SMART BENCH FOR AMBULANCES

PATENTED TECHNOLOGY

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ABSTRACT

The Department of Nursing of the University of Alicante has designed a new ambulances platform, which in addition to the current functions of the platforms allocating the stretchers in vehicles, provides the exact value of the weight of the patient, in real time, facilitating the calculation of precise doses of drugs, fluids, mechanical ventilation, etc.

This platform has digitals sensors placed parallel along its lower side bars, connected to a digital transmitter and a screen via bluetooth or Wi-Fi. The design of the electronic device can be configured in a basic mode, just showing the weight of the patient allowing to health professionals to better calculate the correct doses of drugs, etc., by themselves; or its advanced mode, also detailing the exact dose of drugs, fluids, parameters of invasive mechanical ventilation, amount of energy, etc., automatically calculated with an integrated software.

Companies interested in the commercial exploitation of the invention through a patent license agreement are sought.



INTRODUCTION

Currently, critical patients transport in the passenger compartment of ambulances is performed on a stretcher housed in a platform, located on the floor of the vehicle. These are longitudinal structures that facilitate the stretcher anchoring in the chassis of the sanitary vehicle to prevent movement during the transport. In addition, they have other functionalities such as allowing lateral movement, to facilitate the mobility of health professionals around the patient, as well as the possibility of placing the patient in different therapeutic positions (e.g., Fowler, Trendelenburg, etc.) and different height to perform diagnostic and therapeutic procedures on the patient. These actuals functions are supported on a hydraulic and electrical system. The characteristics of these structures must comply with the regulations in force.

On the other hand, the culture on clinical safety to decrease the risk of adverse events is currently being developed in prehospital medical emergency services. For this reason, different devices are being implemented to improve patient safety in this field.

Nowadays, health professionals make a subjective estimation of the patient's weight, and a wide range of undesirable effects can appear as a result of the error in the calculated dose depending on this data.

Therefore, there exists the need to know the exact weight of the patient to eliminate or minimize the error in the calculation of the doses of drugs and fluid therapy used in the stabilization of critical patients, both paediatric and adult, as well as parameters of mechanic ventilation and amount of joules of energy to administer in defibrillation in children during a cardiac arrest.

TECHNICAL DESCRIPTION

The Department of Nursing of the University of Alicante has designed a platform for ambulances with the function of an electronic scale that, in addition to their current functions, provides the exact value of the patient's weight, in real time, facilitating the calculation of the precise doses of drugs, fluids, etc.

This new bench design has digital sensors that capture the patient's weight, acting as an electronic scale, neglecting the weight of the stretcher that acts as a constant.

The sensors are digital load cells that calculate the exact weight of the patient in a range of weights from 3 to 300 kilograms for paediatric to adult, excluding neonates and neonatal transported in an incubator. The cells are arranged parallel to each other along the lower side bars of the platform.

A digital transmitter interconnects the sensors with each other. It could be connected to a digital screen or an electronic device with its own software. The design of the electronic device can incorporate two versions of the screen that show the parameters calculated for each patient:

- **Basic design:** Bench with digital scale function, LED light display incorporated in the side of the platform and wire connection to the digital transmitter.
- **Advanced design:** Bench with digital scale function, connected via Bluetooth to a mobile device with touch screen and integrated software showing the exact dose of drugs, fluids or other parameters, according to the weight of the patient.

The device complies with Spanish and European legal requirements in relation to the sanitary equipment of the medical vehicles, both ambulances and helicopters, according with the European Directive and Spanish Law.

- Royal Decree 22/2014 related to the technical characteristics, the sanitary equipment and the endowment of personnel of the vehicles of sanitary transport by road.
- European Directive UNE-EN 1789:2007+A2:2015. Together with homologation technical requirements as a medical device.
- DIRECTIVE 2007/47/CE.

In this way, the initial therapeutic care of critical patients is favoured, reducing the undesirable side effects by estimating the doses of these drugs or therapies.

ADVANTAGES AND INNOVATIVE ASPECTS

Basically, the great advantage of this new design of platform for ambulances is the exact and automated calculation of doses and parameters according to the real weight of the patient, such us:

- Dose of drugs and dilutions (for example: calculation of fibrinolytics, calculation of antidotes, dose of inotropic drugs, doses of drugs in rapid sequence of intubation, analgesics, corticosteroids, etc.).
- Dose of fluids (for example, the Parkland formula in burned patients, hypertonic saline fluid, Mannitol fluid, etc.).
- Parameters for invasive mechanical ventilation.
- The energy in joules to be administered to children, in cardiac arrest.

In addition, the device could be easily implemented into an existing element within the ambulance, letting the sanitary staff to obtain an objective knowledge of the patient’s weight.

The main innovative aspect of this invention is the incorporation of a new functionality in the form of an electronic scale for ambulance benches that would allow the exact calculation of the doses of drugs, fluids and other parameters to be administered to critical patients according to their weight.

CURRENT STATE OF DEVELOPMENT

This smart bench for ambulances is in the development phase/design. Both, the manufacture of a prototype and its homologation are currently in process.

MARKET APPLICATIONS

The present invention relates to a platform, in land or air medical vehicles, in the field of **prehospital emergencies**, which functions as digital balance providing the weight of the patient calculated in real time.

COLLABORATION SOUGHT

Companies (specially, **manufacturers of benches**) interested in acquiring this technology for **commercial exploitation** through patent licensing agreements are sought. The company should be responsible for the development of the prototype, the validation of the technology, its manufacture and introduction into the market.

INTELLECTUAL PROPERTY RIGHTS

This technology is protected through **granted Spanish patent** under previous examination proceedings:

- Title: "Smart bench for ambulances"
- Application number: P201631678
- Application date: 23rd December, 2016

In addition, international patent application under the PCT has also been made:

- Reference: PCT/ES2017/070150
- Application date: 24th July, 2017

MARKET APPLICATION (1)

Medicine and Health