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Economic Evaluation

24/7 Physical Therapy Intervention With Adult Patients in a Chilean Intensive Care Unit: A Cost-Benefit Analysis in a Developing Country

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ABSTRACT

Objectives: Physiotherapy in an adult intensive care unit (ICU) affects health outcome. To justify the investment in ICU physical therapy, the cost savings associated with its benefits need to be established. The main objective of this study is to evaluate the potential cost savings of implementing 24-hour, 7-days-per-week physiotherapist (24/7-PT) in a Chilean public high-complex specialized ICU.

Methods: Using clinical data from a literature review and a micro-costing technique, we conducted a cost-benefit analysis in the National Institute of Thorax in Chile. Our example scenario involves 697 theoretical admissions of adult patients with cardiovascular or respiratory diseases, and the costs and benefits by reduction of length of stay in ICU, days of mechanical ventilation, and days with respiratory infections during the first year and 5 years of admissions. A sensitivity analysis was considered according to the variability in total costs, production income, and clinical benefits.

Results: Net cost savings generated in our example scenario demonstrate that the implementation of 24/7-PT produces a minimum saving for the institution of $16 242 during the first year and $69 351 over a 5-year interval considering individual income production. Out of the 30 scenarios included in the sensitivity analyses, 26 (87%) demonstrated net savings.

Conclusions: A financial model, based on literature review and actual cost data, projects that 24/7-PT intervention is a cost-benefit alternative in adult ICU patients with cardiovascular or respiratory diseases in Chile. It is necessary a scenario of at least 3 sessions per day with insurance payment for individual treatments to support the long-term implementation of a 24/7-PT program.

Keywords: cost-benefit analysis, cost savings, critical care, healthcare cost, intensive care units, physical therapy modalities.

VALUE IN HEALTH REGIONAL ISSUES. 2020; 23(C):99–104

Introduction

Studies have reported that a patient's stay in an intensive care unit (ICU) can vary from hours to months[1] and that bed rest can lead to cardiovascular, respiratory, neuromuscular, and psychological complications.[1-4] Several systematic reviews have demonstrated that physical-therapy intervention in the ICU is effective in improving the mobility capacity, muscle strength, decreased days in mechanical ventilation, length of stay in ICU, and mortality.[2,5-8]

For these reasons, the European Society of Intensive Care Medicine recommendation for high-complexity hospital settings (level III) is to have 1 physiotherapist for every 5 beds, 7 days-per-week, with specialized training and experience in critical patients.[9] In Chile, it has been proposed as essential to have 24-hour coverage in ICUs, with physiotherapists who (1) demonstrate high technical and professional skills, (2) can deliver respiratory and neuromuscular care, and (3) collaborate actively with mechanical ventilation and respiratory therapies.[10]

An alternative approach to evaluating the impact of therapeutic interventions in healthcare is through economic measures that relate directly and indirectly to the number of hospitalizations.[11] Different cost analysis techniques are used depending on the clinical domain and geographical region,[12] and results can be used to make clinical decisions from an economic perspective in an attempt to minimize expenses and maximize solvency.[13]

Conflict of Interest: The authors reported no conflicts of interest.

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https://doi.org/10.1016/j.vhri.2020.04.006

Several studies of physical therapy in the ICU report nonsignificant increases in total costs of physical-therapy intervention,[14] savings for reduced hospital stays,[15] and reduction in the days of mechanical ventilation and respiratory complications.[16] However, these studies did not use a consistent format of economic analysis that allows standardizing their results, except for Lord et al (2013), who evaluated the implementation of an early ICU rehabilitation program. They executed a sensitivity analysis, including time horizon and financing perspectives, and reported a net annual savings of $3 763 149 per year.[17]

As in other countries, Chile has made a steady increase in health investment, with a 4.8% higher budget in 2017 than previous years.[18] The presence of a physiotherapist has an impact on the health and productivity of survivors and their caregivers, as well as optimizing intensive-care beds availability, surgical waiting lists, and healthcare costs.[19] Therefore, and considering that funds in all healthcare systems are scarce, the challenge is to maximize health benefits using the available resources.[20]

To have physiotherapists available 24 hours a day and 7 days a week in the ICU is necessary to establish that the savings produced by the benefits of physical therapy is sufficient to justify the investment of hiring physiotherapists. The purpose is to provide cost data that may contribute to optimizing resources in the ICU,[12] through an example scenario of economic analysis that would minimize subjectivity by using a rigorous analysis.[12]

Methods

This study aimed to evaluate the potential cost savings of implementing 24-hour/7-days-per-week physiotherapists (24/7-PT) compared with having physiotherapists only during business hours (BH-PT) and standard medical care (SMC) interventions in a Chilean adult ICU.

Cost-Benefit Analysis

The cost-saving analysis was performed by financial modeling that considered the costs and benefits of the introduction of 24/7-PT from the perspective of the public health provider, with a horizon of 1 and 5 years and a discount rate of 0% and 3%, respectively.[21]

Intervention alternatives compared

First, SMC included all health actions, technology, or medical devices that are required for the diagnosis, treatments, or follow-ups of health conditions[22] and that constitute the baseline of comparison for the following alternatives. Second, BH-PT involved as minimum of 1 and maximum of 2 sessions per day, to be performed during daylight hours from 8:00AM to 5:00PM. Third, 24/7-PT, which considered a minimum of 3 and maximum of 4 daily sessions, to be executed by a physiotherapist within 24 hours a day and 7 days a week.

Both 24/7-PT and BH-PT included a physiotherapeutic evaluation before each intervention, in addition to respiratory and motor physical therapies.[22] Respiratory physical therapy considered secretion removal techniques, respiratory exercises, ventilatory facilitation of flow and volume exercises, and manual hyperinflation techniques; and motor physical therapy procedures included positioning, bed transfers, passive, active-assisted, and active exercises, bedside seating, standing-up activities, chair transfers, and static and dynamic gait, as proposed by international recommendations for intervention in critical patients.[1]

The financial analysis considered a population of adult patients over age 18 with cardiovascular or respiratory diseases hospitalized in the ICU of the National Institute of Thorax admitted during 2015. The National Institute of Thorax is a high-complexity national reference center for the management of patients with cardiovascular and respiratory diseases in Chile. The National Institute of Thorax has a level III ICU (high complexity[9]) where previous studies reported that physiotherapies interventions[23] were comparable to those described and recommended by literature reviews to obtain clinical benefits.[1]

Variables of the Cost-Benefit Analysis

The financial modeling of cost-benefit analysis considered the following variables: (1) the costs of intervention alternatives (direct, indirect, and total costs per patient per day) based on existing cost data; (2) the clinical benefit of the alternatives (medical and physical therapy interventions) based on a literature review; (3) the annual number of ICU admissions during 2015; and (4) a fixed and variable daily production income, based on the insurance payment by the National Health Fund (NHF) from Chile. Sensitivity analysis, which used conservative and best-case scenarios, considered the variability in total costs, production income, and clinical benefit for each variable.

Cost of intervention alternatives

Using a micro-costing technique, a model was designed to assess the total costs per patient per day by the sum of direct and indirect costs to each intervention alternative (24/7-PT, BH-PT, and SMC), in addition to the costs investment necessary to implement a monthly coverage of 24/7-PT and BH-PT considering the cost of equipment and the residence and monthly salary of 4 or 1 physiotherapist, respectively. We include SMC costs in the 24/7-PT and BH-PT costs interventions, assuming SMC as the baseline healthcare support.

A 2016 study was based on the previous year's records (2015). Direct costs of the example scenario considered: (1) determination of the use of supplies, equipment, and clinical staff through a cost form survey; (2) calculation of clinical staff associated costs by the average of salaries; and (3) calculation of purchased supplies and equipment. Indirect costs included the estimation of indirect structural costs, obtained through primary and secondary costs departmentalized from the entire hospital; and the depreciation of physical spaces, as either hospital building or physiotherapist's sleeping room (residence).

Clinical benefit of interventions alternatives

Clinical benefit was to be considered as the reduction of length of stay in the ICU, days of mechanical ventilation, and days with respiratory infections reported in the literature. A literature review was performed by a systematic search made in Medline, Embase, Lilacs, and Cochrane databases (see Appendix 1 in Supplemental Materials found at https://doi.org/10.1016/j.vhri.2020.04.006). Because the articles reported the "respiratory infections" outcome as the number of patients with the disease, we assumed that 1 patient would stay 7 days in the ICU to complete medical treatment. The clinical benefit was expressed in monetary units, according to the total daily costs identified for each outcome measure.

Annual number of ICU admissions

The example scenario assumed an actual number of ICU admissions (697 patients) at the National Institute of Thorax that

represents a large ICU in the model. An annual growth rate of 4% was considered to the time horizon of 5 years.

Fixed and variable daily production income

To determine the cost-benefit of the implementation of 24/7-PT and BH-PT interventions, the production income of physical therapy was theoretically paid as insurance payment by the NHF assuming 2 modalities: (1) fixed production, which allows the income of $15 per day (code 06-01-031 NHF: full physical therapy) maximum once per day; and (2) variable production, which allows the income of $7 per individual treatment (codes NHF 06-01-001: evaluation, 06-01-017: respiratory physical therapy and 06-01-024: motor physical therapy), whenever they are performed on a patient.

Sensitivity analysis

A total of 30 economic scenarios of sensitivity analysis, including costs, benefits, and variations in income between the intervention alternatives, was performed as conservative and best-case scenarios. The cost-sensitivity analysis involved the difference in input costs of open versus closed endotracheal suction (MDI Trach Care®, Minerva Medical, Bogota, Colombia) systems, which were required for the management of patients in mechanical ventilation (conservative-case scenario). The benefit sensitivity analysis considered the evidence of higher methodological quality (best-case scenario) and the average of all articles available (conservative-case scenario) for each outcome measured. The presentation of results includes the variability in the income by production, given by the number of daily sessions performed on each patient. The conservative and best-case scenarios considered a decrease and an increase in the income by production, respectively. In summary, the total number of scenarios come from multiplying the 3 clinical benefits (reduction of length of stay in the ICU, days of mechanical ventilation, and days with respiratory infections) by the 2 alternatives compared (BH-PT vs SMC and 24/7-PT vs BH-PT) for 2 types of income (fixed and variable) in 2 possibilities of number of sessions (minimum and maximum), added to 2 alternatives of endotracheal suction (open and closed) in each alternative of intervention (SMC, BH-PT, and 24/7-PT), generating a total of 30 scenarios. The Excel spreadsheet model with all the scenarios of sensitivity analysis is available upon request from the corresponding author, in order to replicate the specific situation and perform additional analyses.

Data Analysis

The total costs of each alternative were compared, and the initial investment costs of 24/7-PT and BH-PT implementation were calculated, as well as the incremental net annual benefit (INAB) for the admission of 697 patients per year, estimated from the registry of the ICU from the past 5 years in the institution, considering a discount rate of 0%. The net present value (NPV) and internal rate of return (IRR) over 5 years considered a growth rate of 4% per annum, given the growth observed from 2014 to 2015 (from 627 to 656 patients, respectively), with a discount rate of 3%. Thus the intervention benefits from the investment if (1) INAB of the compared interventions is positive; (2) NPV is positive; and (3) IRR is higher than the discount rate.[24] Microsoft Excel 15.31 was used for data analysis, and costs are presented in US dollars.

This study design was based on the Methodological Guide for the Economic Evaluation of Health Interventions of Ministry of Health[21] and the Methodological Guide for Preparation, Evaluation, and Prioritization of Health Sector Projects from the Ministry of Social Development in Chile.[24] This project was approved by the Ethical Scientific Committee from the Eastern Metropolitan Health Service in Santiago, Chile, and this article adheres to the CHEERS statement recommendations (see Appendix 2 in Supplemental Materials found at https://doi.org/10.1016/j.vhri.2020.04.006[25]).

Results

Using the financial model, the 24/7-PT intervention produces net cost savings for the institution during the first year and over a 5-year interval. However, it represents the alternative with the higher direct and indirect costs associated per patient. One day of hospitalization in the ICU with respiratory infection generates the highest total costs (Table 1). The implementation of 24/7-PT and BH-PT entails an initial investment of $98 001 and $27 431, respectively. The difference in the total costs for a patient in mechanical ventilation, using open versus closed endotracheal suction (MDI Trach Care, MinervaMedical, Bogota, Colombia) systems, resulted in a negligible difference of 1% (conservative-case scenario).

In 9 of the 12 generated scenarios to determine INAB (at 75%), sensitizing according to available scientific evidence, net savings between $3 066 and $659 291 per year were observed (Table 2). Among the 18 identified scenarios in the NPV and IRR over 5 years,

Table 1. Direct, indirect, and total costs per patient per day, according to ICU length of stay, one day of mechanical ventilation, and one day with a respiratory infection.

Type of Cost	Cost components	ICU length of stay			One day of mechanical ventilation*			One day with respiratory infection		
		SMC	BH-PT	24/7-PT	SMC	BH-PT	24/7-PT	SMC	BH-PT	24/7-PT
Direct Costs	Clinical staff	$307	$321	$328	$307	$321	$328	$307	$321	$328
	Equipment	$6	$6	$6	$12	$12	$12	$6	$6	$6
	Supplies	$11	$16	$16	$19	$24	$24	$62	$67	$67
Indirect Costs	Structural indirect costs	$78	$82	$84	$81	$86	$87	$90	$95	$96
	Depreciation of physical spaces	$0.4	$0.4	$0.6	$0.4	$0.5	$0.6	$0.5	$0.5	$0.7
Total Costs		**$402.40**	**$425.40**	**$434.60**	**$419.40**	**$443.50**	**$451.60**	**$465.50**	**$489.50**	**$497.70**

Note. Costs of 24/7-PT and BH-PT include costs of SMC. Data presented in US dollars ($).
ICU indicates intensive care unit; BH-PT, physiotherapists only during business hours; SMC, standard medical care; 24/7-PT, 24-hour/7-days-per-week physiotherapists.
*Involves equipment and supplies for invasive mechanical ventilation and 1 open endotracheal suction per day.

Table 2. Annual net incremental benefit of alternatives compared in this study, according to available evidence, for each outcome measure.

Outcome measure (reduction of)	Alternatives compared	Clinical benefit (days)	Patients benefited per year (n)*	Incremental annual benefit (USD)†	Incremental annual costs (USD)‡	Incremental net annual benefit (USD)§	Average annual net incremental benefit (USD)‖
ICU length of stay	BH-PT vs SMC	2	14	$11 434	$16 844	–$5410*	–$17 274
	24/7-PT vs BH-PT	8.4	10	$34 171	$5728	$28 443‡	$16 242
Days of mechanical ventilation	BH-PT vs SMC	2.7	14	$16 120	$4 410	$11 710*	$3066
	24/7-PT vs BH-PT	5	10	$21 192	–$6706	$27 897‡	$19 337
Days with respiratory infection	BH-PT vs SMC	7	15	$47 258	–$27 088	$74 346†	n/e
	24/7-PT vs BH-PT	133	10	$621 087	–$38 204	$659 291‡	$246 703

Note. Data presented in days, number of patients (n), or US dollars ($).
ICU indicates intensive care unit; BH-PT, physiotherapists-only-during-business-hours; SMC, standard medical care; 24/7-PT, 24-hour/7-days per week physiotherapists; n/e, no more evidence to determinate the average; vs, versus.
*Calculated based on total annual ICU patients and number of subjects in the experimental group (n EG) of each article (697/[n EG]).
†Considers the cost of the baseline alternative (SMC or BH-PT in each case, Table 1), the clinical benefit and the total number of patients benefited per year.
‡Considers the difference in the total costs of alternatives to compare, involved in the care of 697 patients per year.
§Incremental net annual benefit (incremental annual benefit – incremental annual cost) according to the evidence of higher methodological quality: (1) Schweickert et al *Lancet*, 2009 (n EG = 49); (2) Westerdahl et al *Chest*, 2005 (n EG = 48); (3) Castro et al *Respiratory Medicine*, 2013 (n EG = 73)
‖Considers the average incremental net annual benefit of all articles identified in each alternative compared.

we observe that variable production income generates cost savings in all outcome measures, even when considering the minimum number of sessions per day. Additionally, these gains were more significant when comparing 24/7-PT versus BH-PT in terms of reduction in ICU stay and days with respiratory infections (Table 3). Considering the 30 total scenarios included in the sensitivity analysis, 26 (87%) demonstrated net savings, primarily when considering the implementation of 24/7-PT, which produced a minimum saving of $16 242 during the first year—considering all the publications of benefits (Table 2)—and $69 351 over 5 years considering variable income production (Table 3). The 24/7-PT versus BH-PT comparison showed losses for the NPV in the reduction of days of mechanical ventilation when it was based on fixed incomes for the minimum and the maximum number of sessions. Other scenarios of losses were in the BH-PT versus SMC comparison showing losses for the INAB in the reduction of ICU length of stay when it considers the benefit based on the higher methodological quality and the average of all articles identified.

Discussion

This cost-benefit analysis supports that the implementation of 24/7-PT in the ICU could have an annual saving that ensures its solvency over time and its ability to withstand external environment variations. Adult patients with cardiovascular or respiratory diseases who theoretically receive a minimum of 3 sessions of physical therapy per day in the ICU, the implementation of 24/7-PT produces a minimum saving of $16 242 during the first year and $69 351 over a 5-year interval considering a charge for individual income production. Although cost-effectiveness and cost-utility analysis are the preferred analyses to be used in ICU studies,[12] this cost-benefit analysis is easy to interpret because a currency, such as US dollars, is a tangible value to be understood.[20] Furthermore, this analysis contributes with helpful data for making financial decisions when funding becomes a barrier to implementing new treatments.[13]

One decade ago, it was reported that interventions that reduce ICU length of stay and duration of mechanical ventilation might not result in significant cost savings if they use the average total cost from hospital charges.[26] The interventions should use micro-costing methods to identify marginal variable costs.[26] Jacobs et al (2001) also reported that the average of daily costs per patient does not reflect the actual use of resources, observing variations of 33.6% in the average daily cost per patient.[27] In this study, the 5-year negative profitability seen for 24/7-PT demonstrated that cost, since the initial investment in clinical staff is 3.5 times greater than to implement BH-PT. However, this scenario reverts to generate variable production income because it is necessary to collect specific benefits for a minimum of 3 treatments per day, reflecting the actual demand of the patient and creating a product that contributes to a positive cash flow, which is sustainable over time.

Costs vary across health systems, countries, and even within provinces or states.[20] In Chile, the real total cost of 1 day of hospitalization in a public ICU with SMC was 1.87 times greater than the NHF tariff during the same year,[28] a difference previously reported in 2011, when such cost corresponded to 2 and 1.89 times more than the NHF tariff for patients with cardiovascular and respiratory diseases,[29] respectively. Regardless of the country, these results are explained because the interventions performed in the ICU are highly complex, involving highly qualified human resources, and depending on advanced technologies and high-cost pharmaceutical inputs.[26,29] The clinical staff represents the highest direct cost, constituting more than 70% in all intervention alternatives; similar to 73% and 71% of the average bedtime costs previously reported in Chile for the management of patients with cardiovascular and respiratory diseases, respectively,[29] and whose transfer of resources remains irrevocable.

It is interesting to note that there is an absence of literature that could establish the clinical benefit of 24/7-PT versus SMC,

Table 3. Net present value and internal rate of return of the alternatives compared, for each outcome measure, sensitized by income production.

Outcome measure (reduction of total)	Daily production income	BH-PT vs SMC		24/7-PT vs BH-PT	
		Minimum 1 s/d	Maximum 2 s/d	Minimum 3 s/d	Maximum 4 s/d
ICU length of stay	Fixed*	$228 063 (12032%)		$20 526 (347%)	
	Variable†	$68 751 (3459%)	$205 138 (10798%)	$133 989 (2900%)	$270 377 (5973%)
Days of mechanical ventilation	Fixed*	$251 239 (13170%)		-$44 112 (n/a)	
	Variable†	$91 927 (4597%)	$228 314 (11936%)	$69 351 (1497%)	$205 739 (4570%)
Days with respiratory infection	Fixed*	$406 579 (21292%)		$2 943 329 (63775%)	
	Variable†	$247 266 (12715%)	$383 654 (20058%)	$3 056 792 (66332%)	$3 193 180 (69405%)

Note. The net present value is presented in US dollars $ and the internal rate of return is presented inside the brakes in percentage. Values considered the INAB from the best scientific evidence to be calculated.
ICU indicates intensive care unit; BH-PT, physiotherapists-only-during-business-hours; SMC, standard medical care; 24/7-PT, 24-hour/7-days-per-week physiotherapists; n/a, not applicable; s/d, sessions per day.
*Fixed production income = $15 per day.
†Variable production income = $7 per session.

which could result from the specificity in the inclusion criteria used in the systematic search and ethical reasons. However, a systematic review available for the 24/7-PT enabled comparison with BH-PT,[30] which facilitated the individual analysis of the clinical benefit.[31,32] Furthermore, in Chile, every hospital or clinical center has at least BH-PT or 24/7-PT; hence comparisons were made between BH-PT versus SMC and 24/7-PT versus BH-PT. The lack of trial studies and the use only of cohort studies for this comparison does not deny the validity of cost data that are typically derived from cohort studies for patients with a particular medical condition.[20] Additionally, cohort studies in other ICU populations reported that the presence of 24/7-PT contributes decisively to reducing the number of hospitalization days and also the mortality of trauma patients while in the ICU.[33]

Including scientific evidence that reports unfavorable results for the physical therapy intervention in the analysis[32,34,35] adds more validity to the results of this study. The results did not change significantly with the variability of costs, benefits, and variations in income (sensitivity analysis), so the uncertainty in these variables has little impact; therefore, these results are more robust.[20] The 3 scenarios where losses of savings were observed (or could not be determined) show that the implementation of BH-PT generates an unnecessary additional expense. This situation can be avoided with the incorporation of 24/7-PT, given that the increased availability of time and resources for the patient care within 24 hours is reflected in clinical and economic benefits that are sustainable over time.

Although the increase in costs associated with inputs giving the type of endotracheal suction (open vs closed system) was marginal (1%), savings in days of mechanical ventilation can be translated into higher positive INAB using the closed suction system with significant increases in the costs associated with mechanical ventilation.[36,37] ICU stay and pharmaceutical costs[37] would thus have a more significant economic impact, resulting in a reduction in ventilation days. Considering also that the direct costs constitute at least 19.3% of the ICU total costs,[26] whether a hospitalized patient with respiratory infection could additionally require a connection to mechanical ventilation is not considered. This patient's situation implies an additional incremental benefit in case of reducing the ICU days for patients with respiratory infections.

The implementation of 24/7-PT generates a positive level of profitability that acts as a surplus for healthcare institutions, enabling reinvestment in more professionals and equipment, technology, and innovation. Such an IRR reflects the ability of the intervention to withstand extreme variations in costs or benefits—for instance, a decrease in the productivity of the physiotherapist or an increase in the cost of wages—and yet maintain a positive NPV.

Despite the formal method of economic analysis used, this study has potential limitations. First, the initial investment in equipment is conservative, adjusted to the reality of the hospital in 2015, which makes it necessary to elaborate specific hypothetical scenarios to determine the variations in profitability that a more considerable initial investment could generate. Second, the use of local reference statistics could limit the results to centers with the quantity of income per year, level of capacity utilization of equipment, and projections of growth rate like that of this study. Although the costs involved are similar to those incurred by another ICU level III at the national level, the results can be extrapolated with caution to other institutions in developing countries. Third, the complexity in the pathologies treated in this ICU could be higher than those of the patients included in the studies used to define the benefit of the interventions, thus reducing the power to assume that the benefit reported in the literature will be the real benefit in the patients of the institution. Fourth, the article (Castro et al, 2013)[33] with better methodological quality to compare 24/7-PT versus BH-PT had a risk of severe bias, which could overestimate the scenario for this comparison, and it could be considered that the beneficial results were overestimated as well. This problem was corrected by performing a sensitivity analysis considering the rest of the articles for this alternative, including those that report unfavorable benefits for the 24/7-PT. Fifth, the increase in ICU income was not considered, which could be attributed to the greater availability of beds, thus perhaps underestimating the real economic impact generated by the intervention. Sixth, the profile of patients evaluated limits the external validity; therefore, the question remains open about the cost-benefit of physical therapy in general ICUs.

However, this is the first formal economic analysis that determines the cost-benefit of physical therapy intervention in adult ICUs that uses traditional cost accounting, including the hospital's perspective, total payments to clinical staff (eg, physicians, nursing, physiotherapist), pharmacy costs, and other direct and indirect costs to find the real cost to the hospital for this intervention.[13] These results are generalizable to institutions with

patients and costs like those reported in this study. Moreover, these results indicate that 24/7-PT would help ICUs in low-income countries where resources are limited, and it is urgent to improve multidisciplinary critical care teams.[38]

Future studies could be oriented to other populations of interest, considering variation in the number of physiotherapists available to perform interventions, long-term outcomes, or incorporating the assessment that patients perceive regarding their health status, which would complement the available evidence for healthcare decision makers to help implement 24/7-PT in ICUs.

Conclusions

A financial model, based on literature review and actual cost data, projects that 24/7-PT intervention is the most cost-benefit alternative of those considered (24/7-PT, BH-PT, SMC) in adult ICU patients with cardiovascular or respiratory diseases, under a scenario of a minimum of 3 sessions per day with insurance payment for individual treatments (variable production income). This study supports the implementation of a 24/7-PT program over time, based on the savings produced for the institution, even under the most conservative assumptions. This study contributes to optimal and informed use of health resources by decision makers, and we hope that it will contribute to supporting the investment of hiring physiotherapists 24/7 in the ICU.

Acknowledgments

Thanks to the School of Physical Therapy at the Universidad del Desarrollo, Chile, for the support during the study development process. Carlos Pozo from the Ministry of Health and Carlos Peralta and Matias Beas from the Ministry of Social Development in Chile, for the guidance in the focus of this study. Bárbara Muñoz Monari, for the contribution to the English writing of this article.

Supplemental Material

Supplementary data associated with this article can be found in the online version at https://doi.org/10.1016/j.vhri.2020.04.006.

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