

'dangerous' products, the analysis showed that 37% of these reagents present a high to very high risk, such as formaldehyde, 42% have a medium risk such as nitric acid and 21% pose a low to very low risk such as acetone.

Our second aim was to reduce risks, so we have proposed preventive measures such as the use of personal protective equipment (mask, gloves) and collective (hoods). The levels of risk have significantly decreased: 82% of the reagents with a very low risk and 12% have a medium risk. The products that have kept a very high severity are used rarely and in small quantities.

Conclusion Our results concord with the literature. We have demonstrated that the level of severity of reagent is manageable by acting on two risk factors: the respect of the safety measure of each chemical and the exposure of the operator to the operations carried out.

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1ISG-021

A COMPREHENSIVE REGIONAL STRATEGY ADDRESSING GUIDANCE ON SAFE HANDLING OF HAZARDOUS DRUGS

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Background Occupational exposure to hazardous drugs (HDs) is a mounting public health concern. Nevertheless, currently there are not harmonised standards for the prevention of HDs' exposure.

Purpose To implement a comprehensive regional strategy (CRS) addressing guidance on safe handling of HDs in order to minimise healthcare workers' exposure based on the harmonisation of safety standards and practices among hospitals.

Material and methods A 32-item online questionnaire about general information, preparation and administration of HDs was carried out to investigate the current situation of training and awareness among workers of 34 regional public hospitals (RPH).

A multidisciplinary working group, involving 40 health professionals (including hospital pharmacists, oncology nurses, occupational medicine professionals and warehouse logistics managers) from 14 different hospitals was formed in 2017 to formally achieve consensus on the management of HDs.

A formal education plan was implemented, providing online and face-to-face train-the-trainers courses to all health professionals involved in the preparation and administration of HDs.

Results Overall, survey results showed heterogeneous procedures concerning NIOSH table 1 drugs and deficiencies in training and in awareness regarding handling of the other HDs.

In January 2018 Resolution 51/2018 was published. This was the first formal European framework establishing mandatory practice standards on safe handling of HDs for 34 RPH.

One of the most remarkable points of Resolution 51/2018 is the creation of HDs' Committees in each hospital, which ensure compliance with the reporting standards and promoting supplementary and specific protocols if necessary.

Additionally, the aforementioned resolution includes two monographic annexes on closed-system transfer devices and personal protective equipment. Further recommendations related to drug preparation, administration and reception, have been also carried out.

So far, 413 training-trainers have completed the formal education plan and 4155 healthcare workers have finished online training courses.

In April 2018 the CRS was presented at the European Parliament during the conference named 'The problem of HDs in the healthcare sector in Europe'.

Conclusion Protection from HDs' exposure depends on adherence to safety programmes, as well as other factors.

A comprehensive approach based on the harmonisation of safety standards, the engagement in safety culture and appropriate practice techniques among hospitals could minimise worker exposure to HDs.

REFERENCES AND/OR ACKNOWLEDGEMENTS

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1ISG-022

FINANCIAL IMPACT OF THIRD-GENERATION CEPHALOSPORINES RESISTANCE IN HOSPITAL SETTINGS – AN EXAMPLE WITH CEFTRIAXONE

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Background Despite the availability of a national antibiotic stewardship programme, antibiotic resistance (AR) in local settings has been increasing in recent years. The consumption of third-generation cephalosporins in national hospitals increased from 0.2 in 2006 to 0.8 in 2016 defined daily doses (DDD) per 1000 patients/day.

Purpose The goal is to estimate the financial impact of cephalosporin resistance in patients with lower respiratory tract infections (LRTI) and to calculate the savings in case of regular application of antibiograms from the hospital perspective.

Material and methods A cost-benefit analysis was applied to evaluate the benefits from the introduction of compulsory antibiograms in hospitals in case of LRTI. Information about the AR towards ceftriaxone was gathered from the National Reference Microbiology Centre. The cost of ceftriaxone and antibiotics commonly applied as alternatives (linezolid, vancomycin, teicoplanin) in the case of AR was calculated based on hospital prices. Cost per bed day and length of stay in hospitals were taken from the National Centre of Public Health and Analyses and the cost of antibiogram from the National Health Insurance Fund. Savings from the avoided hospital stay, cost of therapy and antibiogram for a cohort of 200 patients with LRTI were calculated.

Results The level of ceftriaxone resistance is 8% (*Pseudomonas aeruginosa*) and 14% (*Klebsiella pneumoniae*). The price per DDD of ceftriaxone is € 1.93, its alternatives € 22.54, the number of hospital days for treatment of LRTI is 9.94, the extension of hospital stays due to AR is five, the price of one hospital bed per day is € 64.83 and the unit price of antibiogram is € 2.25. Thus, the total costs for treatment of LRTI patients are € 99,256.57 with and € 101,888.07 without

antibiogram. The performing of antibiogram provides savings of € 2,631.49 for the treatment course. The availability of resistant isolates is associated with additional costs of € 3698.39.

Conclusion The application of efficient national antibiotic policy, use of defensins and regular provision of antibiogram tests in hospitals could decrease the costs of LRTI treatment. Further studies revealing the economic consequences of the use of defensins as a special class of antimicrobial peptides should be performed.

REFERENCES AND/OR ACKNOWLEDGEMENTS

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11SG-023 CYSTIC FIBROSIS OUTPATIENT TREATMENT COSTS: A RETROSPECTIVE ANALYSIS

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Background Cystic fibrosis (CF) is the most serious and frequent hereditary autosomal disease that causes respiratory, hepatic and pancreatic dysfunction.

Purpose To assess the pharmaceutical cost associated with CF outpatients from the Adult Cystic Fibrosis Unit at a third-level hospital.

Material and methods Retrospective observational study of CF medication in adult patients throughout the year 2017, patients without complete annual monitoring were excluded. Collected data: age, sex, mutation of cystic fibrosis transmembrane conductance regulator (CFTR) gene, forced expiratory volume in 1 s (FEV1), colonisation by *Pseudomonas aeruginosa* (PA) and drug therapy. Considered costs were laboratory selling price notified in Nomenclator. CFTR modulator drugs and hypertonic 7% sodium chloride solution as master preparation were not considered for overall costs (purchase price was zero). The SPSS program (15.0 version) was used for data analysis.

Results Fifty-nine adult patients were included, 54.2% were female and average age was 32.2 years (± 9.2): 35.6% patients were homozygous for F508 deletion, 42.4% were heterozygous and 22.0% had another mutation. The average FEV1 was 72.6%: 55.9% patients were FEV1 $\geq 70\%$, 39.0% FEV1=40%–69% and 5.1% FEV1 <40%. In addition, 32.2% were colonised by sensitive PA and 8.5% by PA multidrug-resistant.

The annual cost was € 547,085.70 and the median cost was € 7,147.58 (IQR=€ 14,397.72). The average cost in homozygous patients was € 12,129.56, in heterozygous it was € 8479.80 and for other mutations it was € 6,182.32. The average cost distributed by FEV1 groups was: € 7,565.09 in patients with FEV1 $\geq 70\%$, € 117,04.65 for FEV1=40%–69% and € 9,410.16 for FEV1 <40%: all differences were statistically significant. The cost difference between patients without infection and with sensitive PA was € 77,183.31 and between multidrug-resistant PA patients it was € 10,272.82: both differences were statistically significant. High-cost medicines were dornase alfa (Pulmozyme), aztreonam (Cayston) and inhaled tobramycin (Bramitob).

Conclusion Cystic fibrosis is a relatively costly disease, although new CFTR modulator drugs will increase costs considerably. Treatment costs per patient are similar to those reported in the literature. The pulmonary function is related to treatment cost: severe dysfunction means lower expenditure than intermediate function, on account of excluding CFTR modulators. The relationship between treatment adherence and cost should be analysed in further studies.

REFERENCES AND/OR ACKNOWLEDGEMENTS

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11SG-024 BIOSIMILARS SWITCH: DO DOCTORS AND PATIENTS REVERT BACK AFTER SWITCHING?

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Background Biosimilars are a great opportunity to improve the efficiency of health systems. Their quality is certified by regulatory agencies and high-quality clinical trials. However, some reluctance about switching between originals and biosimilars still remains between doctors and patients because of different reasons.

Purpose

To determine if doctors or patients revert back to initial treatment after switching between biologic originals and biosimilars in real life.

Material and methods Electronic prescriptions were used to identify all patients under biologic treatment who had a biosimilar available. Rituximab (Mabthera, Rixathon), etanercept (Enbrel, Benepali, Erelzi), infliximab (Remicade, Inflectra, Remsima) and filgrastim (Neupogen, Accofil) were considered. Darbepoetin (Aranesp), peg-eritropoetin beta (Mircera) and biosimilar eritropoetin alpha (Binocrit) were considered despite not being biosimilars because the hospital Formulary Committee agreed the switch between them. Patients switched from original to biosimilar or vice versa when selected for evaluation. If treatment remained unchanged after the switch until the time of evaluation it was considered successful, understanding that both the patient and the doctor were satisfied. If the change was reverted, the clinical file was reviewed to assess the reason.

Results Between September 2015 (first biosimilar prescription) and September 2018 5909 patients were treated with the above-mentioned biologics: 874 received a biosimilar but only 250 had a switch. Switch description: Etanercept: 41 patients Enbrel to Erelzi, four patients Enbrel to Benepali, three patients Benepali to Erelzi, no switch reverted. Infliximab: 34 patients Remicade to Inflectra, one patient Inflectra to Remicade, no switch reverted. Eritropoetins: 12 patients Aranesp to Binocrit, no switch reverted. Filgrastim: 116 patients (74.4%) Neupogen to Accofil and 12 patients (7.7%) Accofil to Neupogen, 26 patients (16.7%) had one or more switches (mostly because of drug shortages) and two patients (1.3%) switched because of patient (fatigue) or doctor (inefficacy) decision.

Conclusion Despite initial reluctance to switch, no significant problems were identified.

Monitoring switch reversion is a useful tool to monitor problems when introducing biosimilars and may help to implement early actions if problems are detected.