Introduction

Sedation and analgesia is commonplace in the ICU. It has many potential applications, including decreasing ventilator demands, improved morbidity and mortality, decreased hospital costs and decreased long term psychological pathologies. Discontinuation of sedatives results in iatrogenic withdrawal. This occurs in 10% of patients who receive Fentanyl infusions for 12 days or greater as a total Fentanyl dose of 1.5 mg/kg, and in 100% of patients who receive Fentanyl infusions for 9 days or greater as a total Fentanyl dose of 2.5 mg/kg. In order to prevent withdrawal, slow weaning can be done by converting IV Fentanyl to PO Methadone and by converting IV Midazolam to PO Diazepam. These medications can then be decreased slowly, rather than abruptly. Unfortunately, there is currently no standard objective measure of iatrogenic withdrawal and consequently no standard rate of weaning. Development and validation of such a tool will improve patient comfort and avoid the increased morbidity associated with iatrogenic withdrawal.

Abstract

There is currently no objective method of detecting iatrogenic withdrawal in children. Recent literature indicates that the WAT and SOS tools have been created to address this problem. Although independently validated in the pediatric population, no comparison exists between the two tools. We wished to conduct a randomized, prospective, clinical trial to compare the efficacy of WAT and SOS in detecting withdrawal and determining duration of drug weaning schedule. Our data represents a pilot study launched to determine the feasibility of conducting a much larger comparative trial. Patients who had received Fentanyl and/or Midazolam infusions for >120 hours were eligible for inclusion. Patients with underlying neurological conditions or prior treatment with benzodiazepines and/or opioids were excluded. Our pilot study included 14 patients randomized to the WAT-1, SOS or Physician judgment group. Midazolam and/or Fentanyl were continued at the discretion of the physician. Methadone was weaned to off first, then midazolam as indicated by the physician. If patients were randomized to the WAT-1 or SOS tool group, they were weaned at the rate determined by the tool used to determine withdrawal. The Physician group could wean by any method determined by the individual physician’s judgment. All patients, regardless of randomization, were weaned using WAT-1 and SOS tools once every shift. We found a strong correlation between WAT-1 and SOS scores (correlation coefficient 0.83, p < 0.0001, 95% CI 0.70-0.87). There was no correlation between total Fentanyl dose and duration of wean. In addition, most patients could be weaned on medications in 5 days regardless of the group they were randomized to. Lastly, nurses found WAT-1 easier to use compared to the SOS.

Description of intervention/study

This pilot study is a prospective randomized clinical study to compare the WAT-1 and SOS tools in detecting iatrogenic withdrawal. PICU patients who had received Fentanyl and/or Midazolam infusions for >120 hours were randomized to one of 3 groups: WAT-1 [14], SOS [5,14] Physician judgment [5-14]. The randomization group determined the tool used to determine withdrawal, and patients were randomized by their attending since the discretion of the physician. Methadone was weaned to off first, then midazolam as indicated by the physician. If patients were randomized to the WAT-1 or SOS tool group, they were weaned at the rate determined by the tool used to determine withdrawal. The Physician group could wean by any method determined by the individual physician’s judgment. All patients, regardless of randomization, were weaned using WAT-1 and SOS tools once every shift. We found a strong correlation between WAT-1 and SOS scores (correlation coefficient 0.83, p < 0.0001, 95% CI 0.70-0.87). There was no correlation between total Fentanyl dose and duration of wean. In addition, most patients could be weaned on medications in 5 days regardless of the group they were randomized to. Lastly, nurses found WAT-1 easier to use compared to the SOS.

Discussion of intervention/study

The WAT-1 and SOS tools appear comparable to each other in determining iatrogenic withdrawal. Differences between WAT-1 and SOS follow a Gaussian distribution. Total Fentanyl dose does not affect time to wean. Differences between WAT-1 and SOS tools in objective determination of iatrogenic withdrawal. Our data suggests that although the WAT-1 and SOS tools appear comparable to each other, most nurses prefer the WAT-1 score. Initial Fentanyl dose does not seem to affect the number of days to successfully wean Methadone. We believe that this may suggest that patient pathophysiology has a role in successfully completing a wean. We plan to apply logistic regression to further define factors associated with successful and unsuccessful wean. Notably, most patients were able to be weaned off Methadone regardless of randomization group. This suggests that the tools are equally efficacious in the measurement of withdrawal. This is in close agreement with the data presented in the current study that shows that WAT-1 and SOS tools are comparable in measuring withdrawal. Interestingly, 100% of patients randomized to the physician group weaned within 1 day. Our data demonstrates the feasibility of comparing WAT-1 and SOS tools in measurement of iatrogenic withdrawal in the ICU. This pilot study provides the basis for our continuing study. We plan to expand our patient number in order to achieve adequate statistical power.

References


Most patients completed 5 day Methadone wean regardless of randomization group

70% of nurses preferred WAT-1 over SOS

Conclusions

There is currently no objective tool to detect iatrogenic withdrawal in pediatric populations. We initiated a pilot study to compare WAT-1 and SOS tools in objective determination of iatrogenic withdrawal. Our data suggests that although the WAT-1 and SOS tools appear comparable to each other, most nurses prefer the WAT-1 score. Initial Fentanyl dose does not seem to affect the number of days to successfully wean Methadone. We believe that this may suggest that patient pathophysiology has a role in successfully completing a wean. We plan to apply logistic regression to further define factors associated with successful and unsuccessful wean. Notably, most patients were able to be weaned off Methadone regardless of randomization group. This suggests that the tools are equally efficacious in the measurement of withdrawal. This is in close agreement with the data presented in the current study that shows that WAT-1 and SOS tools are comparable in measuring withdrawal. Interestingly, 100% of patients randomized to the physician group weaned within 1 day. Our data demonstrates the feasibility of comparing WAT-1 and SOS tools in measurement of iatrogenic withdrawal in the ICU. This pilot study provides the basis for our continuing study. We plan to expand our patient number in order to achieve adequate statistical power.

References