

Redesigning the neurovascular unit of a health care complex[★]

Vincent AUGUSTO^a, Xiaolan XIE^a,

^a*École Nationale Supérieure des Mines de Saint-Étienne
Engineering and Health Division
158 cours Fauriel 42023 Saint-Étienne cedex 2 France*

Abstract

The neurovascular unit is the highest consumer of various medical examinations such as MRI scans, CT scans, echocardiography. These medical examinations are provided by external facilities such as radiology department which have to manage requests from diverse patient groups: inpatients, emergent patients, and outpatients. This paper addresses patient length of stay minimization problem which is highly related to waiting times before appointments for medical examinations. We focused on the neurovascular unit for two reasons: (i) all stroke patients are emergent patients who need fast diagnose and treatment; (ii) neurovascular diagnose rely on various medical examinations such as MRI scan. No arrangement exists between the neurovascular unit and satellite provider units.

A simulation approach is proposed in this article to (i) underline the correlation between patient length of stay and medical examination delaying, and to (ii) propose a new organization based on a precise appointment scheduling strategy. A design of experiments is presented to minimize patient length of stay and optimize contract execution. Proposed organization has been applied in a French university teaching hospital.

Key words: Health services, neurovascular, MRI, contract, appointment

1 Introduction

Patient length of stay (LOS) in public hospitals is a major issue and depends of multiple factors. Medical diagnostic facilities, such as magnetic resonance imaging (MRI) or echocardiography installations, represent a critical component of a comprehensive health care system. Access to these facilities and waiting times for appointments highly impacts patient length stay, health state and medical costs. Thus health authorities are under great pressure to better manage such facilities, in order to offer a better quality of service and maximize patient satisfaction. In addition, French public hospitals must deal with a major change concerning financial management called pricing in activity (PA). This method aims at medicalizing funding while balancing financial resources allocation in order to make responsible health care actors. Basically, all medical specialties have to reduce patient LOS in their unit in order to keep a good financial balance and reduce global cost of patient care.

The neurovascular unit presented in this paper is mainly dedicated to stroke patients care. A stroke is the rapidly developing loss of brain functions due to a disturbance in the blood vessels connected to the

[★] This paper was not presented at any other revue. Corresponding author V. Augusto. Tel. +33-4-77426626. Fax +33-4-77420000.

Email addresses: augusto@emse.fr (Vincent AUGUSTO), xie@emse.fr (Xiaolan XIE).