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Determinants of inappropriate acute pain management in old people unable to communicate verbally in the emergency department



Attilio Allione ^{a,*}, Emanuele Pivetta ^b, Elisa Pizzolato ^a, Bartolomeo Lorenzati ^a, Fulvio Pomero ^c, Letizia Barutta ^a, Giuseppe Lauria ^a, Bruno Tartaglino ^a

^a Emergency Medicine Unit, S. Croce and Carle General Hospital, Cuneo, Italy

^b Cancer Epidemiology Unit, CPO Piemonte, CeRMS, University of Turin, Italy

^c Internal Medicine Unit, Santa Croce and Carle General Hospital, Cuneo, Italy

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ABSTRACT

Objectives: Poor pain management is relevant among individuals unable to communicate verbally (UCV). Analgesia may be due to three determinants: patients' status, physician's characteristics and pain etiology. Our aim is to investigate the association between prescription of ED pain treatment and these determinants.

Materials and Methods: An observational prospective study including UCV patients was conducted. Severity of pain was evaluated by ALGOPLUS Scale and a score $P \geq 2$ out of 5 on the pain scale was retained as the threshold for the presence of acute pain in elderly UCV patients.

Results: Our data showed that only 31,9% of UCV patients received a pharmacological treatment. The presence of the caregiver would influence the rate of therapy administration [OR 6,19 (95% CI 2,6–14,75)]. The presence of leg pain [OR 0,32 (95% CI 0,12–0,86)] and head pain [OR 0,29 (95% CI 0,10–0,84)] were less likely associated to receive analgesia. Pain related to trauma [OR 4,82 (95% CI 1,17 to 19,78)] and youngest physicians [OR 1,08 (95% CI 1,001 to 1,18)] were variables associated with the administration of drugs opiates.

Discussion: Older UCV patients presenting to the ED with pain are at high risk of inadequate analgesia. Providers should always suspect presence of pain and an increasing need for behavioural pain evaluation is necessary for a complete assessment.

Conclusions: Presence of a caregiver influences a more appropriate pain management in these patients. Staff training on pain management could result in better assessment, treatment, and interaction with caregivers.

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1. Introduction

Pain treatment in the Emergency Department (ED) plays a challenging role in daily clinical practice since up to 60% patients do not receive adequate pain management in this particular setting.¹ A high risk of oligoanalgesia has been identified for patients that are unable to express and further define their discomfort (defined as

Unable to Communicate Verbally, UCV), for whom it is essential to perform routine pain assessment in order to improve pain management and global care.^{2,3} Among these, elderly patients, a large portion of ED population, represent a conspicuous percentage.⁴

Since impaired mental status is reported in approximately 25% of elderly people, comprehensive pain assessment through self reports, as recommended in recent international statements,⁵ is not always obtainable.^{6,7}

Behavioural observations represent a good option to detect pain presence in similar situations. Particularly, the ALGOPLUS Pain Scale has been validated to measure pain in a geriatric non-communicative population in the ED.⁸ To our knowledge, no previous studies have analysed factors predicting oligoanalgesia in these vulnerable patients.

* Corresponding author. Dpt of Emergency Medicine, Azienda Ospedaliera S. Croce e Carle, Via Michele Coppino 26, 12100, Cuneo, Italy.

E-mail address: allione.attilio@libero.it (A. Allione).

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The Direct Acyclic Graph (DAG) in Fig. 1 illustrates the possible framework of “analgesia pathway” in the ED. DAG is a graphical tool for epidemiological research that helps doctors to directly specify a causal pathway and model, in order to avoid biased estimates of the covariate effects on the outcome.⁹ In our opinion, oligoanalgesia may be due to three determinants: I) patients' status (caregiver's presence, marital status, educational attainment, retirement home residence), II) attending physician's characteristics (age expressed as proxy of years from medical degree and gender), and III) pain etiology.

The aim of our work is to evaluate variables that could influence ED pain treatment in UCV patients.^{10,11}

2. Materials and methods

2.1. Study design, setting and selection of participants

We performed a single-centred observational prospective study in the setting of the ED in the Santa Croce and Carle Hospital in Cuneo, a Northern Italy urban university-affiliated hospital with an annual census of about 80,000 ED discharges. Before the study conduction, no coded and locally approved protocol for pain management in the ED existed. Between November 2010 and June 2011, during triage evaluation, a random sample of UCV patients presenting with acute pain was selected.

The entire ED medical staff was involved in the study and were kept blind to the study outcomes.

All UCV patients, over 65 years, presenting with acute pain (including traumatic injuries, e.g. fractures, abdominal, musculo-skeletal, thoracic pain, and acute peripheral vascular disease)^{12–15} were eligible.

UCV patients were defined as patients with delirium (screened using Confusion Assessment Method¹⁶), and/or aphasia, moderate-to-severe cognitive impairment (detected using a Six Item Screener in the ED setting¹⁷), and/or poor/null knowledge of the Italian language, and/or unable to fill out self-rating scales.

Exclusion criteria were absence of pain, chronic pain (length > 2 weeks), narcotic pain medications received in pre-hospital care, hemodynamic instability patient or caregiver unwilling to provide informed consent for participation.

The study protocol was designed respecting Helsinki declaration principles for clinical research on human subjects and obtained Hospital Review Board approval.

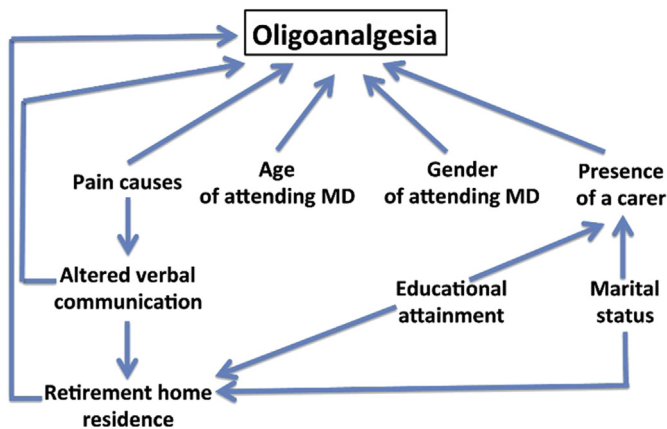


Fig. 1. Directed Acyclic Graph (DAG) for “oligoanalgesia pathway” in the ED. A directed path is a sequence of arrows, a graph is acyclic if no directed path forms a closed loop. An arrow between two variables represents the possible presence of causal influence.

2.2. Methods of measurement and outcome measures

Data were obtained using an *ad hoc* spreadsheet including age, gender, ethnicity, triage priority level (emergency or urgency, and semi- or non-urgent), educational level (expressed as years of training), residence characteristics (home vs retirement home), length of stay in ED (in days), age and gender of physician in charge for each patient, presence of a caregiver, marital status (married or unmarried), details on location and duration of pain.

Pain severity was assessed using the ALGOPLUS Pain Scale, a score above 2/5 points was considered positive for acute pain presence (Fig. 2).⁸ Any kind of drug prescribed to reduce pain, such as acetaminophen, non-steroidal anti-inflammatory drugs, opioids and others (for example, antacids for abdominal pain, nitrates for chest pain) was collected as analgesic.

2.3. Outcomes

The aim of our study is to investigate the prescription of ED pain treatment and its possible determinants. Secondary outcomes included details on drugs used, time to administration and length of stay in the ED.^{10,11}

2.4. Statistical analysis

Continuous variables were reported as mean ± Standard Deviation (SD) or median and InterQuartile Range (IQR); categorical variables were presented with numbers and percentages. Associations between categorical variables were assessed with Chi-Square test; comparison between continuous variables was performed using ANOVA and Wilcoxon test. A two-tail p value lower than 0.05 was considered for statistical significance.

Based on the previous international literature and the DAG (see Fig. 1), we chose the variables to include in our models. Then unconditional multivariate logistic regression models were used to evaluate the relationship between clinical features and pain therapy proxies. Any ED pain medication, any opioid drugs used in the ED, discharge pain treatment, timing of pain therapy for all enrolled patients, and for those triaged as low-urgent risk were used as dependent variable in each models and we chose different covariates for each multivariate models in order to avoid the risk of saturate them (independent variables chosen were showed in Table 2).

NCSS ver.2007 and Stata 13.1 (Stata Corporation, College Station, Texas, USA) were used to perform statistical analysis.¹⁸

Score each grouped item yes/no for presence or absence	Yes	No
1- Facial expressions: frowning, grimacing, wincing, clenched teeth, unexpressive		
2- Look: inattentive, blank stare, distant or imploring, teary-eyed, closed eyes		
3- Complaints: “ow-ouch”, “that hurts”, groaning, screaming		
4- Body position: Withdrawn, guarded, refuses to move, frozen posture		
5- Atypical behaviors: agitation, aggressivity, grabbing onto something or someone		
Total YES		/5

Fig. 2. Acute pain-behavior scale for older persons with inability to communicate verbally.

3. Results

A total of 257 patients were enrolled. The male/female, M/F, ratio was 0.56, with a median age of 85 years, (interquartile range [IQR] 13 years, range 65–103 years). In Table 1 we summarized patients' characteristics.

Eighty-nine patients presented with abdominal pain, 74 with limb pain (57 from legs and 17 from arms), 45 with headache, 25 with chest, and 24 with spine pain. The median age of ED staff physician was 41 years (IQR 10 years, range 30–60) and most of them were men (M/F ratio 4.8).

Eighty two patients (31.9%) received an analgesic treatment in an average time of 37.4 min (95% CI 28.5 to 46.2).

The most commonly administered medications were acetaminophen in 23 patients (28%), opioids in 22 patients (26.8%), and non-steroidal anti-inflammatory drugs in 19 patients (23.3%).

The route of administration was intravenous for almost the entire cohort (80 patients, intramuscular route was used in 2 cases).

Sixty-six patients were presented to the ED from home and in most of the cases (93.9%) with a caregiver (i.e. a relative, or a carer, or a friend); only 16 patients presented from a residence home and 62.5% of them with a caregiver.

Table 2 summarized results of multivariate logistic models.

In almost all performed models, the presence of a carer was significantly associated with an increased probability of occurrence of the dependent variable (expect for the evaluation of discharge pain therapy).

4. Discussion

This is a mono-centric prospective observation study, conducted in a second level ED located in an urban teaching hospital affiliated with university. The hospital has specific palliative and pain services. During a period of eight months, 257 patients were enrolled in the ED. Medical staff involved in the research was heterogeneous for gender, age and background (including internal and emergency medicine, hematology, pulmonary medicine, geriatrics, general and orthopedic surgery).

Table 1
Patients' and pain medications characteristics.

	Total
Age; median yr (IQR)	85 (13)
Gender; M/F (ratio)	92/165 (0.56)
Race; n (%)	
Italian	241 (93.8%)
Arab	7 (2.7%)
Est-European	7 (2.7%)
African-American	2 (0.8%)
Triage priority level; n (%)	
Emergency/Urgent	49 (19.1%)
Semi-urgent/Non-urgent	208 (80.9%)
Educational attainment (yr); n (%)	
0	11 (4.3%)
5	74 (28.8%)
8	108 (42.0%)
13	56 (21.8%)
18	8 (3.1%)
Residence; n (%)	
Home	155 (60.3%)
Retirement home	102 (39.7%)
Long staying in ED, minutes (min, max)	190 (range 11–600)
Presence of a carer; n (%)	151 (58.8%)
Marital status; n (%)	
Married	84 (32.7%)
Unmarried	173 (67.3%)

yr: year; IQR: interquartile range.

In almost all our models, we found a causal relationship between outcome (i.e. any pain medication in the ED, any opioid medication, pain therapy in an appropriate time for all patients and only for those triaged as low-urgent) and presence of a caregiver for UCV patients.

To some studies performed in North America, age, cognitive impairment, ethnicity, providers' perception of patients' pain and ED crowding are the main factors leading to oligoanalgesia.¹⁹ Consistently with these results, in our cohort only 31.9% of UCV patients received a pharmacological treatment.

Also our results seemed to underline that older UCV patients were at risk of oligoanalgesia for all types of pain in the ED, suggesting a specific need of attention for this population. In particular, patients with lower extremity and head pain might not receive any analgesic treatment.

Several explanations could justify this phenomenon. First, recognizing pain presence is the first and main step in adequate pain evaluation, but it can be difficult in UCV patients. Second, the study enrolled a heterogeneous group of patients with different forms of cognitive impairment and treatment regimens varied in relation with individual providers' characteristics (gender, age, background and previous studies), likely related to different approaches to pain management in schools of medicine and residency programs over the last decades. Third, patients with lower limbs pain may result to receive less pharmacologic pain treatment because non-pharmacologic therapies such as heat, ice, bandage or splint could have been successfully used even before ED admission. Fourth, in some cases physicians did not administrate pain killers according to an old opinion for which pain management have to be avoided before identifying the underlying causes of pain.²⁰ Fifth, Emergency physicians may choose not to administer analgesics in consideration of the potential short-term/long term adverse events, in particular for multi-drug treated patients. Sixth, there are no validated guidelines for treatment of headaches in older patients with head trauma.²¹

Our study underlines the important role of caregivers in pain management. Caregivers could be spouses, relatives, friends and even healthcare personnel, such as doctors and nurses. In many cases they are wives or husbands who are themselves elderly with increased risks for physical injury or medical illness and also anxiety, stress and depression. On the other side, these people run the risk of not providing adequate support to the patient, and of negatively influencing pain management.²²

Patients with cognitive impairment are often unable to communicate verbally, thus it is very important to get information from caregivers on their past pain management, non-verbal patterns of expression and successful treatments. Our results are consistent with previous data suggesting carer's presence influences pain management in the ED.²³ In addition, a shared care plan involving caregiver or nursing staff and primary care physician should be organized before the discharge.

In the present study we did not find an association between education level and pain management (for all outcome and in all univariate models - results did not showed) and we avoided to use this variable in the multivariate models. This was surprising, as other studies suggested low educational attainment, generally measured as years of school, is a well-established risk factor for dementia among older adults. On the other side, high educational levels are usually related to the probability of being assisted by a dedicated caregiver.²⁴

We have to consider that elderly patients with dementia or other cognitive impairments can develop superimposed delirium, which makes pain management even harder. Particularly for this group of patients, pharmacological pain treatment is crucial since non-pharmacological self-management techniques are less feasible.

Table 2

Multivariate Logistic Analysis of Predictor Variables for Drug administration, pain medication with opioids, therapy administration time, discharge medications.

Model Variables	Any ED pain medication	Any ED opioid medication	Discharge pain therapy	Pain therapy in appropriate time (all patients)	Pain therapy in appropriate time for low-urgent patients
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Patient Sex (men ref.)	0,92 (0,49–1,73)	0,36 (0,15–0,89)	1,28 (0,56–2,91)	1,03 (0,53–1,99)	1,57 (0,75–3,31)
Patient Age	0,98 (0,96–1,00)	–	0,99 (0,96–1,02)	0,98 (0,95–1,01)	0,98 (0,96–1,00)
Pain location					
Abdomen	Ref.	–	Ref.	Ref.	Ref.
Legs	0,32 (0,12–0,86)	–	0,38 (0,12–1,23)	0,53 (0,22–1,30)	0,46 (0,18–1,23)
Arms	0,47 (0,13–1,66)	–	0,52 (0,09–3,07)	0,91 (0,27–3,07)	0,92 (0,25–3,32)
Spine	0,83 (0,22–3,17)	–	0,96 (0,10–9,09)	1,56 (0,43–5,59)	0,97 (0,24–3,85)
Lumbar region	1,04 (0,22–4,79)	–	0,21 (0,04–1,15)	0,85 (0,15–4,73)	0,67 (0,12–3,96)
Head	0,29 (0,10–0,84)	–	0,39 (0,11–1,39)	0,65 (0,23–1,78)	0,60 (0,18–1,96)
Chest	0,73 (0,28–1,94)	–	1,02 (0,20–5,26)	1,12 (0,41–3,06)	1,14 (0,37–3,46)
Carer' presence	6,19 (2,60–14,75)	4,82 (1,38–16,84)	1,77 (0,68–4,66)	2,82 (1,15–6,87)	3,23 (1,24–8,43)
Trauma (no trauma ref.)	1,61 (0,77–3,39)	–	1,87 (0,74–4,77)	–	–
Discharge to home	0,93 (0,41–2,08)	–	0,69 (0,27–1,81)	0,54 (0,23–1,31)	0,66 (0,25–1,71)
Attending physician's gender (men ref.)	1,17 (0,53–2,57)	–	1,30 (0,40–4,16)	–	–
Attending physician's age (cat. variable, ref. Age<=41 years)	1,05 (0,56–1,96)	–	0,98 (0,92–1,04)	–	–

Bold numbers in Table 2 are statistically significant values.

A rapid pain treatment in these patients is related to several factors, 1) cognitive impairment affects pain perception but not its sensation; 2) untreated pain is potentially dangerous in these patients; 3) dementia impairs individual's perception of pain and the ability to report and recall it, to evaluate and communicate about relief. Amount of unrecognized pain is greater in patients who cannot evaluate and/or verbally express their sufferance.²⁵

Indication of a rapid pain treatment in patients with dementia is strengthened by interaction of cognitive and functional impairment, pain, and behaviour. Pain can exacerbate functional impairment in people with dementia.²⁶

Since opioids represent a pillar in severe pain management, their level of usage is considered a quality indicator in pain management in any setting. Literature suggests that physicians' biases and knowledge deficits are the main cause for improper pain management in the elderly and misconceptions most commonly occur with treatment using opioids.²⁰

A large variety of acute diseases (e.g. acute myocardial infarction, sepsis, medication toxicity and acute abdominal diseases) can get to physicians' attention because of trauma.²⁷

Opioids should be used with adequate awareness of their mechanisms in order to balance their beneficial and potential side effects (constipation, confusion, and sedation), which more often occur in elderly people, keeping in mind that pain treatment does not mean masking symptoms and that also traditional narcotic analgesia can determine delirium and increased risk of falls.^{28,29} Dealing with people showing multiple comorbidities, cognitive impairment, sensory dysfunction and behavioural changes, for

whom self-evaluation can be difficult, empathy and communication skills should be considered essential elements to detect and treat a complex multifactorial experience like pain. However, it is important to reflect on some interesting general observations made in recent literature related to physician traits³⁰.

Multiple physician' characteristics (e.g., type of training, clinical experience, perception of patient's pain, gender, age) represent a determinant in pain management variability. Training and years of practice are associated with disparities in ED pain management. Lately, Safdar and colleagues have shown that female physicians are more inclined than men to administer analgesics to patients, even those with severe pain³¹.

4.1. Limitations

Our study collected data in a single, university affiliated, center in Northwestern Italy, thus external validity is uncertain, but, despite this limitation, we collected data of randomly selected patients with low risk of selection bias.

Information on non-pharmacologic treatment recommended in patients with pain in the ED was not reported. In this case, we may have slightly underestimated oligoanalgesia but, since this type of treatment is infrequent in an acute care setting, we probably did not affect our results due to this missing data.

The experience of pain can be different in distinct types of dementia. We did not have the possibility to collect data about types of dementia (e.g. vascular dementia, fronto-temporal dementia, Alzheimer's disease) because not all patients provided a complete

history during evaluation in the ED and it was not possible to link our records to the hospital registry, partly because not all enrolled patients have a record in our hospital.

Moreover, the medical record oversimplifies what is actually a more complex situation and it could underestimate effective pain treatment.

Additionally, we could not analyze “oligoanalgesia” as a single variable, but in accordance with other studies we have considered “drug administration, opiate analgesia and time of administration”, as good pain management indicators.

5. Conclusion

Our data show that older UCV patients presenting to the ED with pain are at high risk of oligoanalgesia for all types of pain.

In these patients, healthcare providers should always suspect the presence of pain and an increasing need for behavioural pain evaluation is necessary for a complete assessment.

To our knowledge, our study was the first in Italy aimed at determining factors related to oligoanalgesia in the population of patients presenting to the ED.

A global pain management is important in ED patients and specifically among UCV patients. For this reason, a specific training not only about drugs use but also for a productive interaction with caregivers might be relevant.

Further studies are required to confirm our results.

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Conflict of interest

None Declared.

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