

exact volume of diluent and a closed system transfer device (CSTD). Nurses just have to dilute the solution into the bag under a laminar air-flow hood using the CSTD. Although 2-part syringe methods were found in the literature, 3-part syringes with limited contact between the elastomeric tip and busulfan solution (reference 62.8426, Codan) were chosen because leaks were observed with the 2-part syringes during the technical study. PhaSeal devices: Injector to close the syringes and a Connector-Luer for infusion bags were selected as CSTDs. All these devices are polycarbonate free.

7 new kits were prepared for a period of 8 days without contact. The results of the evaluation show that nurses and physicians (n = 14) were overall dissatisfied by the previous protocol (neither good nor bad: 35.7%, bad: 21.4% and very bad: 35.7%) while the majority preferred the new one (very satisfied: 28.6%, satisfied: 42.9%, neither good nor bad 7.14%, no response: 21.4%). Overall nurses and physicians answered that new modalities limit the risk of dose errors (93%) and occupational exposure (86%).

**Conclusions** Implementing this procedure has improved handling practise with good satisfaction.

No conflict of interest.

## TCH-029 OUTCOMES EVALUATION OF AN INTERNATIONAL WORKGROUP ON ROBOTICS: A MULTICENTRE STUDY

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**Background** The growing demand for patient and operator safety in anticancer drug compounding led to an increasing demand for automation. As 18 hospitals have now introduced APOTEC Achemo, it became necessary to set up a round table at which all users could share their knowledge and expertise. Therefore, in 2009 a workgroup on robotics (named APOTEC Community) was established. Every year its members meet to share their needs with the manufacturer and assemble new ideas. The annual system upgrade is a consequence of the meeting. 160 new requirements, merged into 4 upgrades, have been collected up to now. The requirements can be classified into the following main topics: a friendlier user interface; software integration with medical health records; higher productivity.

**Purpose** To assess the results in terms of productivity following the 2012 upgrade within the APOTEC Community

**Materials and Methods** Five oncology pharmacies were selected for this study: University Hospital of Ancona, European Institute of Oncology, Romagna Cancer Institute, S. Camillo Hospital of Rome, Cleveland Clinic. The abovementioned pharmacies were monitored before and after the upgrade, as far as the monthly productivity with APOTEC Achemo is concerned.

**Results** The 5 hospitals together prepared an average of 4150 preps/month before the 2012 upgrade, while 6000 preps/month was surpassed after the installation. Productivity showed an average increase of 46%, ranging from 11% to 67%. This variability is closely correlated with the best practise and has been analysed for each case.

**Conclusions** The creation of a round table where the APOTEC-Achemo users share experiences and discuss best practise is playing an essential role in the continuous improvement of this innovative technology. The progress recorded after the latest upgrade in terms of productivity (+46%) is only one example of this powerful tool.

No conflict of interest.

## TCH-030 PET/CT IMAGING WITH [11C]CHOLINE AS A RADIOPHARMACEUTICAL FOR THE DETECTION OF RECURRENT PROSTATE CANCER: A RELIABLE PRODUCTION METHOD AND QUALITY CONTROL

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**Background** PET/CT Imaging with the radiopharmaceutical [11C]-choline has become a useful tool in the detection of prostate cancer, mainly used in the assessment of treated patients presenting rising PSA and negative response after conventional imaging procedures. Tracer uptake on tumoral tissues is correlated to an increased synthesis of membrane substrates: [11C]-choline is trapped by phosphorylation taking part on phosphatidylcholine turnover. The sensitivity of this diagnostic method (almost 100%) is greater than CT or PET-[18F]FDG implying the superiority of the PET-choline procedure. PET-choline was first investigated in the late 1990s although no specific monographs are included in main Pharmacopoeias. The use of this powerful tracer is now based on Clinical Trials but, on September 2012, the FDA approved the production and use of 'Choline C11 Injection' to help the detection of recurrent prostate cancer.

**Purpose** To define the key role the pharmacist plays in the preparation of [11C]-choline IMPD for Clinical Trials, presenting the tracer production in the details. Quality Control for characterising the final product and releasing it as 'solutio iniectionis' are also described.

### Materials and Methods

cyclotron (Eclipse, Siemens)  
Automatized synthesiser (ModularLab, Eckert Ziegler)  
GMP grade reagents and disposables  
[11C]labelling based on 'wet' methylation chemistry

**Results** [11C]carbon dioxide (50 GBq) was produced by cyclotron and delivered to the synthesiser placed in our radiopharmacy. Carbon dioxide was first reduced to methyl iodide, then dimethyl-aminoethanol was [11C]-methylated. Finally the product was purified and filtered obtaining 15 GBq of sterilised [11C]-choline (16 min total time and 30% yield). Radiochemical purity was higher than 98% and other CQs were performed in accordance with EPF [18F] FDG monograph.

**Conclusions** Due to the short half-life decay (20 min) [11C]-choline production must be performed in PET facilities with on-site cyclotron and radiopharmacy. We presented a reliable and safe method for producing [11C]-choline for 3–4 patients' PET scans.

No conflict of interest.

## TCH-031 PHARMACIST EXPERIENCE IN CONTINUING IMPROVEMENT OF THE AUTOMATIC SYSTEM

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**Background** An annual meeting between the manufacturer of APOTEC Achemo and all the users is held to share experience and discuss suggestions for best practise. The feedback collected during the meeting forms the basis for the next system upgrade aimed at increasing performance. Some improvements that we suggested were included in the 2012 upgrade and improved our productivity: a new procedure for reconstitutions; an extemporaneous picking list; faster communication between the management software and the robot; a more efficient vision system for identifying labels.

**Purpose** To quantify the benefits that pharmacists reaped in the day-to-day work in terms of productivity (number of preparations/day), after the annual upgrade.

**Materials and Methods** The performance of the APOTECaChemo equipment was analysed before and after the 2012 upgrade. The time required for cyclophosphamide, trastuzumab and gemcitabine reconstitution was also investigated.

**Results** An average of 45 doses per day was prepared before the upgrade, with a maximum of 60 preparations. After the installation, an average of 75 preparations per day was recorded, with a maximum of 100. The reconstitution of stable powder drugs (cyclophosphamide, trastuzumab and gemcitabine) during 'spare time' (weekends, early mornings, lunch times) allowed an average gain of 55 (11.5%), 72 (15%) and 24 (5%) minutes per day, respectively.

**Conclusions** The new upgrade allowed us to increase daily productivity by 66.6%. The continuing multidisciplinary dialogue among the stakeholders (physicians, pharmacists, technicians and engineers) enables us to make better use of APOTECaChemo in the daily clinical activity and encourages the technology to develop.

No conflict of interest.

#### TCH-032 PHARMACY PREPARATION: RETROSPECTIVE ANALYSIS OF MORPHINE BAGS USED FOR THE PREPARATION OF ELASTOMERIC INFUSION PUMPS

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**Background** The Italian Law no. 38 of 15 March 2010, has considerably simplified the prescribing and dispensing of medicinal products for the treatment of pain. The law regulates all matters concerning the medical treatment that the Italian state provides to citizens through the National Health Service.

National networks are also in place for palliative care and the treatment of pain, which provide guidelines for implementing the Hospital Territory Without Pain project.

**Purpose** To examine whether pharmacy compounding can improve the service offered, optimise the time and resources used for preparation, and whether this will require the allocation of new resources.

**Materials and Methods** Since the beginning of 2011 the San Giovanni Bosco hospital pharmacy has used morphine bags at levels of 2% morphine per 100 ml to prepare elastomeric infusion pumps for analgesic treatment in addition to vials used. The aim was to monitor how the consumption of morphine was changing by comparing the quantities consumed in 2010 and 2011. This was done using data from the controlled drugs register.

**Results** In 2011, the quantity of morphine consumed increased by 4.5%. The amount of morphine waste from broken elastomeric infusion pumps, expired vials and bags, bags left unused due to death of the patient or change of treatment and bags with unused content increased in total by 94%. 35% of morphine destroyed was deemed outside of its validity period while 62% of elastomeric infusion pumps were returned to the pharmacy as faulty. Despite the increase in expired morphine and the increase in morphine purchased there has been a reduction in spending of approximately 28%.

**Conclusions** This analysis allowed us to verify that the use of morphine bags has led to a slight reduction in expenditure. It is also important to emphasise the easier fitting of the infusers by operators which leads to time savings.

No conflict of interest.

#### TCH-033 PHYSICO-CHEMICAL STABILITY OF READY-TO-ADMINISTER EPINEPHRINE INJECTION SOLUTIONS 20 µg/ml, 50 ml

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**Background** In the University Medical Center Mainz standard concentrations are defined for medicinal products to be administered by continuous injection with syringe pumps in adult intensive care patients. Patient-individual doses are provided by adjusting the injection rate. Various medicines are aseptically prepared in the pharmacy department as ready-to-use products. Batch preparation of the products and keeping them in stock is only possible if stability of the products is tested using a validated method.

**Purpose** The purpose of this study was to test the stability of ready-to-administer epinephrine solutions for injection 20 µg/ml in 50 ml plastic syringes.

**Materials and Methods** Epinephrine bulk solution 20 µg/ml was prepared aseptically by diluting Suprarenin 25 mg/25 ml Sanofi-Aventis with 5% glucose infusion solution in empty infusion bags (PP/PE). The solution was filled with the NeoCare Compounder into 50 ml BD Perfusion Syringes, Luer Lock Tip, protected from light. The syringes were stored at 2–8°C in the refrigerator. Epinephrine concentration was determined by using a validated HPLC method with UV detection at 280 nm and an innovative HPLC column Nucleodur which contains sulfonyl groups.

**Results** The concentration of epinephrine in the 50 ml syringes remained unchanged over a period of 2 months. After 28 days and 2 months of refrigerated storage the concentration amounted to 100.5% and 100.8% of the nominal concentration, respectively. Neither adrenochrome (detection wavelength 480 nm) nor any other degradation products were detected during the study period. With regard to these results batch production is feasible. Stability over 2 months is assured.

**Conclusions** Epinephrine solution for injection 20 µg/ml, aseptically prepared by diluting the marketed injection concentrate with 5% glucose infusion solution in 50 ml light-protected plastic syringes, is stable under refrigerated storage conditions for at least 2 months.

No conflict of interest.

#### TCH-034 RECYCLING DRUGS FOR VIRAL DISEASES IN THE OUTPATIENT AREA

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**Background** When drugs are multidose packaged, all units must be dispensed to the same patient. Sometimes, patients don't finish their treatment and return units left to the Pharmacy Department. Units returned must be discarded, so it is a loss to the Pharmacy Department.

**Purpose** To evaluate how much the Pharmacy Department loses when multidose packaged drugs for viral diseases are returned to the outpatient area.

**Materials and Methods** A single-centre retrospective observational study was carried out in the outpatient area of the Pharmacy Service of the Hospital Clínico Universitario de Valladolid over 10 months, between June 2011 and March 2012. The following information was collected in structured tables: name of medicine, number of units returned, price to book value per unit and total value.