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Documentary structuring of the clinical pharmacy service in an intensive treatment center in a large public hospital

Estructuración documental del servicio de farmacia clínica en una unidad de cuidados intensivos de un gran hospital público

Estruturação documental do serviço de farmácia clínica em uma unidade de terapia intensiva de um hospital público de grande porte

ABSTRACT

Objective: To describe the structuring and implementation of clinical pharmacy in the intensive care unit. **Methods:** This is a descriptive study, whose methodology was the elaboration of a flowchart of activities developed by the pharmacist and forms to facilitate pharmacotherapeutic follow-up. To make the documents, a bibliographic search and other forms of clinical follow-up from the institution and other services of clinical pharmacy were carried out. **Results:** Structural documents were created: flowchart of the pharmacy service; pharmacotherapeutic follow-up form; prescription evaluation checklist and pharmacotherapeutic follow-up checklist; pharmaceutical intervention notification model; and, a database to record the interventions to be performed. These documents have important information for the daily monitoring of the patient. **Conclusion:** The proposed method assists in the development of clinical activities, promoting integration of the pharmacist to the multidisciplinary team, comprehensive patient care and safety. Adaptation to a specific form guarantees the team to conduct personalized monitoring.

DESCRIPTORS: Hospital Pharmacy Service; Drug Therapy; Intensive Care Units; Patient Safety.

RESUMEN

Objetivo: Describir la estructuración e implementación de la farmacia clínica en la unidad de cuidados intensivos. **Métodos:** Se trata de un estudio descriptivo, cuya metodología fue la elaboración de un diagrama de flujo de actividades desarrolladas por el farmacéutico y formularios para facilitar el seguimiento farmacoterapéutico. Para la confección de los documentos se realizó una búsqueda bibliográfica y otras formas de seguimiento clínico desde la institución y otros servicios de farmacia clínica. **Resultados:** Se crearon documentos estructurales: diagrama de flujo del servicio de farmacia; formulario de seguimiento farmacoterapéutico; lista de verificación de evaluación de prescripciones y lista de verificación de seguimiento farmacoterapéutico; modelo de notificación de intervenciones farmacéuticas; y, una base de datos para registrar las intervenciones a realizar. Estos documentos contienen información importante para el seguimiento diario del paciente. **Conclusión:** El método propuesto ayuda al desarrollo de las actividades clínicas, promoviendo la integración del farmacéutico al equipo multidisciplinario, la atención integral del paciente y la seguridad. La adaptación a una forma específica garantiza al equipo realizar un seguimiento personalizado.

DESCRIPTORES: Servicio de Farmacia en Hospital; Quimioterapia; Unidades de Cuidados Intensivos; Seguridad del Paciente.

RESUMO

Objetivo: Descrever a estruturação e implementação de farmácia clínica na unidade de terapia intensiva. **Métodos:** Trata-se de estudo descritivo, cuja metodologia foi elaboração de fluxograma de atividades desenvolvidas pelo farmacêutico e formulários para facilitar acompanhamento farmacoterapéutico. Para confecção dos documentos foi realizada uma pesquisa bibliográfica e consulta a outros formulários de acompanhamento clínico da própria instituição e de outros serviços de farmácia clínica. **Resultados:** Foram criados documentos estruturantes: fluxograma do serviço de farmácia; formulário de acompanhamento farmacoterapéutico; check-list de avaliação da prescrição e check-list de acompanhamento farmacoterapéutico; modelo de notificação de intervenção farmacéutica; e, banco de dados para registro das intervenções a serem realizadas. Esses documentos contam com informações importantes para o acompanhamento diário do paciente. **Conclusão:** O método proposto auxilia no desenvolvimento de atividades clínicas, promovendo integração do farmacêutico à equipe multiprofissional, cuidado integral do paciente e segurança. Adaptação a formulário próprio garante a equipe conduzir acompanhamento de personalizado.

DESCRIPTORES: Serviço de Farmácia Hospitalar; Tratamento Farmacológico; Unidades de Terapia Intensiva; Segurança do Paciente.

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INTRODUCTION

Currently in the hospital pharmacy, the pharmacist is involved in the stages of selection, acquisition, storage, control and distribution of medicines. In addition, the recent contribution of this professional in the clinical pharmacy has provided greater effectiveness in the process of rational use of medicines, maximizing therapy and reducing risks and costs.^{1,2,3,4}

The Federal Pharmacy Council (CFE - Conselho Federal de Farmácia) Resolution 585, of August 29th, 2013, defines clinical pharmacy as an “area focused on the science and practice of the rational use of medicines, in which pharmacists provide care to the patient, in order to optimize pharmacotherapy, promote health and well-being and prevent diseases”.⁵ In this scenario, the pharmacist in the clinical pharmacy performs, above all, the pharmacotherapeutic follow-up, which involves a rational sequence of actions that seek to monitor drug therapy and evaluate the fulfillment of the therapeutic objectives to which it is proposed, aiming at effectiveness and safety.^{4,6}

For the implementation of a clinical pharmacy, some prerequisites must be met, namely: existence of a secure drug distribution system, time for clinical pharmaceutical practice, support from managers, insertion of the pharmacist in the multidisciplinary team, among other factors.¹

The scenario of care in intensive care units is sometimes complex for professionals due to the critical condition of the patient. In this way, the multidisciplinary team works

with processes that are sometimes poorly designed, unnecessary use of material and medicines, limited space for stock in the sector, high workload for the nursing team, making it difficult to implement and maintain training and continuing education. Thus, this system feeds itself with the permanence of poorly designed and sometimes unsafe processes for patients.⁷

The health team, sometimes working

together, will provide safe and complete assistance to the critical patient. Some findings in drug therapies can be optimized with adequate information for doctors and nurses on the management of medications. Dose, dosage, route of administration suitable for therapy may be relevant information to the medical team during the preparation of the prescription. As well as intervals for drug administration, suitable diluents, volumes for reconstitution, dilution; and infusion time are essential for good nursing conduct.^{8,9}

The pharmacist must be integrated with the multiprofessional team, promoting daily monitoring of patients and seeking to contribute to the quality of care⁶, aiming at the safety and correct use of pharmacotherapy, and this professional can identify and solve problems related to drugs.^{4,7,8,9}

It is important that there is an effective and efficient communication between health professionals, therefore, the pharmacist must document the care provided and the interventions performed, since this information is vital for the progression of patient care.¹⁰ Some authors recommend that this documentation be registered in the medical record, since this document is of common access to all health professionals.^{3,11}

Recently approved, Resolution No. 675 of the CFE, of October 31st, 2019, regulates the duties of the clinical pharmacist in an intensive care unit (ICU).¹² The ICU is intended for the care of critical patients who commonly require intensive care, with the use of various medications, sometimes administered intravenously, which significantly increases the risks of drug inte-

Currently in the hospital pharmacy, the pharmacist is involved in the stages of selection, acquisition, storage, control and distribution of medicines.

reactions and incompatibilities.^{4,13} These patients are at high risk of presenting medication-related errors, due to the critical nature of the disease, polypharmacy, the use of high-risk drugs and frequent changes in pharmacotherapy.^{14,15}

In view of the complexity of care that critical patients require, several authors recommend the presence of the pharmacist in the ICU.^{6,14,16,17} This pharmacist must have the ability to act in any process related to the medication.¹⁴ Also considering that care for critical patients plays a decisive role in their chance of survival¹⁸, monitoring of pharmacotherapy is essential. Thus, this article describes a model for the documentary structuring of a Clinical Pharmacy service in the ICU of a large Federal Hospital located in the city of Rio de Janeiro.

METHODS

This is a descriptive documentary study developed to structure perfection to be competent in the implantation of the clinical pharmacy of the ICU of a large and highly complex federal hospital located in the city of Rio de Janeiro, with about 400 beds, distributed in 16 inpatient units, including an ICU with 10 beds.

Initially, a flow chart was drawn up to include the clinical activities to be developed in the routine of the pharmacy service. For this, processes were considered that comprise obtaining clinical data from patients, evaluating possible drug-related problems and, if necessary, performing pharmaceutical interventions.

After elucidating the activities flowchart, a form was designed to facilitate and standardize the performance of patients' pharmacotherapeutic follow-up. It contained information on patient identification, clinical history and data on clinical evolution, clinical parameters, laboratory tests, current pharmacotherapy and pharmacotherapeutic evaluation, covering information about drug interactions, tube incompatibilities and physicochemical incompatibilities.

In order to define which parameters would be used in the pharmacotherapeutic follow-up form, a wide bibliographic re-

search on clinical pharmacy was carried out, seeking the main parameters monitored by the clinical pharmacist and subsequently each parameter that was deemed necessary was researched particularly to be justified. In addition, other forms of clinical follow-up from the institution and other clinical pharmacy services were also consulted. The bibliographic research was carried out using the Capes, SciELO and Pubmed databases, Portal de Periódicos Capes, SciELO and Pubmed, as well as course completion works, master's dissertations, doctoral theses, books, government documents and specialized institutions. The following descriptors were used for bibliographic research: clinical pharmacy, pharmacotherapeutic follow-up, patient identification, clinical history, clinical parameters, laboratory tests, pharmacotherapy, pharmacotherapeutic evaluation, pharmaceutical intervention, drug-related problems, patient safety.

Two check-lists were prepared to check the items that should be part of the prescription and the items that should be analyzed in the patient's pharmacotherapeutic follow-up. The prescription check-list was prepared according to the protocol included in the National Patient Safety Program on safety in the prescription, use and administration of medications.¹⁹ The pharmacotherapeutic follow-up checklist was designed to facilitate checking the process to be performed by the pharmacist during the patient's daily follow-up, which is based on the flow chart of clinical activities.

The elaboration of a model document for recording in the medical record of the pharmaceutical interventions to be performed was also considered, containing information about the observed drug interactions and/or incompatibilities and their respective suggested behaviors. This document, before being attached to the patient's medical record, must be evaluated by the doctor and/or nurse responsible to validate the intervention to be performed.

Finally, with the aim of providing control over the clinical activities developed and facilitating future analyzes of the clinical pharmacy service, a database was created to record pharmaceutical interventions.

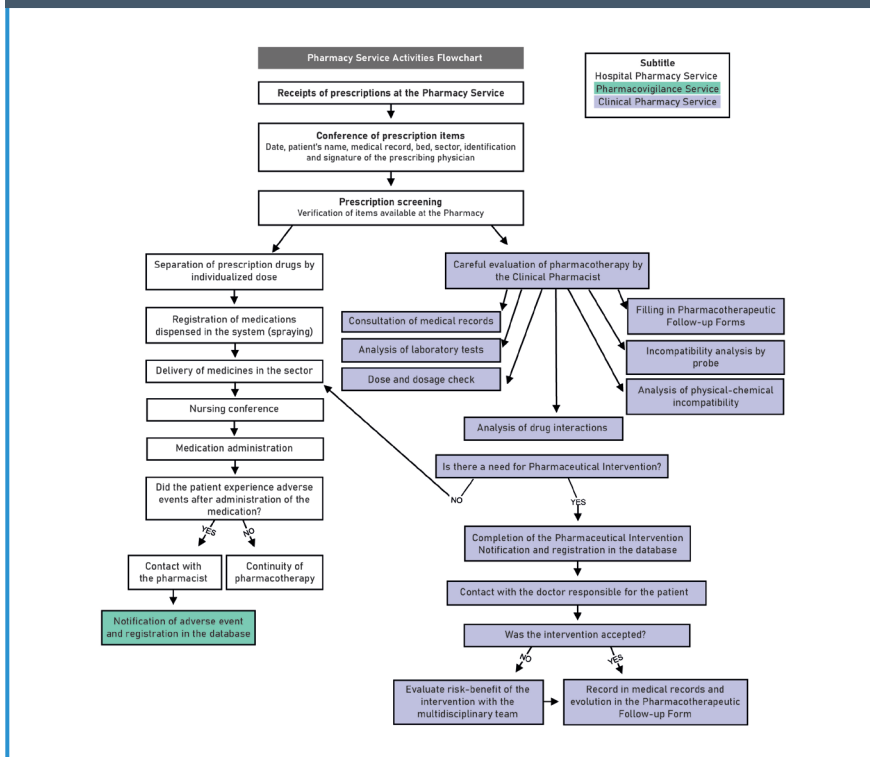
RESULTS

Initially, a flowchart of activities was prepared, covering the activities carried out by the pharmacy service (Figure 1), containing the activities of separation, checking and administration of the prescribed drugs, which are crucial steps to ensure the safety and correct use of the drugs. Based on the clinical activities that the pharmacist can carry out⁵, the following activities were selected to be initially implemented in the clinical pharmacy service, included in the flowchart:

- Receipt, screening and careful analysis of the prescription, looking for possible errors in writing, transcription, scheduling and reconciliation;
- Evaluation of possible drug-related problems, involving pharmaceutical interventions when necessary;
- Consultation of medical records and clinical and laboratory evaluation, aiming to obtain important clinical data for the pharmacotherapeutic monitoring of patients;
- Medical records of pharmaceutical interventions performed; and,
- Participation in clinical case discussions, providing information about the pharmacotherapeutic follow-up of patients and collecting information regarding the patient's clinical evolution.

The pharmacotherapeutic follow-up form seeks to facilitate the daily monitoring of patients. It contains important information about the patient's clinical evolution, such as evaluation of pharmacotherapy, progression or regression of infections, active problems, changes in medical procedures, occurrence of adverse reactions, altered clinical parameters that require more rigorous monitoring, among others information. This form is divided into identification, evolution and pharmacotherapeutic follow-up, it was elaborated by the authors and after its approval by the team, it was implemented in the routine of the clinical pharmacy service. (Figure 2).

Figure 1. Flowchart of activities of the Clinical Pharmacy Service at the Adult ICU, Rio de Janeiro, 2020.



Source: own elaboration, 2020.

Figure 2. Pharmacotherapeutic follow-up form for critical patients in the ICU, Rio de Janeiro, 2020.

PHARMACOTHERAPEUTIC FOLLOW-UP FORM
Intensive Treatment Center (ICU)

IDENTIFICATION	
Name: _____	
Medical record: _____	Bed: _____ Date of hospitalization: ____/____/____
Weight: _____ Height: _____	Age: _____ Color/ethnicity: _____
Cause of hospitalization: _____	
Observations: _____	
CLINICAL HISTORY	
Comorbidities/Dysfunctions:	
() AH () DM () DISLIP () COPD () CI () RI () LF () CA	
Others: _____	
Allergies: _____	
Medicines for previous use: _____	
EVOLUTION	
	Date: ____/____/____
EVOLUTION	
	Date: ____/____/____

HA: arterial hypertension (hipertensão arterial); DM: diabetes mellitus; DISLIP: dyslipidemia; DPOC: chronic obstructive pulmonary disease (doença pulmonar obstrutiva crônica); IC: cardiac insufficiency (insuficiência cardíaca); IR: renal insufficiency (insuficiência renal); IH: liver failure (insuficiência hepática); CA: cancer.

The identification contains information about the patient's physical characteristics (weight, height, age and color/ethnicity) and causes of hospitalization (date and cause of hospitalization). In addition, the form contains information about the patient's medical history (comorbidities and dysfunctions, allergies and previous use medications). The evolution field has a record of the patient's clinical evolution observed by the pharmacist (active problems; diet; use of catheter and venous and / or arterial accesses; on dialysis; last evacuation). Laboratory tests, essential to ensure the individualization of therapy, are: kidney, liver function and hemodynamic changes. The information about the patient's pharmacotherapy (drugs prescribed for the patient) was determined based on the mnemonic FASTHUG-MAIDENS.²⁰

In the pharmacotherapeutic evaluation, changes made to the patient's prescription during the day (usually throughout the round) and pharmaceutical conduct (drug interactions, incompatibilities by tube and/or physicochemicals) are recorded. An electronic pharmacotherapeutic follow-up form with the same content as that illustrated in Figure 2 was also prepared, to maintain an electronic record and facilitate the analysis of some items (checking the doses of the prescribed drugs with the recommended doses in the package insert and in clinical studies).

The prescription check-list (Figure 3), prepared according to the protocol included in the National Patient Safety Program (PNSP - Programa Nacional de Segurança do Paciente)¹⁹ and the pharmacotherapeutic follow-up contains items analyzed during the follow-up, in order to facilitate the pharmacist's conference on the processes.

A model was prepared for recording medical records of pharmaceutical interventions performed (Figure 4). The notification of pharmaceutical intervention contains information identifying the patient, the type of intervention performed, a description of the medication-related problem (MRP) observed and a descrip-

Figure 2. Continuation of the pharmacotherapeutic follow-up form for critical patients in the ICU, Rio de Janeiro, 2020.

Hb: hemoglobin; Ht: hematocrit; Plq: platelets; INR: international normalized ratio; PCR: C-reactive protein; Leu: leukocytes; U: urea; Cr: creatinine; CCR: creatinine clearance; TGO: glutamic oxalacetic transaminase; TGP: glutamic-pyruvic transaminase; Na+: sodium; K+: potassium; MO: microorganism.

Figure 3. Prescription checklist and pharmacotherapeutic follow-up checklist for patients in an intensive care unit

Prescription checklist		Pharmacotherapeutic follow-up checklist	
Patient identification		Dosing Conference	
Full name		Laboratory tests	
Medical record number		Drug interactions	
Bed		Incompatibilities by probe	
Service		Physico-chemical incompatibilities	
Hospital's name		Adjustment of kidney functions	
Identification of the prescriber		Adjustment of liver function	
Full name		Schedule	
CRM number		Antimicrobial control	
Signature			
Date			
Legibility			
Use of abbreviations			

tion of the suggested conduct. In addition, evaluation of the intervention, where the doctor or nurse can communicate conduct. From the interventions, a database was created (date, patient identification, intervention number, type of intervention, MRP, pharmaceutical conduct, evaluation) for evaluation and monitoring with indicators to control the process.

DISCUSSION

According to PNSP about the correct identification of patients, at least two identifiers must be used (full name of the patient, full name of the mother, date of birth and/or medical record number).²¹ Therefore, the full name of the patient and the number of the medical record, as well

as the number of the occupied bed (unreliable because it is changeable throughout the process) were chosen for registration on the pharmacotherapeutic follow-up form, but it helped in the organization and separation of forms.

Physical characteristics (weight, height, age and color/ethnicity) were important to define some parameters of pharmacotherapy. Weight and height helped to determine the body surface, with definition of the therapeutic dose, especially chemotherapy.²² A Failure to measure and record these parameters may result in the occurrence of serious and even fatal medication errors, especially if related to potentially dangerous medications, such as anticoagulants and chemotherapy, especially in elderly and pediatric patients.²³

In the evaluation of pharmacotherapy, knowing the patient's previous history (comorbidities, dysfunctions and medications in previous use) is essential to enable medication reconciliation. According to Lombardi et al. (2016), up to 27% of prescription errors may be related to incomplete medication histories, resulting in discrepancies between the medications used before admission and those used during hospitalization.²⁴

Therefore, the adequate collection of the history at the time of admission is important to ensure patient safety. In addition, it is important to know the patient's allergy history, since approximately 25% to 30% of adverse drug reactions are due to allergic and pseudo-allergic reactions.^{25,26}

The interaction of the drug with the food or components of the diet can lead to a reduction in bioavailability, and may even lead to the development of adverse effects.^{27,28} A multicenter study carried out by Reis and collaborators (2014) in the ICU of seven teaching hospitals in Brazil showed that of the 320 patients with 24 hours of hospitalization using enteral nutrition, 20 patients (6,3%) had drug-nutrition interactions.²⁹ Another concern is adsorption on the walls of the enteral tube.^{27,30}

Incorrect administration of medications by nasogastric and nasoenteral tubes can result in loss of the enteral tube or even a therapeutic failure, which can

cause damage to the patient.^{30,31,32} In addition, the installation of a new probe can generate problems such as patient discomfort, risk of incorrect probe positioning, additional material costs and radiological exams to confirm the probe positioning.³¹ Thus, the presence of nasogastric and nasoenteral tubes and their compatibility with the patient's pharmacotherapy is an evaluation point by the pharmacist.

Regarding venous and arterial accesses present in the patient, physical-chemical in-

compatibilities are evaluated, as well as the analysis of the best access to be used in the administration of each medication.^{33,34} The administration of incompatible drugs can result in several changes in the drugs administered, leading to compromised therapy and patient safety. The observed changes in physical incompatibility are: precipitation, color changes, gas release and turbidity. While chemical incompatibility are: dose reduction, drug degradation, formation of inactive or toxic products.³³

The influence of dialysis (possibility of reducing plasma levels of the drug) is emphasized, the kidneys are considered essential in maintaining the body's homeostasis, due to their regulatory, excretory and endocrine functions.³⁵ A study carried out in 2014 by Marquito and collaborators concluded that the association of drugs in individuals with chronic kidney disease was related to a high prevalence of serious drug interactions, with an increase in the probability of occurrence by 2,5 times for each additional drug.³⁵ Thus, patients with renal impairment need dose adjustment, highlighting the importance of monitoring pharmacotherapy.

Constipation as a frequent adverse effect in the use of some medications also requires adjustments to pharmacotherapy.³⁶ According to Agra and collaborators (2013) the estimated prevalence of constipation varies between 50% and 90%, being higher among patients using painkillers, especially opioids.³⁷ However, non-steroidal anti-inflammatory drugs, antihypertensives and antiarrhythmic calcium channel blockers, diuretics, drugs that act on the nervous system (anticholinergics, tricyclic antidepressants, anticonvulsants, antiparkinsonians, antipsychotics, sedatives), among other medications may also present such an event.³⁶

In addition, the pharmacist must be attentive to the monitoring of laboratory tests and, when diagnostic kits are available, also to the monitoring of serum levels of drugs, in order to ensure safety and efficacy in the use of medications, as well as to propose, when necessary, changes for pharmacotherapy's adequacy.^{38,39,40,41,42}

To facilitate the registration and evaluation of the pharmacist, the part of the form covering the patient's pharmacotherapy was divided into pharmacological classes, based on FASTHUG-MAIDENS. In 2005, Vincent proposed a FASTHUG mnemonic as a standardized approach to assist ICU doctors in caring for critically ill patients.⁴³ In 2011, Maba-sa and collaborators changed the mnemo-

Figure 5. Pharmaceutical intervention notification model in medical records for ICU patients, Rio de Janeiro, 2020.

Pharmaceutical Intervention Notification
Intensive Treatment Center (ICU)

Patient: _____

Medical record: _____ Bed: _____ intervention Number: _____

<input type="checkbox"/> Prescription (writing/transcription/decision) <input type="checkbox"/> Medication Reconciliation <input type="checkbox"/> Dose adjustment <input type="checkbox"/> Drug interaction <input type="checkbox"/> Physico-chemical incompatibility	<input type="checkbox"/> Probe incompatibility <input type="checkbox"/> Administration/Reconstitution/Dilution <input type="checkbox"/> Alternative to lack of medication <input type="checkbox"/> Adverse drug reaction
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Medication-related problems observed:

Suggested behaviors:

Pharmaceutical

Evaluation of intervention:

Accepted Not Accepted Partially Accepted

Notes:

Doctor/Nurse

Date: ____/____/____

nic to FASTHUT-MAIDENS, so that it was possible to identify problems related to medications in the ICU.²⁰

Based on this methodology, the pharmacological classes used in the form were: glycemia control, thromboprophylaxis, ulcer prophylaxis, sedation, analgesia, electrolytes, antimicrobials with control of the start and end dates of treatment. In addition, some classes that had a recurring prescription were added to facilitate registration, namely: corticosteroids, vasoactive drugs, gastrointestinal function and renal function.

Documentation/registration is a crucial step for the integration of care and the progression of patient care, it is important that it is effective and efficient among health professionals. 10 For this, the pharmacist must

document the care provided and the interventions ideally performed in the medical record, since this document is of common access to all health professionals involved in patient care.^{3,11}

According to the resolutions of CFF nº 585 (2013) and 675 (2019), it is the pharmacist's clinical task to make the pharmaceutical evolution and record in the patient's medical record to guarantee the transition and continuity of care.^{5,12} The importance of frequent and adequate registration is emphasized, in order to enable the continuity of information and promote safer care.⁴⁴ However, in order to constantly evaluate the process and adapt the documentation whenever necessary, ensuring quality and assertiveness of the service.^{45,46}

CONCLUSION

The present study made it possible to create templates for forms to be used in clinical pharmaceutical practice, in order to facilitate the pharmacotherapeutic follow-up of critically ill patients and improve the quality of care provided.

The structuring of a clinical pharmacy service is always complex and should be well studied and designed specifically for the patient group you are looking to monitor. Although many clinical services may have similarities, each service has its own peculiarity, which makes it difficult to create a single care model.

This work has the function of optimizing the creation of documents in other services and justifying the information pertinent to clinical practice. ■

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