STATISTICAL RESULTS OF AN ANALYSIS OF THE PHYSIOTHERAPY DEPARTMENT IN THE JOHANNESBURG HOSPITAL

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ABSTRACT: *The health services environment in South Africa has changed dramatically during the past five years especially for state-funded hospitals in the public sector. At the Johannesburg Hospital the admission of chronic patients has increased considerably over the past five years, thus increasing the workload for the physiotherapists. In spite of the increased workload of physiotherapists the staff complement of the Physiotherapy Department has decreased from forty-one to eighteen staff members due to severe budget constraints.*

The radical cuts to the staffing structure prompted this investigation. This article describes the results obtained from statistical analyses of time sheets completed by the staff over a six-month period to determine whether the staff complement was adequate.

The approach followed with the statistical analysis was to use confidence intervals to compare the standard treatment times with the actual treatment times. Hypothesis testing was used to determine whether it would be possible to standardise treatment times for similar treatments in different treatment areas. The required capacity was calculated based on the amount of time spent on direct patient care by the physiotherapists during the six-month period.

KEY WORDS: PHYSIOTHERAPY DEPARTMENT, PUBLIC HOSPITAL, STATISTICAL ANALYSIS, TREATMENT TIMES, STANDARDISATION, CAPACITY CONSTRAINTS, STAFF SHORTAGE

INTRODUCTION

The health services environment in South Africa has changed dramatically during the past five years especially for state-funded hospitals in the public sector. There has been a reduction in the budget allocations to hospitals in the public sector as a result of a decision to reduce funds to state-funded hospitals and to increase funds for primary health care. This decision was taken to provide better health services to the entire population of the country. Under the previous government persons living in rural areas were particularly neglected. Primary health care focuses on basic health services provided by clinics. Another concession that was made was that children under six years and expectant mothers would be treated at any public hospital at no cost to the patient. This concession led to an increased demand for these services at tertiary care hospitals such as the Johannesburg Hospital and as a result overloading the budgets and facilities. At the Johannesburg Hospital the admission of chronic patients has increased considerably over the past five years, thus increasing the workload for the physiotherapists. Much of the work of physiotherapists is related to the treatment of patients with chronic diseases. In addition there has been a significant increase in the numbers of acute cases admitted due to trauma. Physiotherapists deal directly with these cases in the acute situation as well as during the chronic rehabilitation phases. In spite of the increased workload the staff complement of the Physiotherapy Department has decreased from forty-one to eighteen staff members due to the severe budget constraints. Various opinions exist about whether or not the staff complement is adequate to deal with the number of patients requiring treatment.

Radical cuts to the staffing structure of the Physiotherapy Department of the Johannesburg Hospital prompted this investigation. The objective of this article is to describe the results of the statistical analysis of time sheets completed by staff in the Physiotherapy Department over a six-month period to determine whether the staff complement was adequate. This article also discusses the key issues identified by the statistical analysis and the probable steps required to address the situation.

DESCRIPTION OF THE PHYSIOTHERAPY DEPARTMENT

The Physiotherapy department at the Johannesburg Hospital consists of 18 full-time physiotherapists six part-time physiotherapists and five physiotherapy assistants at the time of the analysis (2000). Before the reduction of staff there were forty-one qualified physiotherapists employed in the Department. There are eight special areas of treatment in the department of physiotherapy.

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They are:

- Intensive Care Unit (ICU)
- Neurology
- Paediatrics
- Orthopaedics
- Exercise Rehabilitation
- Medical
- Surgical
- Adult Outpatient

Each member of staff works in a specific area unless there is an urgent requirement for assistance in another area. Five senior staff members supervise all these areas, each also working in a specific area. Timesheets were developed with the input of these supervisors. The surgical-, exercise rehabilitation- and outpatient areas do not have specific supervisors working in those areas but some of the most senior physiotherapists on the staff work in the surgical wards and in exercise rehabilitation.

TIMESHEETS

To confirm that there was indeed a shortage of staff, the physiotherapists agreed to give their input by completing timesheets. Thereafter the supervisors assisted in the final development of the timesheets. Each area of treatment required different timesheets as direct patient care or treatment types differ. The main sections in the timesheets are for direct patient care, indirect patient care and other activities.

Direct patient care includes all hands-on treatment of patients. Indirect patient care includes education of the caregiver, teaching the patient and/or the caregiver how to manage the disease; ward rounds; contact with doctors, nurses and caregivers, as well as waiting time (such as waiting for equipment or lifts). Other activities includes meetings, administration, personal education and development, education of other groups as well as personal time such as tea breaks and lunch. Supervisors provided information on the standard treatment times for various treatment types under direct patient care. This information was required to compare the results obtained in the study with. The standard times are an estimate of what the senior physiotherapists expect the duration of treatments to be.

STATISTICAL ANALYSIS

The approach followed was to first compare the actual physiotherapy treatment times to the standard times. This was followed by a comparison of the actual performance times of similar treatments in different areas. Thereafter a comparison was made between areas of the percentage split between the time the physiotherapists spent on direct patient care, indirect patient care and other activities. Possible reasons for discrepancies were identified. The total time needed to treat all the patients who required physiotherapy was then used to calculate the number of physiotherapists required in the department.

To compare the treatment times with the standard times the confidence intervals of the mean of treatment times were calculated and compared with the standard times. Standard times, skewed away from the middle, were a cause for concern and indicate that rework was probably necessary. The confidence intervals were prepared for each individual treatment type. The assumption made to calculate the confidence intervals was that the variance was unknown, but the times of different replications of the same treatment service, had a normal distribution. For treatments where 30 or more observations were available, we assumed the distribution of the sample means has an approximate normal distribution (Hines and Montgomery, 1980). The central limit theorem indicated that under general conditions the distribution of the sample means had an approximate normal distribution as the sample size (n) increased (Lehmann, 1986). Therefore it can be assumed that the sampling distribution is a normal distribution for $n>30$ (Hines and Montgomery, 1980). Only those treatments with sufficient ($n>30$) data points were discussed. The confidence intervals were only calculated for n larger than 30. Hines and Montgomery (1980) supported the use of the normal distribution for $n>30$.

Subsequently a comparison between specific treatment times of similar activities in different treatment areas helped determine whether standardisation across treatment areas was possible. Hypothesis tests on the means of the similar treatments were made to determine whether the treatment times were the same or not. Again the assumption for treatments where more than 30 samples of specific treatments were available, based on the central limit theorem, was the normal distribution.

The percentage of time spent by a physiotherapist on direct, indirect treatment and "other activities" was determined for each treatment area. The various treatment areas had a different distribution of time across the direct, indirect or "other activities" components due to the nature of the treatment area. The supervisors confirmed the results.

The load and capacity was then determined by calculating the average time required per treatment area to treat all the patients that needed hands-on treatment or direct patient care. The average time required per day per treatment area, to treat all patients, summed for all treatment areas, gave the total number of hours, for which Physiotherapy treatment was required in the department. Based on the average percentage of time spent on direct patient care the number of physiotherapists the department required was calculated. A comparison between this number and the current number indicated the capacity shortfalls.

Insufficient capacity will influence quality of treatments, cost of patient care as well as quality of work-life for physiotherapists. Excessive capacity would lead to unnecessary increase in cost (Chase and Aquilano, 1995) and due to limited funds other departments would suffer. It was therefore essential to determine what the current capacity of the Physiotherapy Department was, as well as the current load to determine what the need was in the department. This information was also required to determine the optimal capacity levels.

CONFIDENCE INTERVAL TEST RESULTS

Confidence Intervals - Exercise Rehabilitation

In Table 1: The standard times are presented as well as the mean (average) and the confidence intervals of the actual treatment times for exercise rehabilitation. There is also a comparison between the confidence intervals and the standard times as well as an indication as to whether the standard is higher or lower than the confidence interval.

See Table 1

In the exercise rehabilitation area, the standard times are generally above the upper confidence limit. This would indicate that either treatment is insufficient or that the standard times are incorrect.

Confidence Intervals - Intensive Care Unit (ICU)

In Table 2: The standard times are presented as well as the mean (average) and the confidence intervals of the actual treatment times for the Intensive Care Unit. The confidence intervals are also compared with the standard times and an indication is given as to whether the standard is higher or lower than the confidence interval.

See Table 2

In the ICU area, the standard times are generally above the upper confidence limit. This would indicate that either the treatment is insufficient or that the standard times are incorrect.

Table 1: Confidence Intervals - Exercise Rehabilitation

Treatment type	Std. time (min.)	Mean treatment times (min.)	Std. Deviation	N	Std. Time Vs. Confidence Interval	Lower Confidence limit	Upper Confidence limit
Adult Cardiothoracic patients. (have undergone valve/open heart surgery)	15	18.72	6.09	74	Low	17.33	20.10
Paediatric cardiothoracic patients (Have undergone valve/open heart surgery)	35	22.5	8.05	54	High	20.35	24.65
Acute pre-discharge	15	19.84	7.24	32	Low	17.34	22.35
Thoracic surgery	35	19.42	8.52		High	16.15	22.70
Other Cardiac exercise. Test	45	31.83	13.36	30	High	27.05	36.61
Cardiac risk factor assess (in patient)	35	19.78	7.38	46	High	17.65	21.91

Std: Standard N: The number of observations

Table 2: Confidence Intervals - Intensive Care Unit (ICU)

Treatment type	Std. time (min.)	Mean treatment times (min.)	Std. Deviation	N	Std. Time Vs. Confidence Interval	Lower Confidence limit	Upper Confidence limit
Ventilated patient with complications	45	30.20	2.54	302	High	29.91	30.49
Ventilated patient without complications	30	33.26	7.47	42	Low	31.00	35.52
Non-Ventilated patient with complications	45	23.31	9.74	129	High	21.63	24.99

Std: Standard N: The number of observations

Table 3: Confidence Intervals - Medical

Treatment type	Std. time (min.)	Mean treatment times (min.)	Std. Deviation	N	Std. Time Vs. Confidence Interval	Lower Confidence limit	Upper Confidence limit
Chronic Respiratory conditions	45	36.60	10.60	259	High	35.30	37.89
Acute Respiratory condition	15	14.93	3.83	218	Within	14.42	15.44
CVA's/ paraplegia	15	15.77	6.25	124	Within	14.67	16.87
Intercostal drain	30	22.55	7.06	46	High	20.51	24.59
Other neurological conditions	30	25.55	6.96	100	High	24.19	26.91

Std: Standard N: The number of observations CVA: Cerebrovascular accident (stroke)

Confidence Intervals - Medical

In Table 3: The standard times are presented as well as the mean (average) and the confidence intervals of the actual treatment times for the medical area. The confidence intervals are also compared with the standard times and an indication is given to whether the standard is higher or lower than the confidence interval.

See Table 3

In the medical area, the standard times are generally above the upper confidence limit. This would indicate that either the treatment is insufficient or that the standard times are incorrect.

Confidence Intervals - Outpatient Department (OPD) 259

In Table 4: The standard times are presented as well as the mean (average) and the confidence intervals of the actual treatment times for the OPD 259 area. The confidence intervals are also compared with the standard times and an indication is given to whether the standard is higher or lower than the confidence interval.

See Table 4

In the OPD 259 area, the standard time is lower than the lower confidence limit. This would indicate that the standard times are probably not accurate.

Confidence Intervals - Surgical

In Table 5: The standard times are presented as well as the mean (average) and the confidence intervals of the actual treatment times for the surgical area. The confidence intervals are also compared with the standard times and an indication is given to whether the standard is higher or lower than the confidence interval.

See Table 5

In the surgical area, the standard times are generally below the lower confidence limit. This would indicate the standard times are probably incorrect.

Confidence Intervals - Neurology

In Table 6: The standard times are presented as well as the mean (average) and the confidence intervals of the actual treatment times for the neurology area. The confidence intervals are also compared with the standard times and an indication is given to whether the standard is higher or lower than the confidence interval.

Table 4: Confidence Intervals - Outpatient Department (OPD) 259

Treatment type	Std. time (min.)	Mean treatment times (min.)	Std. Deviation	N	Std. Time Vs. Confidence Interval	Lower Confidence limit	Upper Confidence limit
Skin disease - Psoriasis - PUVA (Light)	20	30.72	27.20	56	Low	23.60	37.84

Std: Standard N: The number of observations

Table 5: Confidence Intervals - Surgical

Treatment type	Std. time (min.)	Mean treatment times (min.)	Std. Deviation	N	Std. Time Vs. Confidence Interval	Lower Confidence limit	Upper Confidence limit
Chronic respiratory conditions	20	26.62	7.18	147	Low	25.46	27.78
Amputees	20	22.04	7.52	112	Within	18.64	23.43
Acute Respiratory conditions	15	18.37	6.60	118	Low	17.18	19.56
Patient Mobilisation	15	16.10	5.06	153	Low	15.30	16.91
IC drains	10	18.93	2.06	117	Low	18.56	19.31

Std: Standard N: The number of observations IC drains: Intercostal drains

Table 6: Confidence Intervals - Neurology

Treatment type	Std. time (min.)	Mean treatment times (min.)	Std. Deviation	N	Std. Time Vs. Confidence Interval	Lower Confidence limit	Upper Confidence limit
CVA (Stroke)	45	30.57	15.51	233	High	28.58	32.56
Head injuries	45	31.99	16.47	115	High	28.97	34.99
Paraplegia	30	38.37	27.06	51	Low	30.94	45.79

Std: Standard N: The number of observations CVA: Cerebrovascular accident (Stroke)

See Table 6

In the neurology area, the standard times are generally above the upper confidence limit. This would indicate that either the treatment is insufficient or that the standard times are incorrect.

Confidence Intervals - Orthopaedics

In Table 7: The standard times are presented as well as the mean (average) and the confidence intervals of the actual treatment times for the orthopaedic area. The confidence intervals are also compared with the standard times and an indication is given to whether the standard is higher or lower than the confidence interval.

See Table 7

In the orthopaedic area, the standard times are generally lower than the lower confidence limits. This would indicate that the standard times are incorrect. The Physiotherapists in the orthopaedic area worked more overtime than the physiotherapists in any other area.

Confidence Intervals - Paediatrics

In Table 8: The standard times are presented as well as the mean (average) and the confidence intervals of the actual treatment times for the paediatric area. The confidence intervals are also compared with the standard times and an indication is given to whether the standard is higher or lower than the confidence interval.

See Table 8

In the paediatric area, the standard times were both above and below the confidence limits. The paediatric area has some of the most experienced physiotherapists in the department. These results suggests that the standard times should be reworked across the board, because the data was gathered from experienced physiotherapists and are therefore likely to be of low variance.

COMPARISON BETWEEN TREATMENT AREAS

The purpose of this section was to determine whether it was possible to standardise across treatment areas. Therefore it was required to determine whether it was statistically justifiable to conclude that the standard times of treatments should depend only upon the type of treatment. The alternative is standard times are dependent upon both the type of treatment and the treatment area where the treatment was performed. The results presented below indicate that the standard times depended upon the treatment type and the treatment area where the treatment was performed.

Although sufficient data is available in some of the tests to permit the assumption that the difference in sample means is normal we take the conservative approach of assuming that the population variances are unknown.

The P-values were calculated using the TTEST function in Excel. The P-Values (Hines and Montgomery, 1980) reported below are the minimum significance

Table 7: Confidence Intervals - Orthopaedics

Treatment type	Std. time (min.)	Mean treatment times (min.)	Std. Deviation	N	Std. Time Vs. Confidence Interval	Lower Confidence limit	Upper Confidence limit
Bed exercise and education 1st treatment	30	28.02	4.86	57	High	26.76	29.28
Bed exercise and subsequent treatments	15	18.16	6.41	214	Low	17.30	19.02
Patient Mobilisation	15	24.05	7.64	210	Low	23.02	25.09
Amputees	20	22.10	8.41	60	Low	20.50	23.70

Std: Standard N: The number of observations

Table 8: Confidence Intervals - Paediatrics

Treatment type	Std. time (min.)	Mean treatment times (min.)	Std. Deviation	N	Std. Time Vs. Confidence Interval	Lower Confidence limit	Upper Confidence limit
Respiratory - uncomplicated	15	16.31	4.98	84	Low	15.25	17.37
Respiratory - complicated	30	32.06	7.04	129	Low	30.85	33.28
Rehabilitation - exercise chronic	45	40.59	15.35	50	High	36.33	44.84
Orthopaedics	20	15.47	9.29	111	High	13.72	17.17
Neurological	60	47.52	16.36	168	High	45.04	49.99
Rehabilitation exercise - early	20	21.28	6.71	97	Within	19.49	23.07

Std: Standard N: The number of observations

levels at which the null hypothesis (H_0) can be rejected in each case. A P-value of 0.05 corresponds to a confidence level of 95%. In all hypotheses investigated, we use a significance level of 0.05 (a standard assumption) to frame our conclusions.

Comparison of treatment of chronic respiratory conditions in the Medical and Surgical areas

The mean value of the treatment sample (and standard deviation in parentheses) were as follows:

- Medical area: 36.60 (10.60) min, n = 259.
- Surgical area: 26.62 (7.18) min, n = 147

H_0: average time spent on chronic respiratory conditions in the Medical area = average time spent on chronic respiratory conditions in the Surgical area.

H_1: average time spent on chronic respiratory conditions in the Medical area > average time spent on chronic respiratory conditions in the Surgical area.

If the population variances are equal the P-value is P = 7.603E-22 < 0.05. If the variances are unequal the P-value is P = 9.715E-26 < 0.05. In either case the P-values are smaller than 0.05. Therefore we can reject the null hypotheses with 95% confidence and conclude that the average time spent on chronic respiratory conditions in the medical area was higher than the average time spent on chronic respiratory conditions in the surgical area.

The reason for this result is that patients in the medical areas are mostly chronic respiratory patients with superimposed lung infections. Chronic respiratory treatments in the surgical areas are mostly for patients with a chronic lung disease that were operated on for some other reason. In this instance physiotherapy is then required mostly to treat the effects of the anaesthesia on the existing lung diseases and to prevent possible lung complications.

Comparison of treatment of acute respiratory conditions in the Medical and Surgical areas

The mean value of the treatment sample (and standard deviation in parentheses) were as follows:

- Surgical area: 18.37 (6.60) min, n = 218
- Medical area: 14.93 (3.82) min, n = 118

H_0: average time spent on acute respiratory conditions in the surgical area = average time spent on acute respiratory conditions in the medical area

H_1: average time spent on acute respiratory conditions in the surgical area > average time spent on acute respiratory conditions in the medical area

If the variances are equal the P-value is P = 3.745E-09 < 0.05. If the variances are unequal the P-value is P = 5.291E-07 < 0.05. In either case the P-values are smaller than 0.05. Therefore one can reject the null hypotheses with 95% confidence, and conclude that the average time spent on acute respiratory conditions in the surgical area was higher than the average time spent on acute respiratory conditions in the medical area.

The reason for this result could be that in the surgical area a patient with an acute respiratory condition is normally a patient that has developed a lung complication during or after surgery and therefore requires and will respond to intensive physiotherapy. In the medical area an acute respiratory condition is normally related to an acute lung disease, patients are very ill and physiotherapists are not able to spend as much time with them as with a patient with a respiratory complication. The results for the treatment times of acute lung treatments in the surgical and medical areas are opposite to the results for treatment times of chronic lung treatment in the same two areas. Acute lung treatment times are longer in the surgical area than in the medical area while chronic lung treatment times are longer in the medical area than in the surgical area.

Comparison of treatment of neurological patients in the Paediatric and Medical areas

The mean value of the treatment sample (and standard deviation in parentheses) were as follows:

- Paediatric area: 47.52 (16.36) min, n = 168
- Medical area: 25.55 (6.96) min, n = 100

H_0: average time spent on neurological patients in the medical area = average time spent on neurological patients in the paediatric area.

H_1: average time spent on neurological patients in the paediatric area > average time spent on neurological patients in the medical area.

If the variances are equal then the P-value is P = 2.06E-29. If the variances are unequal, the P-value is P = 1.51E-37. In either case, the P-values are microscopic. Therefore, we can reject the null hypotheses with 95% confidence and conclude that the average time spent on neurological patients in the paediatric area was higher than the time spent on neurological patients in the medical area.

The reason for the result is that the neurological patients in the medical area are usually still unstable e.g. immediate period after having had a stroke. Physiotherapy in these cases would be limited and doing passive movements and ensuring that the positioning of patients is adequate, would often be the only requirements. Once these patients are stabilised, they are moved to the neurological wards or outpatient areas.

In paediatric neurology children may have acute brain injury or a chronic condition such as cerebral palsy. In chronic cases they may have been hospitalised due to severe fitting or because they have not been treated previously. These children are stable and the physiotherapist spends much more time with them. Intensive physiotherapy to neurologically affected paediatric patients often has a more rewarding outcome than in the adult patient population.

Comparison of treatment of amputee patients in the Orthopaedic and Surgical areas

The mean value of the treatment sample (and standard deviation in parentheses) were as follows:

- Orthopaedic area: 18.31 (8.41) min, n = 60.
- Surgical area: 22.04 (7.52) min, n = 112.

H_0: average time spent on amputee patients in the orthopaedic area = average time spent on amputee patients in the surgical area.

H_1: average time spent on amputee patients in the orthopaedic area > average time spent on amputee patients in the surgical area.

If the variances are equal then the P-value is P = 0.0023. If the variances are unequal, the P-value is P = 0.0024. In either case the P-values are smaller than 0.05. Therefore we can reject the null hypotheses with 95% confidence and conclude that the average time spent on amputee patients in the area of orthopaedics was higher than the average time spent with amputee patients in the area of surgery. In this instance the average values are basically the same although the confidence intervals are large. The large interval could be the cause of this result.

In the surgical and orthopaedic treatment areas there is not much difference in the actual treatment of patients and therefore it would be expected that the treatment times would be the same as the averages indicate. It is however possible that there may be a small difference. In the surgical area, amputation is normally due to vascular disease. These patients are normally ill and older. In the area of orthopaedics, amputations are normally due to trauma e.g. a motorcycle accident and the patient is usually younger and capable of doing more exercises and for longer periods of time.

Comparison of treatment of mobilising patients in the Orthopaedic and Surgical areas

The mean value of the treatment sample (and standard deviation in parentheses) were as follows:

- Orthopaedic area: 24.05 (7.64) min, n = 210.
- Surgical area: 16.10 (5.06) min, n = 153.

H_0: average time spent on mobilisation patients in the orthopaedic area = average time spent on mobilisation patients in the surgical area.

H_1: average time spent on mobilisation patients in the orthopaedic area > average time spent on mobilisation patients in the surgical area.

If the variances are equal the P-value is P = 2.446E-25. If the variances are unequal the P-value is P = 6.259E-28. In either case the P-values are much smaller than 0.05. Therefore, we can reject the null hypotheses with 95% confidence. This is in favour of the alternative conclusion indicating average time spent on mobilisation of patients in the orthopaedic area was higher than the average time spent on mobilisation of patients in the surgical area.

The reason for the result is that mobilising a patient in the orthopaedic area involves teaching the patient to walk, as he/she usually needs an aid to walk. Mobilising a patient in the surgical area is mostly a patient that the physiotherapist needs to assist in getting up to walk, after they have had a surgical incision, in order to optimise their recovery. Crutches and other aids are rarely indicated.

DIRECT PATIENT CARE VERSUS INDIRECT PATIENT CARE

In table 9: the percentage of time spent on each section of direct, or indirect patient care or other activities in each treatment area is provided.

See Table 9

Based on the results from the timesheets the average time spent on direct patient care is 59.29%, for indirect patient care the average is 16.70% and the average for other activities is 23.89%

Explanations for the difference in the percentage between direct and indirect patient care in the various treatment areas.

In the exercise rehabilitation area, more time is spent on education and teaching patients how to cope with their chronic diseases. The more effectively patients manage their own diseases, the lower the chances of re-hospitalisation are.

In the Intensive Care Units (ICU), patients are critically ill. Direct patient care forms the largest part of the physiotherapy treatment. Of all the treatment areas, one expects direct patient care to be the highest in these areas. Very little education is possible to the patient but some instructions would be given to staff and family members of patients. The only other component of indirect patient care relevant here is the interaction with the doctors and nurses.

In the medical area, patients are ill and frequently have chronic diseases (e.g. patients with AIDS and a superimposed pneumonia). Direct patient care could be high. There should however be emphasis on education and teaching patients to manage their disease. It seems as if due to time constraints the education and management component is being neglected in this area. This is a problem because if the education and management component were taken care of efficiently re-hospitalisation could possibly be decreased.

In the surgical area, not as much education and management is required. Typically, the problem would be a once-off problem that needs surgical intervention, but is not a chronic problem that requires management over extended periods of time.

Table 9: Percentage Direct Patient Care, Indirect Patient Care and Other

Treatment Area	% Time: Direct patient care	% Time: Indirect patient care	Other
Exercise rehabilitation	41.63%	13.55%	44.83%
ICU	71.81%	9.32%	18.87%
Medical	62.38%	19.84%	17.78%
OPD	69.10%	14.02%	16.89%
Surgical	72.40%	11.77%	15.83%
Neurological	44.85%	23.07%	32.08%
Orthopaedic	52.22%	24.88%	22.34%
Paediatric	59.93%	17.15%	22.52%
Average	59.29%	16.70%	23.89%

ICU: Intensive Care Unit OPD: Out patients' department

In the neurological area much time is spent during the treatment on education of the patient and teaching the caregiver to manage the disease, these patients often have a severe residual disability. Hospitalised patients are more acute and therefore it is to be expected that direct patient care would be higher than indirect patient care.

In the outpatient (OPD) area patients attend for specific treatments. A large percentage of the physiotherapist's time is for direct patient care although education is also important. Physiotherapists present the education component mostly to groups of outpatients and therefore this takes up a smaller percentage of their time.

In the orthopaedic area direct and indirect patient care are equally important. Much education and teaching management of the condition takes place while treating the patient directly. It is the hospital policy to discharge patients as soon as possible and therefore enough time is not always available to spend on indirect patient care as would be desirable.

In the area of paediatrics, education and management of the patient's caregiver is vital. The physiotherapist educates and teaches the caregiver to manage the patient whilst treating the patient and therefore allocates the time as direct patient care. This type of intervention is possible in paediatric wards since parents and caregivers ideally spend most of the day with the patients. More critical direct care is required for patients with severe burns or trauma and very little indirect patient care is then required.

LOAD & CAPACITY

The purpose of this section was to determine the amount of work to be performed daily and to contrast it with the amount of physiotherapy time available to deal with the load.

See Table 10

In Table 10 the columns are:

Average number of patients not treated: This is the number of patients that physiotherapists could not treat per day due to time constraints.

Average Number of treatments per day in each treatment area: This is the average number of treatments each area needs to perform daily. It sometimes happens that a patient requires more than one treatment from a physiotherapist per day. Therefore, this column indicates the number of treatments and not the number of patients treated.

Average time required per day in each treatment area: This is the average time in minutes that each area is busy with some form of treatment (direct patient care).

Average time required per day - including the patients not treated: This is the average time, in minutes, required for treatments to ensure that all patients are treated. (Calculated from the average number of treatments per day plus the average number of patients not treated per day)

Average Treatments per day per physiotherapist: This is the average number of treatments each physiotherapist in the various areas performs daily.

In Table 10 the total number of minutes for which treatment was required daily, on average, for all the treatment areas was 10254.21 minutes.

Required Capacity

In the study performed by Hospital and the WITS University Physiotherapy Departments the load and capacity was determined (De Charmoy and Eales, 2000). The load was determined and the results obtained were that on a given day there was 746 patients of those 394 of them required physiotherapy treatment. It was determined that these patients

Table 10: Load and Capacity

Treatment Area	Avg. no. of patients not treated	Avg. no of treatments / area / day (min.)	Avg. time required / area / day (min)	Avg. time required / day incl. patients not treated	Avg. no. of treatments / physiotherapist / day
Exercise rehabilitation	0.22	4.26	141.23	141.23	4.26
ICU	0.25	37.65	774.78	3564.33	8.19
Medical	0.38	16.69	372.74	666.10	9.34
OPD	-	8.26	326.29	548.10	6.12
Surgical	-	16.12	317.53	317.53	16.12
Neurological	3.09	22	452.23	1302.25	7.64
Orthopaedic	0.49	28.91	596.96	2003.13	8.62
Paediatric	0.65625	21.69231	611.06	1711.54	7.75
Total		155.5823	3592.82	10254.21	68.04
Average		19.4478	449.1025	1281.776	8.505

OPD: Outpatient Department

required 132 hours of treatment. Based on their assumption that the Physiotherapists spent 45% of their time on direct patient care they therefore would require 36.5 full time physiotherapists.

Based on the results obtained over a six months period, the number of hour's patients for which treatment was required, daily, was 171 hours (Total minutes for all the treatment areas 10254.21). Based on the previous calculation that indicated that an average of 59.29% of the physiotherapists' time was spent on direct patient care, the department would therefore require 34 full time physiotherapists (171/ 0.5929/ 8.5 = 34 the number of full time physiotherapists)

CONCLUSION

Based on the supervisor's opinions that treatments are not adequate where the time spent on patients was less than the standard time indicated, the results of this study indicates that the quality of the treatments patients received requires further investigation.

The standard times are not correct. This study could be used to determine more accurate standard times to enable the supervisors to have more accurate expectations of performance times.

The comparison made of similar treatments in different treatment areas indicated that in all cases the treatment times were different. Therefore, it would not be possible to standardise across treatment areas.

In conclusion it can be said that since physiotherapists spend an average of 59% of their time on direct patient care, 171 hours would require 34 full-time physiotherapists at the Johannesburg Hospital to effectively treat the patients seen by them in the period over which the study took place. This is a clear indication that there is a need for more Physiotherapists in the department. The current complement of physiotherapy staff is 18 full time physiotherapists; the department is understaffed by 46%.

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