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COMPLIANCE WITH A MORPHINE PROTOCOL AND EFFECT ON PAIN RELIEF IN OUT-OF-HOSPITAL PATIENTS

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□ **Abstract—This study was carried out to evaluate the compliance with a morphine protocol and its effects on pain relief in pre-hospital care. In this prospective study, pain intensity was evaluated by the Visual Analog Scale (VAS) from the beginning and every 5 min until hospital arrival (Tend). Group 1: No major deviation from the protocol (intravenous morphine as a first bolus of 0.05 mg/kg followed by repeated boluses every 5 min until VAS ≤ 30 mm). Group 2: Major deviation from the protocol. There were 216 patients included. The mean dose of morphine was 9.0 ± 5.7 mg. The morphine protocol was respected in 123 patients (57%). The mean VAS score was significantly better at Tend in Group 1 vs. Group 2 (27.8 ± 21.1 mm vs. 37.8 ± 22.1 mm, respectively), the degree of pain relief was significantly better (73% vs. 53%, respectively) and the initiation time for pain relief was significantly shorter in Group 1 vs. Group 2 (10 min [5–15] vs. 15 min [10–26], respectively). Satisfaction was significantly better in patients expressing pain relief than in unrelieved patients (94% vs. 61%, respectively). Out-of-hospital pain management using morphine depends on careful attention to dosage and the time interval between re-injections. Emergency teams may employ these data to improve the quality of pain relief in the field.** **© 2008 Elsevier Inc.**

□ **Keywords—analgesia; out-of-hospital; morphine; relief; compliance with protocol**

INTRODUCTION

A number of studies have shown that emergency physicians may not be giving adequate analgesia to patients in Emergency Departments or in the pre-hospital setting (1–10). Reasons for this insufficiency of analgesia are most often erroneous dogma and bad habits (2,11–24). To improve analgesia in emergency situations, recommendations about analgesia have been made by emergency physicians, with proposals for appropriate use of morphine for severe acute pain (16,25–27). Morphine sulfate has been studied in the pre-hospital setting and its benefit and its safety have been demonstrated in this context (25–28). Nevertheless, there are few data about compliance with morphine pain control protocols or the initiation time for pain relief after intravenous morphine treatment in emergency care (29). This study was therefore carried out to evaluate the compliance with intravenous morphine protocol and its effect on the quality of pain relief in pre-hospital emergency medicine.

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METHODS

Study Design

This was a prospective cohort study conducted on consecutive patients transported by an ambulance crew during a 1-year period of observation.

Study Setting and Population

This study was carried out by the French Emergency Medical Services (EMS) system (Service d'Aide Médicale d'Urgence; SAMU), in a city of 290,172 inhabitants during a 12-month period. The EMS system in our country is based on a two-tiered approach: Emergency Medical technicians provide basic life support and physician-staffed ambulances provide advanced life support (28,30–34). The telephone number is a national emergency number. Switchboard operators, available 24 h a day, receive all calls related to life-threatening disease in the dispatching centers and forward them to the dispatching physician, who decides whether to send out a team of emergency medical technicians (who are members of the fire-department rescue services) or, according to the potential severity, an ambulance staffed by the medical team. Due to the greater numbers of emergency medical technicians, they are frequently closer to the patient and can start basic life support before the arrival of the medical team. They are not able to give medications. The medical units provide advanced life support on scene and up to the hospital if necessary. There were 18 senior physicians with more than 2 years experience in pre-hospital care, supervised and trained by anesthesiologists. Each team was composed of one physician, one driver, and a third person such as a nurse or a resident.

Study Protocols and Measurements

This study was the follow-up of a quality control program focusing on pain management in pre-hospital care (5,28). The protocol had been introduced 4 years before this study, based on national recommendations (25). Then the protocol had been actualized 1 year before this study and all physicians and nurses received training about pain management and morphine titration administration to inform the newcomers and enhance everyone's knowledge. The protocol instructions were a part of this training. The decisions regarding pain protocol were not left to the physicians' discretion. On the contrary, they were urged to utilize the protocol. The intensity of acute pain was measured in all consecutive adult patients examined in the pre-hospital setting during 1 year. Pain was not evaluated when the patient was unconscious or suffering from psychiatric disease or major cardiorespiratory failure necessitating ventilation and anesthesia. Intensity was measured by a Visual Analog Scale (VAS) at the beginning (T0, on scene) and every 5 min during the pre-hospital management until hospital arrival (Tend). The patients received information about the pain protocol. The acute pain treatment protocol was the one recommended by a panel of experts of the French Anesthesiology and Critical Care Society published in 2000: morphine sulfate for severe acute pain (defined by VAS $\geq$ 60 mm) or for specific etiology such as chest pain: 0.05 mg/kg as a first bolus followed by boluses of 1 to 4 mg according to the VAS score to achieve a VAS score $\leq$ 30 mm (25). Minor analgesics such as intravenous paracetamol and inhaled nitrous oxide also were recommended in association with morphine sulfate. The physician was in the ambulance during all pre-hospital management. Patients were under close clinical surveillance and were all monitored by an electrocardiographic monitor, a non-invasive blood pressure device, and pulse oximetry. Two groups of patients were defined with respect to the morphine titration protocol. Group 1: No major deviation from the protocol (i.e., the protocol of morphine titration was respected in terms of adequate doses for the first bolus and appropriate intervals between the following boluses). Group 2: Major deviations from the protocol were observed, defined by non-compliant doses for the first bolus (i.e., first bolus $<$ 0.04 mg/kg or $>$ 0.06 mg/kg, or an interval time between the following boluses $\geq$ 10 min). The main recorded criteria were: the VAS score every 5 min during the pre-hospital medical management and the difference of VAS (Δ VAS) between T0 (on scene) and Tend (on arrival to the hospital), the percentage of patients with pain relief (defined by a VAS score $\leq$ 30 mm), the initiation time for pain relief, the occurrence of adverse effects (such as nausea and vomiting, sedation, bradypnea, and hypotension), and patient satisfaction at the end of pre-hospital management (verbal assessment obtained by the pre-hospital team, just at the time of hospital admission) (25,28,35–37). Failure of pain management was defined by composite criteria (i.e., insufficient pain relief defined by a VAS $>$ 30 mm or occurrence of side effects). We also collected demographic data, including body weight (provided by the patient), the main disease processes and the cause of pain, a severity score (ambulatory simplified acute physiological score; SAPS), and other treatments used (type of analgesic, doses used, and time of administration). A study analysis was done on the sub-group of trauma patients to evaluate if relief was more difficult to obtain in trauma patients than in other disorders.