on-one basis. The theory therefore needs to be flexible and allow for home programmes, group therapy and independent practice by patients and families, and should not require intensive intervention from the occupational therapist. Intervention has to be based on improvement of occupational performance and community reintegration, and not just the underlying dysfunctional components such as weakness, spasticity and secondary impairments. Panelists also discussed the need to focus more on the treatment of chronic stroke patients and the population requiring rehabilitation in the rural areas of South Africa. The intensity and individual attention required by the NDT theory may therefore not fit well with the needs of the majority of stroke patients.

Another concern raised in the discussion was that occupational therapists might be realising the shortcomings of certain stroke rehabilitation theories, and therefore supplementing them with other theories, and thereby hybridising several very different theories. The danger of hybridisation is that occupational therapists become unsure of what techniques they are using and are unable to explain their actions. This is confusing for students who are learning the use of theories as interpreted by their role models.

It was mentioned in the panel discussion that the answer might lie in teaching one effective stroke rehabilitation theory rather than several theories that do not have sufficient evidence for effectiveness in our unique context. Which theory this is to be has yet to be decided.

## **Assessments taught at an undergraduate level**

### **Non-standardised assessments**

Due to the differences in non-standardised assessments taught at the different training centres, as well as emerging evidence of the most effective treatment of body functions that should be addressed in intervention with stroke patients, it is recommended that the curricula be revised. The revision should be based on the latest research in stroke rehabilitation. This includes a reduced focus on the treatment of spasticity. Reducing spasticity during intervention with stroke patients has been proven ineffective in automatically improving performance, and there is little correlation between a reduction in spasticity and an improvement in function. Although the presence of spasticity is acknowledged, the emphasis in therapy has been questioned<sup>47,48</sup>. The reduction of spasticity is traditionally treated using the NDT<sup>33,34</sup> and Rood theories<sup>13,49</sup>. The results from this study show that all training centres teach the assessment of muscle tone. However, it is important to note the research findings regarding the effect of abnormal muscle tone on a person's function after stroke and that abnormalities in muscle tone alone do not cause dysfunction<sup>14,39,47</sup>.

The treatment of negative impairments, as described in literature<sup>50</sup>, is becoming more important in reducing disability after stroke, therefore muscle strengthening and improvement of endurance should be a priority in treatment<sup>39,47</sup>, and skills in assessing these components should also be a priority. The results from this study show that not all centres consider muscle testing as part of the assessments taught in stroke rehabilitation. The improvement of muscle strength and reduction of secondary impairments have been shown to be correlated with an improvement in function of stroke patients<sup>14,47</sup>, and may be seen as essential in a stroke rehabilitation curriculum.

As discussed in the panel, students are experiencing frustrations due to the different terminology used by clinicians, and the different focuses in stroke rehabilitation. Revision of the content of the curricula should also clear up confusion regarding terminology and the most important factors affecting abnormal movement after central nervous system injury. Supervisors should ensure that they are updated regarding the latest information in stroke rehabilitation, and training centres should host regular workshops to ensure that clinicians understand what students are taught.

### **Standardised assessments**

The findings from the current study show that very few standardised assessments are included in the undergraduate curricula. If occupational therapists are not taught to use standardised assessments effectively during their undergraduate training, their subsequent ability to use these assessments as part of their intervention protocols could be negatively affected. Assessments should not be based on observations and subjective opinion only. However, previous surveys showed that general observations were used most frequently, and occupational therapists have been widely criticised for their lack of use of standardised assessments<sup>3,18,23</sup>. A principle should be followed in the occupational therapy profession that a sound assessment or re-assessment cannot be based on observations only, but should be supplemented and substantiated by standardised assessments<sup>39</sup>. Through the increased use of standardised assessments, occupational therapists will be able to provide evidence for their intervention techniques. In order to research the effectiveness of the NDT theory specifically in the South African context, standardised assessments should be used instead of subjective opinions and observations only.

## **CONCLUSION**

Stroke is a disabling condition which affects stroke survivors and their families' ability to function in everyday tasks. Stroke rehabilitation is an important field in which students should receive adequate training and experience in order to manage stroke patients effectively and competently, as research predicts an increase in stroke incidence in sub-Saharan countries. In order to ensure that training at an under-



graduate level is sufficient to ensure that newly qualified occupational therapists can manage stroke patients effectively, several changes would have to be made to the current stroke rehabilitation curricula in South Africa. Firstly, requirements of the number of stroke patients students assess and treat during the four years of training should be revised and formally set. Secondly, the most suitable stroke rehabilitation theory for the South African setting should be selected, and the number of theories taught should be limited to ensure competence and understanding of all concepts related to that theory. Thirdly, the terminology and focus on underlying dysfunctional components after stroke should be based on the latest evidence in stroke rehabilitation, and all training centres should use the same terminology to make supervision less frustrating and confusing across the different universities. And lastly, the use of standardised assessments should be introduced at an undergraduate level, to ensure that occupational therapists are evaluating their effectiveness and ensuring that their practice is evidence based. This will also allow for sound evidence to be presented regarding the most suitable stroke rehabilitation theory for South Africa.

### Special thanks and acknowledgements

The author would like to thank the following persons and acknowledge their contribution to the article by assisting with the panel discussion: Fiona Millan, Amshuda Sunday (University of Cape Town), Anupa Singh and Jodie de Bruyn (University of Pretoria).

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## The influence of blended learning on student performance in an undergraduate occupational therapy curriculum

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**ABSTRACT**

*Change is scary, especially when the world of technology, lecturers (digital immigrants) and students (digital natives) come together with learning in mind. Developing blended learning by integrating e-learning into an existing undergraduate Problem Based Learning (PBL) curriculum requires adaptable lecturers and the time for students to become habitual users of the Virtual Learning Environment (VLE). The occupational therapy curriculum at the University of the Witwatersrand has traditionally been delivered via PBL, but the increasing need to improve throughput rates and meet the diversity of learning needs of the students has driven the strategy towards blended learning. This study investigates the effect of habituation (student experience in using e-learning automatically) on student performance in one PBL module.*

*A retrospective two-cohort design was used to review the students' access to the VLE and their performance on the summative assessments of the PBL module of two concurrent academic cohorts. Data were analysed descriptively and statistically for significance (Mann-Whitney U) and effect size (Cohen's d and Hedge's g).*

*There was a significant difference between the two cohort's access to the VLE ( $p \leq 0.002$ ) indicating higher habituation to blended learning in the second cohort, who had more exposure to e-learning due to their second year of using VLE. There was a small but relevant effect size (average  $d = 0.31$ ) in all three measures of student performance when comparing the two cohorts. The average of the student marks on each measure shifted from a failing to a passing average. This study shows that the habituation of blended learning into an existing curriculum results in improved academic performance.*

**Keywords:** curriculum design, blended learning, connectivism, e-learning, developmental assessment

### INTRODUCTION

The context of this study is within an existing Problem Based Learning (PBL) occupational therapy undergraduate curriculum and considers the effect of change management of embedding blended learning within one PBL module by comparing two concurrent cohorts of students in the third year of study. This learning module relates to the skills and knowledge required to assess and treat chil-

dren with learning challenges. Integrating e-learning into the existing PBL curriculum (creating a blended learning environment) has been a strategic focus within the department over the past four years.

### LITERATURE REVIEW

Problem Based Learning (PBL) is recognised as a successful pedagogical strategy in the training of undergraduate occupational

