A Rehabilitation Case Management Model for Severely Burned Victims

Emilio Gonzalez Silva

ABSTRACT

In Chile, since 2007, the treatment of people with major burns is protected by the Explicit Health Guarantees Law, which guarantees access, opportunity, and financing to public and private providers that offer treatment compliance and follow-up. This includes the Emergency Hospital of Public Assistance, located in Santiago, the main National Reference Center for the management of burns in adults throughout the national territory. To favor the counter-referral of severely burned patients after their care at the National Reference Center Emergency Hospital of Public Assistance, a follow-up process has been designed during all in-hospital rehabilitation phases. This has been named the Rehabilitation Case Management model, with the additional emergence of the rehabilitation case manager.

KEY WORDS: ***Burn care, Case manager, Rehabilitation***

INTRODUCTION

In recent decades, a decrease in mortality from burns has been observed worldwide,[1] mainly as a result of advances in the general management of critical care and the development of specialized burn care teams.[2] However, the subsequent sequelae can deteriorate the quality of life of patients for months, years, and/or permanently,[3] making the care of patients with severe burns complex and requiring a specialized team that attends to the multiple needs of the patient and the immediate environment, starting from the burn injury to years later.[4,5]

The management of burn patients has evolved[6] since the first formal records included in the Ebers papyrus (1500 BC),[7] with some paradigmatic changes (early excision and work from Douglas Jackson[8] in the 1960s, from Zora Janzekovic in Yugoslavia,[9] and in 1964 after the development of the Tanner-Vandeput mesh dermatome[10]). These surgical advances have been accompanied by advances in local control of infections, nutritional support, resuscitation by fluids, a greater understanding of the inhalation injury, and combat of hypermetabolic response to trauma, which have favored increased survival among patients.[11]

Since 2007, the treatment of major burn patients in Chile has been protected by the Explicit Health Guarantees law (GES, in Spanish), which guarantees access, opportunity, and financing to public and private providers that offer compliance with treatment and follow-up.[12] The Public Assistance Emergency Hospital, located in Santiago, Chile, is the main National Reference Center for the management of adult burns throughout the national territory.[13] Every year, the Public Assistance Emergency Hospital treats more than 200 severely burned patients from all over the country. Treated patients include those with Garces index of 71 to 100 points (serious), 101 to 150 points (critical), and >150 points (exceptional survival),[14] who at the end of the care process must return to their originating hospitals to continue with the process of monitoring and long-term transdisciplinary rehabilitation.

To favor the counter-referral process of severely burned patients after their care at the National Reference Center Public Assistance Emergency Hospital, a follow-up process has been designed during all in-hospital rehabilitation phases, called the rehabilitation management process, which has also added the emerging role of the rehabilitation case manager.

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MATERIALS AND METHODS

Chile is a tricontinental country situated on the southwestern margin of South America; its territories comprise a combined area of 2,006,096.3 km^2 in its continental, Oceanic, and Antarctic territories.[15] The National Reference Center, "Dr. Mario Garcés Salinas" Burn Service, was inaugurated in 1969,[16] and its clinical team is made up of plastic and general surgeons, intensive care physicians, anesthesiologists, nurses, nutritionists, psychologists, social workers, and the rehabilitation team.[17] The rehabilitation team is organized as a Clinical Support Unit under the Kinesiology Service and includes physiatry, speech therapy, occupational therapy, respiratory therapy, and physical therapy, which provide specialized rehabilitation in all phases of inpatient care for burn patients.[18] In September 2020, the rehabilitation team implemented a new clinical rehabilitation management model, based on the follow-up of the rehabilitation patients treated at Public Assistance Emergency Hospital for major burns, with the emerging role of the rehabilitation case manager.

This is a retrospective descriptive study about the implementation process and start-up of a new clinical management model, which does not present clinical risks for patients or use sensitive and/or personal data.

RESULTS

Rehabilitation case management process

The rehabilitation case management process considers continuous monitoring of each patient (case) throughout the entire process of in-hospital care (from admission to their return to hospitals of origin). The entire process has 3 stages from which different activities and tasks derive, with their respective managers and quality indicators: (1) creation of case, (2) follow-up, and (3) closing of case.

Case creation

The Burn Service of the National Reference Center, "Dr. Mario Garcés Salinas," located in the center of the country's capital, offers medical treatment to the most serious burn patients from all over the country. There are 2 major ways of admissions: (1) presentation of new patients through the digital platform of the National Registry of Burns and (2) spontaneous consultation with the Emergency Department of the hospital. Once the patient is admitted, the rehabilitation team generates an "immediate admission alert" that is forwarded to the entire rehabilitation team. Information includes the patient's main data (eg, name, age, total body surface area, burn depth, burn location). This first alert allows us to quickly establish awareness at all professional levels to define immediate needs to be resolved.

During this stage, the rehabilitation goals of the treating team are established, based on the functional level and health status before injury, added to the characteristics of the injury and its effect on the patient. In this way, and after the initial stabilization, the case manager creates the case, which corresponds to a daily monitoring document of the main aspects of the patient's medical and surgical condition, as well as the follow-up of the milestones of the rehabilitation process set by the treating team (Figure 1). The completion of the rehabilitation epicrisis also begins in this stage. It can be filled out from any electronic device, and the main interventions carried out by the different health professionals are stored throughout the entire process of in-hospital care (Figure 2).

Case follow-up

In this stage, the case manager accompanies the entire clinical process conducting daily clinical visits to monitor and continue the rehabilitation plans made for each patient throughout all phases of the treatment. During this stage, we can effectively contribute to the needs of the intensive care and plastic surgery teams, becoming the official link for the feedback between the multidisciplinary team and the rehabilitation team. Follow-up and continued rehabilitation helps to avoid the division of care (which usually occurs in intensive care units), preventing the duplication of functions, the overlapping of tasks, and generating a rational and optimal use of the resources.[19]

The epicrisis can also be completed by any member of the care team (nursing, psychology, psychiatry, physicians, and social work) from any of the following services: Intensive Care Unit for Burns, Intensive Treatment Unit for Burns, and Medium Care Unit.

Case closure

After medical and surgical treatments are completed, the hospital discharge process begins, which implies managing the counter-referral of the user to their originating hospitals (base hospital), where long-term rehabilitation and follow-up can continue. This process consists of managing the coordination of all medical and nonmedical needs that may affect the time of discharge, generating the activation of the integrated national health network.

The importance of this stage is key because it allows continuity of the rehabilitation processes developed in the in-hospital phase, generating an important way to connect with the team that will provide long-term continuity. These measures also seek to positively impact the reduction of early readmissions due to manageable causes that can evolve in the postburn phase. Integrated strategies against high-risk multimorbidity in the public system have shown excellent results, with a lower incidence of mortality,

hospital admissions, stay, and the number of emergency consultations.[20] Finally, the rehabilitation team evaluates the fulfillment of goals that have been set throughout the hospital stay to establish their achievement during each phase and level involved.

What have we obtained with the implementation of this model?

Real-time monitoring of the main rehabilitation milestones: All members of the rehabilitation team are aware of the patient's clinical condition in real-time by using a closed communication system where relevant aspects of the clinical process of each patient are notified, allowing the implementation of effective early rehabilitation interventions (Table 1).

Establishment of a maximum number of in-hospital rehabilitation actions: Every member of the rehabilitation team (physiatrists, speech therapists, occupational therapists, respiratory and physical therapists) defined and fulfilled a maximum number of actions to be developed during each phase of the in-hospital care process, including

FIGURE 1. Daily Follow-Up

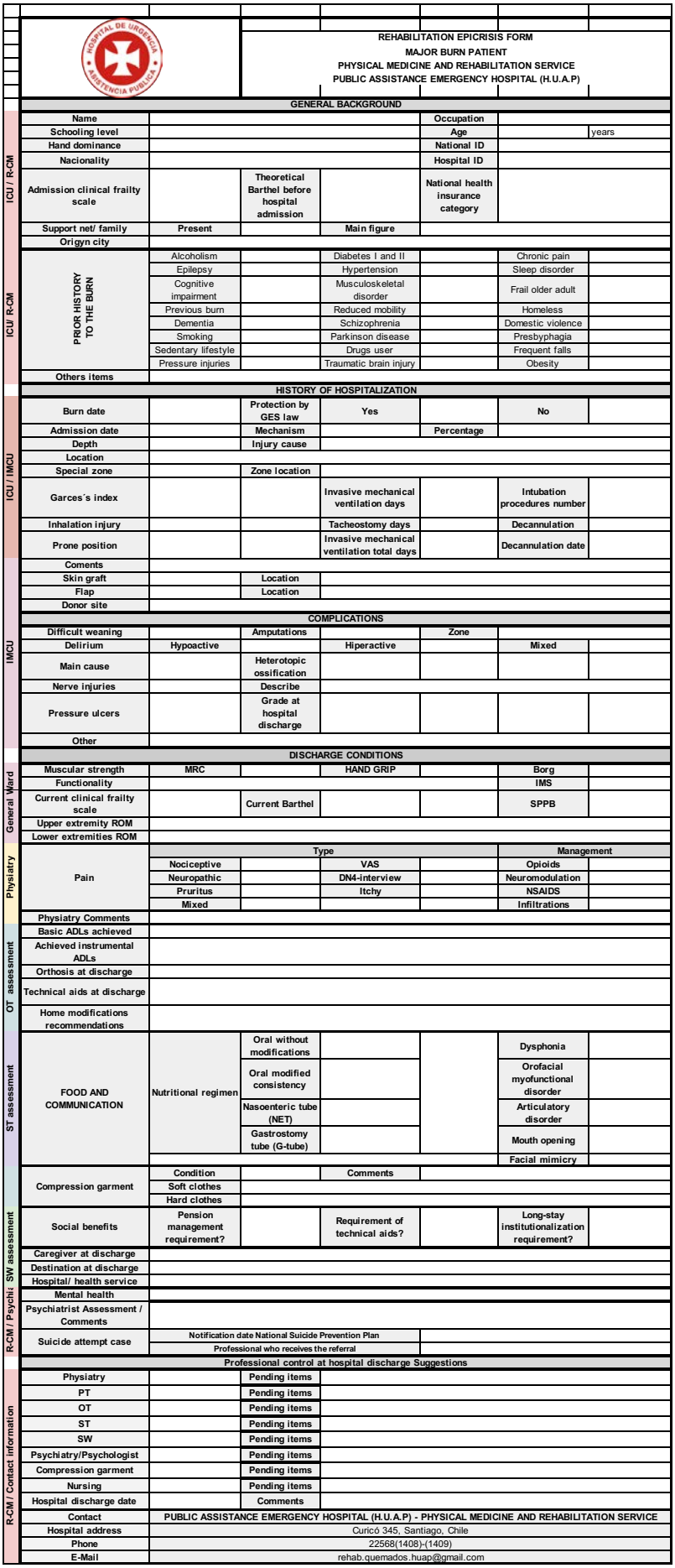
NAME:		**AGE:**	**SSN:**
DERIVATION:		**COMORBIDITIES:**	
BURN DATE:	**HOSPITAL ADMISSION:**	**TBSA:**	**GARCES'S INDEX:**
BURN LOCATION:			

	Record date	**Patient follow-up**
PT	**dd/mm/yy**	**Sedation and neurological status; connection and response (RASS, SAS, CPOT, etc)**
		General medical status, management of the current acute situation by systems
		laboratory tests (CBC: inflammatory parameters, renal function, others, etc.)
		Ventilatory assistance: parameters, settings, 24/h plan, control (DP, P_{pl}, C_{RS}, P_{mus}, P_{es}, PIM, $P_{0,1}$,IOx, etc)
		Functionality: strength, motor milestones, training plan (MRC, FSS-ICU, SPPB, Hand Grip, IMS, etc)
		Surgical management: brief surgical history, post-surgical positional needs and future surgical plan
OT	**dd/mm/yy**	**Background: premorbid and medical conditions, education, occupation, circumstances, significant people**
		Cognitive status, level of connection, thought structure, (CAM-ICU, MoCA test, SPMSQ)
		Functional performance in activities of daily living (IADL, Katz, Lawton,etc)
		Positional needs: acute admission, maintenance and special surgical requirements
		Intervention: contact with family, global evaluation, intervention strategies, evaluation of technical aids
ST	**dd/mm/yy**	**Anatomy–Motricity: Incomplete dentition • presence of scabs, absent lip seal, mouth opening < 25 mm.**
		Swallowing: lip-tongue movement, Gagging reflex, cough, oral-pharyngeal motility (DOSS, DRS, PAS)
		Communication: articulatory, intelligibility, airflow management coordination (GRABS, RASATI)
		Cognition: inhalation or hypoxic-ischemic injury, TBI confirmation cognitive-communicative screening
		Intervention: device suitability assessment, therapeutic swallowing, training and regimen suggestions
PH	**dd/mm/yy**	**Functional history Physiatry and evaluation**
		Pain assessment, characterization and management (suggestions and indications)
		Continuous active search, prevention and management of delirium
		Tapering and discontinuing opioid use and Analgesic scheme prior to discharge
		Family Meetings indications for discharge and network coordination

Abbreviations: CM, case manager; OT, occupational therapist; PH, physiatry; PT, physiotherapist; ST, speech therapist

Burn, hospital, and surgical time line							
dd/mm/yy	**dd/mm/yy**	**dd/mm/yy**	**dd/mm/yy**	**dd/mm/yy**	**dd/mm/yy**	**dd/mm/yy**	**dd/mm/yy**
Burns date Mechanism	**First aid**	**Hospital admission**	**Surgical interventions**	**National Burn Center admission**	**Surgical interventions**	**Hospital discharge**	**Case closure**

FIGURE 2. Digital Epicrisis



REHABILITATION EPICRISIS FORM
MAJOR BURN PATIENT
PHYSICAL MEDICINE AND REHABILITATION SERVICE
PUBLIC ASSISTANCE EMERGENCY HOSPITAL (H.U.A.P)

GENERAL BACKGROUND

ICU / R-CM	Name			Occupation		
	Schooling level			Age		years
	Hand dominance			National ID		
	Nacionality			Hospital ID		
	Admission clinical frailty scale		Theoretical Barthel before hospital admission		National health insurance category	
	Support net/ family	Present		Main figure		
	Origyn city					
ICU/ R-CM	PRIOR HISTORY TO THE BURN	Alcoholism		Diabetes I and II		Chronic pain
		Epilepsy		Hypertension		Sleep disorder
		Cognitive impairment		Musculoskeletal disorder		Frail older adult
		Previous burn		Reduced mobility		Homeless
		Dementia		Schizophrenia		Domestic violence
		Smoking		Parkinson disease		Presbyphagia
		Sedentary lifestyle		Drugs user		Frequent falls
		Pressure injuries		Traumatic brain injury		Obesity
	Others items					

HISTORY OF HOSPITALIZATION

ICU / IMCU	Burn date		Protection by GES law	Yes	No	
	Admission date		Mechanism		Percentage	
	Depth		Injury cause			
	Location					
	Special zone		Zone location			
	Garces´s index			Invasive mechanical ventilation days	Intubation procedures number	
	Inhalation injury			Tacheostomy days	Decannulation	
	Prone position			Invasive mechanical ventilation total days	Decannulation date	
	Coments					
	Skin graft		Location			
	Flap		Location			
	Donor site					

COMPLICATIONS

IMCU	Difficult weaning		Amputations		Zone	
	Delirium	Hypoactive		Hiperactive	Mixed	
	Main cause		Heterotopic ossification			
	Nerve injuries		Describe			
	Pressure ulcers		Grade at hospital discharge			
	Other					

DISCHARGE CONDITIONS

General Ward	Muscular strength	MRC		HAND GRIP	Borg	
	Functionality				IMS	
	Current clinical frailty scale		Current Barthel		SPPB	
	Upper extremity ROM					
	Lower extremities ROM					
Physiatry	Pain	Type			Management	
		Nociceptive		VAS	Opioids	
		Neuropathic		DN4-interview	Neuromodulation	
		Pruritus		Itchy	NSAIDS	
		Mixed			Infiltrations	
	Physiatry Comments					
OT assessment	Basic ADLs achieved					
	Achieved instrumental ADLs					
	Orthosis at discharge					
	Technical aids at discharge					
	Home modifications recommendations					
ST assessment	FOOD AND COMMUNICATION	Nutritional regimen	Oral without modifications		Dysphonia	
			Oral modified consistency		Orofacial myofunctional disorder	
			Nasoenteric tube (NET)		Articulatory disorder	
			Gastrostomy tube (G-tube)		Mouth opening	
					Facial mimicry	
SW assessment	Compression garment	Condition		Comments		
		Soft clothes				
		Hard clothes				
	Social benefits	Pension management requirement?		Requirement of technical aids?	Long-stay institutionalization requirement?	
	Caregiver at discharge					
	Destination at discharge					
	Hospital/ health service					
R-CM / Psychi	Mental health					
	Psychiatrist Assessment / Comments					
	Suicide attempt case	Notification date National Suicide Prevention Plan				
		Professional who receives the referral				

Professional control at hospital discharge Suggestions

R-CM / Contact information	Physiatry		Pending items
	PT		Pending items
	OT		Pending items
	ST		Pending items
	SW		Pending items
	Psychiatry/Psychologist		Pending items
	Compression garment		Pending items
	Nursing		Pending items
	Hospital discharge date		Comments
	Contact	PUBLIC ASSISTANCE EMERGENCY HOSPITAL (H.U.A.P) - PHYSICAL MEDICINE AND REHABILITATION SERVICE	
	Hospital address	Curicó 345, Santiago, Chile	
	Phone	22568(1408)-(1409)	
	E-Mail	rehab.quemados.huap@gmail.com	

TABLE 1. Closed Communication System Main Alerts

• Hospital admission and discharge date
• Diagnosis (total body surface area, burn depth and location, age)
• Location and in-hospital transfer (unit, room, bed)
• Epidemiological importance of detected germs
• Intubation, weaning, and reintubation process
• Ventilatory assistance devices changes or modifications
• Surgical positional requirement
• Death

(1) protection, (2) awakening, and (3) activation (according to the National Guidelines for the Rehabilitation of Severely Burned Patients) (Figure 3). These limited numbers of actions were defined to standardize the rehabilitation process but also take into consideration each patient's particular needs and the implications for different patient groups.

Completion of a transdisciplinary rehabilitation discharge summary: One of the most striking changes implemented by our model is the time to start the completion of the discharge summary or epicrisis, in order to facilitate the counter-referral and transition process to the next care setting. It was usually completed at the end of the clinical care process, focusing mainly on discharge diagnoses. However, our model allows users from the different services where the patient was treated to generate the document and record information in it at any time during the entire in-hospital process.

Because of its high documentary value and transdisciplinary origin, at the time the patient is released from the hospital, 3 different epicrises are given: (1) medical, (2) surgical, and (3) rehabilitation; the goal is to improve communication from provider to provider during the inpatient-outpatient transition.

DISCUSSION

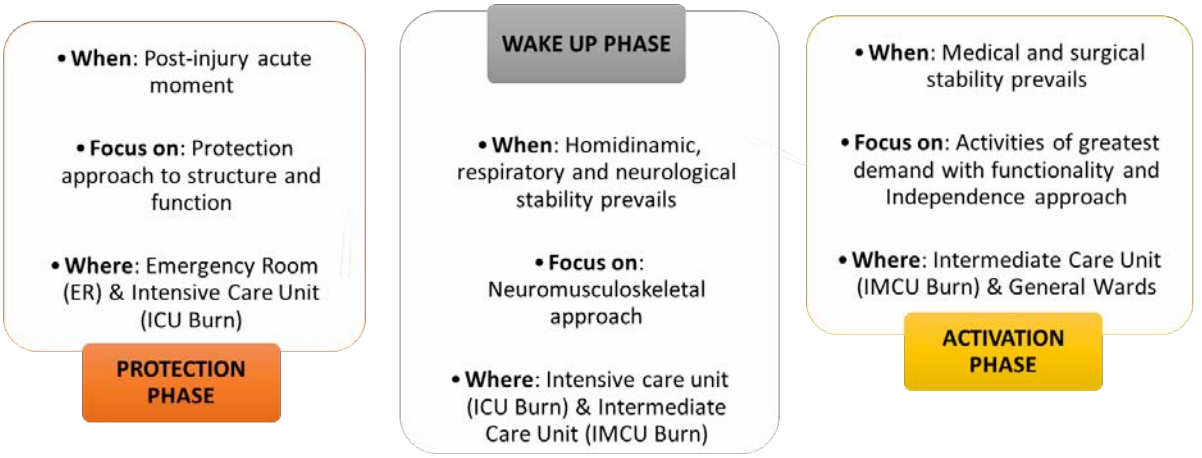
The rehabilitation case management model (rehabilitation case manager), implemented at the Public Assistance Emergency Hospital, is the first rehabilitation follow-up model implemented in the institution and has established itself as a useful tool for optimizing in-hospital rehabilitation and promoting the necessary counter-referral processes to comply with the long-term follow-up stipulated by law for patients with burns in Chile.

The creation of the follow-up for rehabilitation of patients started because of the need to efficiently link all rehabilitation professionals involved in the management of burn patients with the intensive care residents and plastic surgery teams, thus maximizing the positive contribution that rehabilitation has on the entire treatment process offered at the burn service. The creation of a rehabilitation case management model also contributes to establishing a hospital counter-referral approach with higher quality standards, allowing the clinical rehabilitation teams of the hospitals of origin to continue with the long-term follow-up process.

Additional tools of patient-centered care[22] can be used at the time of hospital discharge for the benefit of the patients, their families, and the health teams themselves due to the future chronicity of the remaining condition and the multimorbidity due to postintensive care syndrome after a large burn.[23]

In this way, family meetings,[24] family-based follow-up systems,[25] and the codesign method based on the

FIGURE 3. Burn Rehabilitation Phases



experience[26] allow patients to receive care that matches their own care objectives, safeguarding the optimal use of financial resources associated with care, increasing the satisfaction of families and caregivers with the process, and finally promoting the joint codesign of improvements around health services.

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