from the first two categories) and experienced stress at workplace (reduced).

Conclusion and relevance Telepharmacy may allow hospital pharmacists of smaller hospitals learn and benefit from experienced colleagues. Following these results, a broader plan for hospital telepharmacy should be designed and supported by national authorities.

REFERENCES AND/OR ACKNOWLEDGEMENTS

No conflict of interest.

4CPS-183 SELECTION OF A POPULATION PHARMACOKINETIC MODEL OF ADALIMUMAB IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE SUITABLE FOR THERAPEUTIC DRUG MONITORING

[1]P Mas-Serrano*, [2]R Nalda-Molina, [2]A Ramón-López, [2]S Marquez-Megías, [1]M Díaz-González, [1]J Selva, [3]A Gutiérrez, [1]C Colomer. *[1]Hospital General Universitario De Alicante, Clinical Pharmacokinetic Unit-Pharmacy Department, Alicante, Spain; [2]Miguel Hernández University, Division of Pharmacy and Pharmaceutics, Alicante, Spain; [3]Hospital General Universitario De Alicante, Digestive Department, Alicante, Spain*

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Background and importance Adalimumab is an anti-TNFα monoclonal antibody used in inflammatory bowel disease (IBD). Its efficacy can benefit from therapeutic drug monitoring (TDM). However, because there are several population pharmacokinetic models (PopPK) published, it is necessary to perform an evaluation of these models in the target population before being used in clinical practice.

Aim and objectives To evaluate the predictive performance and adequacy of four PopPK of adalimumab in adult patients diagnosed with IBD, using TDM in a clinical setting.

Material and methods A retrospective observational study (2014–2018) was conducted. Inclusion criteria were adult patients with IBD treated with adalimumab, with at least one trough concentration (TC). Four different PopPK were evaluated: Mod-A (FDA-2007), Mod-B Ternant-2015, Mod-C Sharma-2015 and Mod-D Berends-2018. The models were implemented in NONMEM V.7.3.

The individual and population predictions of TCs were estimated from the four PopPK models. Two datasets were created; DATASET-1 was used to evaluate the model adequacy, all patients and TCs were included, and their population predictions were compared with the observed TCs; DATASET-2 was used to assess the predictive performance and only patients with two or more TCs were included. Only the first TC of these patients was used to estimate the Bayesian estimates, and the individual predictions were compared with observed TCs.

To validate these models, bias and precision of estimated concentrations were calculated as the mean predictive error and the mean square predictive error in the population, respectively.

Abstract 4CPS-183 Table 1

	DATASET-1		DATASET-2	
	Bias (95% CI)	Precision (95% CI)	Bias (95% CI)	Precision (95% CI)
Mod-A	−5.26 (−5.95; −4.57)	7.61 (6.8; 8.42)	−0.906 (−1.99; 0.175)	4.80 (2.97; 6.63)
Mod-B	−2.88 (−3.47; −2.29)	5.52 (4.88; 6.16)	−0.666 (−1.71; 0.376)	4.59 (2.83; 6.35)
Mod-C	−3.71 (−4.34 ;−3.01)	6.26 (5.52; 7.00)	−2.84 (−3.95; −1.72)	5.63 (4.22; 7.04)
Mod-D	−3.06 (−3.66; −2.46)	5.67 (4.92; 6.41)	−1.77 (−2.89; −0.643)	5.20 (3.56; 6.85)

Results A total of 171 patients with 245 TCs in DATASET-1 and 55 patients with 74 TCs in DATASET-2 were included; 5.85% of patients in DATASET-1 and 3.64% in DATASET-2 developed anti-adalimumab antibodies.

Conclusion and relevance Mod-B performed better both in the evaluation of adequacy (DATASET-1) and for predictive performance (DATASET-2). All four models overestimated TC although Mod-B had better bias and precision (ie, closer to zero). Implementation of this PopPK in clinical practice should be done with caution.

REFERENCES AND/OR ACKNOWLEDGEMENTS

No conflict of interest.

4CPS-184 EVALUATION OF A CLINICAL PHARMACY SERVICE ON AN INPATIENT WARD IN AN ACUTE HOSPITAL

[1]C Mc Gann*, [1]B Love, [1]J Carr, [2]E Dolan, [2]M O'Connor. *[1]Connolly Hospital, Pharmacy Department, Blanchardstown, Ireland; [2]Connolly Hospital, Medicine for the Elderly, Blanchardstown, Ireland*

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Background and importance Intensive clinical pharmacy input from admission to discharge has been shown to improve patient outcomes. The clinical pharmacy service in our institution has historically been under-resourced.

Aim and objectives The study aim was to develop a ward based clinical pharmacy service and to evaluate its impact using a number of clinical, safety and financial metrics.

Material and methods A clinical pharmacist was assigned to provide pharmaceutical care to patients on a medicine for the older person ward. Over an 8 week period, the pharmacist prospectively recorded her interventions/activities. To assess impact on patient care, interventions were graded according to the Eadon criteria. The potential cost avoidance associated with interventions was estimated using two methods identified in the literature. Both define costs related to medication errors and calculate cost avoidance associated with clinical interventions based on prevention of harm. Medication incident reporting was analysed to assess the impact on patient safety.

Results

- Eighty–four patients received a pharmacist review. Across a spectrum of activities, a total of 267 pharmacist interventions were recorded: 87% of patients had at least one pharmacist intervention.
- A total of 90% of interventions requiring follow–up with the medical team were accepted and resulted in a change to patient care.
- Eadon grading of interventions deemed that 81% of interventions improved the standard of patient care.
- Two different methods were used to estimate potential cost avoidance: one estimated annual savings of € 154 103–€ 344 926; the other estimated these at € 174 373. Given current pharmacist salary costs, this equates to a cost–benefit ratio of

2.8:1 to 6.3:1. (This does not include the 27% reduction in drug spend observed during the study period. However, more longitudinal data are required to confirm and characterise this phenomenon.)
- In the third quarter of 2018, 21 medication incidents were reported from the study ward compared with an average of 4 incident reports from the first and second quarters of 2018. This represents a fivefold increase in medication incident reporting, suggestive of an enhanced culture of patient safety.

Conclusion and relevance This study assessed and quantified a wide spectrum of pharmacist contributions to medication management and safety. Costing of these contributions estimated the cost–benefit ratio of the clinical pharmacy service, providing compelling support for the extension of this service throughout the hospital.

REFERENCES AND/OR ACKNOWLEDGEMENTS
No conflict of interest.

4CPS-185 ADMINISTRATION OF ORAL ANTICANCER DRUGS FOR PATIENTS WITH SWALLOWING DIFFICULTIES

N Meca*, A Manzaneque, G Castells, G Garreta, C Sebastián, I Parés, P Arcenillas, J Nicolás. *Hospital Universitari Mutua De Terrassa, Pharmacy, Terrassa, Spain*

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Background and importance Administration of oral anticancer drugs (OAD) can be problematic in patients with swallowing difficulties. The inability to swallow solid dosage forms can compromise compliance and may lead to poor clinical outcome, representing a challenge for pharmacists.
Aim and objectives To identify alternative administration options for OAD in patients with swallowing difficulties.
Material and methods We conducted a systematic review with paired reviewers. All OAD used in our hospital were included. Our search was made in the following databases: Micromedex, Drug Information Handbook of Oncology and Medline. We also searched in every summary of product characteristics (SPC) and consulted with each laboratory when no information was obtained.
Results Sixty-three active substances were included in the systematic review, 40 were formulated as tablets. In 13 drugs there was information in the drug information document about alternative ways of administration. Information on alternatives in administration was found for 46/63 drugs: 15/46 had a galenic formulation (alectinib/busulfan/cyclophosphamide/erlotinib/etoposide/hydroxycarbamide/imatinib/lapatinib/methotrexate/mitotane/pomalidomide/thalidomide/tetrionine/tioguanine/topotecan); 5/46 had commercially available oral preparations (dabrafenib/dasatinib/eltrombopag/temozolomide/trametinib); 1/46 had both galenic and commercial preparations (mercaptopurine); and 25/46 had an alternative method of manipulation (see table 1) following recommendations for manipulation of hazardous drugs (NIOSH, group 1) and providing the necessary material from the pharmacy service.

Any alternative was found in 17/63 due to: lack of information (10/17), pharmacokinetics/physicochemical parameters (4/17) and high risk of manipulation (3/17). Unificated OAD recommendations (repeat the process twice to ensure the entire drug).
Conclusion and relevance For most OADs, official information (SPC/laboratory) regarding swallowing difficulties is not available. Therefore, this type of systematic review can be useful for pharmacists to provide an alternative which is equally safe and effective for the patient.

Abstract 4CPS-185 Table 1

Drug	Method proposed	Oral liquid vehicle	Process time (min)
Afatinib			
Capecitabine			
Ceritinib			
Chlorambucil			
Osimertinib			
Procarbazine			
Ruxolitinib		Water	15
Vantedanib			
Venetoclax			
Palbociclib	Disperse	Hot water	5
Vismodegib		Semisolid food	
Lomustine			
Nilotinib		Apple sauce	2
Axitinib			
Everolimus			
Gefitinib			
Ibrutinib		Water	
Melphalan			
Sorafenib*	Dissolve		10–15
Vemurafenib*	(*previously		
Crizotinib	crushed)	Hot water	10 (+15 min cold water)
Lenalidomide			15
Imatinib		Apple juice/water	15
Lenvatinib			10
Sunitinib		Apple sauce	2

REFERENCES AND/OR ACKNOWLEDGEMENTS
No conflict of interest.

4CPS-186 DESCRIPTION OF PHARMACEUTICAL INTERVENTIONS IN AN INTENSIVE CARE UNIT

[1]M Muñoz Burgos, [2]S Escalona Rodriguez, [1]E Prado Mel, [1]M Mejias Trueba*. *[1]Hospital Universitario Virgen Del Rocio, Hospital Pharmacy, Seville, Spain; [2]Hospital Universitario Virgen Del Rocio, Intensive Medicine, Seville, Spain*

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Background and importance Several associations of scientists and clinical pharmacists have developed the specialty of critical care pharmacists, among them the American College of Clinical Pharmacy, the American Society of Health System Pharmacist and the Operating Room Satellite Pharmacy Association. Patient safety and clinical outcomes are enhanced when clinical pharmacists participate proactively as a member of the multidisciplinary intensive care unit (ICU) team.
Aim and objectives To describe the pharmaceutical interventions (PIs) carried out by a resident pharmacist and its acceptance in a tertiary referral hospital.
Material and methods A prospective and descriptive study was carried out in an ICU of 30 beds in a tertiary referral hospital for 2 months, from July to August 2019. Pharmacist interventions, both proactive recommendations and resolution of question by the rest of the care team, were considered. Variables included were number of ICU admissions, number of PIs,