

medicine safety of parenteral ready-to-use all-in-one mixtures, e.g. TPN bags in neonatology.

No conflict of interest.

#### TCH-046 THE ADVANTAGES OF UV-RAMAN SPECTROSCOPY FOR CHECKING THE STRENGTH OF NALBUPHINE PREPARATIONS

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**Background** A paediatric nalbuphine formulation is prepared in the hospital pharmacy of the Nouvel Hôpital Civil of Strasbourg. It was previously checked by HPLC. Following the acquisition of an UV-Raman spectrometer, a method was developed in order to improve the monitoring of nalbuphine preparation.

**Purpose** To check paediatric nalbuphine formulations with a simple, fast and reliable method by using UV-Raman spectroscopy.

**Materials and Methods** In order to validate a method using the QC-prep (a UV-Raman spectrometer), we prepared three concentration ranges, prepared by diluting three different samples of nalbuphine reconstituted in 0.9% NaCl. Each range was composed of 5 points of calibration. The linearity was validated from the average of the three ranges. The fidelity of the method is tested by repeatability (one solution was sampled five times by the QC-prep) and reproducibility (five different solutions were sampled at one time). The method is considered as valid if the linearity is good enough ( $r^2 > 0.999$ ) and the coefficient of variation (CV) and relative error of repeatability and reproducibility are below 5%.

**Results** The QC-prep method for nalbuphine 1 mg/ml in 0.9% NaCl is valid in terms of:

- Linearity: the calibration is linear from 0.2 to 2.0 mg/mL ( $r^2 = 0.9997$ )
- Repeatability: the CV is less than 0.25%
- Reproducibility: the CV is less than 2.5%
- Accuracy: the relative error is less than 5%

Five different batches have been checked in routine work. No mistakes have been identified, either in the concentration of the drug (quality control and sample), or in identification of the solvent.

**Conclusions** Calibration of the QC-prep is simple thanks to easy-to-use software. This is a powerful tool that enables us to determine the concentration of nalbuphine more quickly, easily and safely than the HPLC method previously used. The UV-Raman spectroscopy method could be extended to the analysis of other formulations such as paediatric antibiotics preparations.

No conflict of interest.

#### TCH-047 THE EFFECT OF A ROBOTIC UNIT DOSE DRUG DISPENSING SYSTEM ON MEDICINES ADMINISTRATION ERRORS AND THE COST OF DRUG DISPENSING

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**Background** A Unit Dose Drug Dispensing System (UDDDS) by a robot (PillPick system, Swisslog) with daily pharmaceutical monitoring of medical prescriptions is being implemented in our

hospital, to gradually replace the ward stock distribution system (WSDS), which allowed a low level of pharmaceutical monitoring. In 2011, UDDDS was used for 374 beds. UDDDS allows named “ready-to-use” treatments to be dispensed daily, avoiding nurse preparation of pillboxes, necessary with WSDS.

**Purpose** To assess the impact of a robotic UDDDS on the incidence of medicines administration errors and to assess the cost of this system.

**Materials and Methods** Medication errors were measured using a direct observation process in two phases, before and after implementation of the UDDDS, in a 23-bed adult cardiology unit with WSDS, computerised prescription order entry and computerised medicines administration record (CristalNet). The cost study took into account both the payroll cost (pharmaceutical staff, nurses) and the cost of the robot. A monthly cost per hospital bed supported was calculated for each system.

**Results** A total of 3233 medicines administrations were observed (1471 pre-implementation and 1762 post-implementation) for 185 patients (91 pre-implementation and 94 post-implementation). After the introduction of UDDDS the percentage of medicines administration discordances with the medical prescription fell (46% to 18%). The identification of drugs by nurses improved (18% to 1%). The monthly cost was estimated at €142 per bed with WSDS and at €161 per bed with UDDDS. Considering the distribution of depreciation and maintenance costs over 950 beds, we assume that the systems costs will become comparable.

**Conclusions** Unit Dose Drug Dispensing by a robot is comparable to WSDS in terms of cost, while being safer, thanks to automated drug picking and pharmaceutical monitoring of medical prescriptions. Barcode verification technology is advancing.

No conflict of interest.

#### TCH-048 THE SECURITY OF PHARMACOKINETIC INFORMATION IN ELECTRONIC HEALTH RECORDS

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**Background** Accurate and complete electronic health record (EHR) information is essential for patient safety, especially when drugs with a narrow therapeutic range are involved.

**Purpose** To evaluate the quality and quantity of information recorded in EHRs concerning pharmaceutical interventions (PIs) generated by therapeutic drug monitoring (TDM).

**Materials and Methods** For 6 months, all onco-haematology inpatients were evaluated who were receiving vancomycin ( $\geq 3$  doses). Renal function (RF) was classified into four categories: severe, moderate and mild renal impairment (RI) and normal RF for creatinine clearance (by Cockcroft-Gault equation)  $<10$ , 10–50, 50–90,  $>90$  ml/min, respectively. PIs were classified into three categories of importance (high, moderate and low) according to the pharmacotherapy follow-up and the relation between plasma concentration and optimal therapeutic range.

The completeness of EHRs regarding the RF and TDM process (ordering, result and PI-related parameters) was assessed.

A binary logistic regression with odds ratio (OR) was performed using SPSS v.15.0.

**Results** TDM was performed for 39 (81%) of 48 patients receiving vancomycin. The median age was 57 years (95%CI: 52–62); 26 were male (68%); 21 (54%) had mild to moderate RI.

There were 76 PIs [median 2/patient (IQR: 2)], 51 (67%), 4 (5%) and 21 (28%) of high, medium and low importance, respectively; 67 (88%) were accepted.

The EHRs did not record RF evolution, TDM requests and results or PIs in 53 (70%), 23 (30%), 39 (51%) and 61 (80%) cases respectively.

OR for recorded TDM results related to highly important PIs compared to low-importance PIs, for recorded TDM ordering related to moderate RI compared to normal RF and records for RF evolution related to moderate RI compared to normal RF were 3 (95%CI: 1–9;  $p = 0.046$ ), 0.3(95%CI: 0.8–0.9;  $p = 0.04$ ) and 4(95%CI: 1–16;  $p = 0.029$ ), respectively. A significant linear trend was observed. OR for all other variables was non-significant.

**Conclusions** The low percentage recording of TDM-related variables and pharmacist interventions in EHR potentially limits inter-professional communication and the decision-making process. This fact highlights the need for clinical pharmacists to safeguard the information they have discovered by recording their interventions in the EHR as a clinical episode in comprehensive patient care. This will increase the visibility of the pharmacist and the effect of his/her actions.

No conflict of interest.

#### TCH-049 TOPICAL MORPHINE GELS FOR PAINFUL WOUNDS

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**Background** The use of morphine applied topically to painful wounds has potential advantages such as a lower dose than with systemic administration and fewer side effects. Gels are known to be suitable for treating wounds.

**Purpose** To develop two physicochemically and microbiologically stable gels: a more viscous formulation (F1) and a fluid formulation for spraying (F2), both containing morphine hydrochloride (MH). The effect of viscosity on drug release from both gels was also investigated.

**Materials and Methods** Sodium carboxymethylcellulose-based aqueous gels were prepared and sterilised by autoclaving. The 0.125% w/w (F1) and 1.0% w/w (F2) gels containing MH were compounded using an injectable solution of MH and preservatives (parabens). Preparation and primary packaging were performed inside a horizontal laminar flow hood. Primary packaging consisted of single dose syringes for F1 and 10 mL amber glass bottles with pump sprays for F2. Stability studies were performed using 3 batches of each final formulation. Samples were stored at  $5 \pm 3^\circ\text{C}$ , at  $22 \pm 3^\circ\text{C}$  (light exposed and protected) and  $40 \pm 2^\circ\text{C}/75 \pm 5\%$  RH for 98 days (samples collected at 6 time points). Organoleptic characteristics, pH, viscosity, MH and preservative content were assessed. Sterility tests, microbiological control and preservative efficacy were studied according to Ph. Eur. The MH release profile was evaluated using Franz cells.

**Results** Formulations were odourless, yellowish, translucent and homogeneous. The pH was 6.35 (F1) and 5.70 (F2), viscosity was 52.933 mPa.s at 6.12 s<sup>-1</sup> (F1) and 16.7 mPa.s at 12.24 s<sup>-1</sup> (F2). Methylparaben, propylparaben and MH contents were between 90–110%. Preservatives were effective and preparations remained sterile and stable for 60 days. MH release was slow and inversely proportional to viscosity.

**Conclusions** The MH gels presented suitable physicochemical and pharmaceutical characteristics for topical application to painful wounds. The slow release profile may reduce the number of applications.

No conflict of interest.

#### TCH-050 USE OF ELECTROENCEPHALOGRAPHY (EEG)-BASED METRICS TO TEST THE GUSTATORY PROPERTIES OF LIQUID TRIMETHOPRIM FORMULATIONS

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**Background** It is well known that the gustatory properties of a formulation strongly affect patient adherence to a treatment. However measuring these properties is highly subjective and difficult, especially for the paediatric population. The use of neuropsychophysiological indexes and covert behaviours in assessing the attractive properties of sensorial stimuli has a long tradition in the domain of affective neuroscience. Ways of measuring range from the use of autonomous nervous system activation patterns, to features extracted from electroencephalographic activity or simple and discriminative reaction time tasks. These measurements provide alternative means for assessing the characteristics of commercial products, overcoming the limitations of self reporting-based research, namely social desirability, and for studying populations unable to provide usable verbal responses (e.g. children).

**Purpose** To find out if this methodology can be used for evaluating the gustatory properties of formulations in order to enhance patient adherence.

**Materials and Methods** Trimethoprim formulations were prepared using NF syrup. Flavour was added afterwards. Participants were stimulated with 3 different flavoured formulations (banana, red berry and neutral) for 10 seconds each while subjected to an EEG recording. The order of presentation was fully counter-balanced between subjects. Subjects rated the different solutions for palatability and intensity. Five seconds of the EEG response for each sample were converted to the frequency domain, and the log power and inter-hemispheric asymmetry were calculated for anterior, central and parietal electrodes. Different algorithms, combining different EEG features, were tested for predictive power regarding palatability and type of formula.

**Results** Theta inter-hemispheric activity at parietal electrodes predicted the behavioural assessment of palatability ( $R^2 = 0.35$ ). Moreover, the application of unsupervised learning methods, such as Support Vector Machines, on the log power at different bands from 0 to 12 Hz, could distinguish with up to 95.24% accuracy between flavoured and non-altered solutions.

**Conclusions** This technology can be used in formulation studies that are attempting to enhance the organoleptic properties of a formulation.

No conflict of interest.

#### TCH-051 VALIDATION OF AN AUTOMATED COMPOUNDER SET UP ONCE A WEEK FOR PARENTERAL NUTRITION SOLUTIONS

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**Background** Our parenteral nutrition production (PN) decreased after we introduced standard solutions. To keep just a small number of daily PN items cost-effective, we decided to validate a once a week setting up of an automated compounder device (ACD).

**Purpose** To test the operation and performance of an ACD (Baxa MM12) for a once a day and a once a week use.

**Materials and Methods** Accuracy (mean in % of the expected value) and precision (Coefficient of Variation) of the ACD was evaluated by weighing different volumes of water 10 times (0.5 to 40 mL; daily operational qualification) and different volumes of