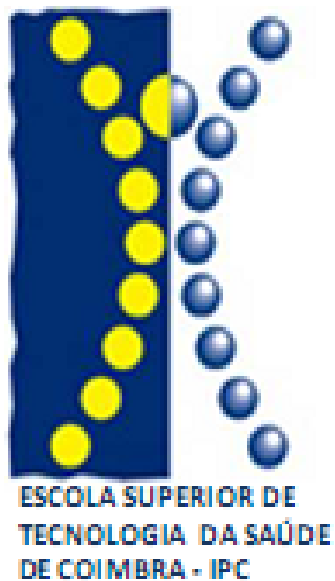


ESTeSC – Coimbra Health School

Abstract Book

Poster Week 6/16

December 12th – 16th, 2016



SCIENTIFIC COMITEE

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PROGRAM

Calendário da semana

Poster Week 6-2016

	2ªf 12/dez	3ªf 13/dez	4ªf 14/dez	5ªf 15/dez	6ªf 16/dez
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18-19h		Ana Lança: 4P Curso: SA UC: Saúde Ocupacional			
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20-21h					

West Nile Virus And Transfusion Medicine***Adriana Machado, Alice Gonçalves, Sandra Taipina, Sara Fazenda, Fernando Mendes****Polytechnic Institute of Coimbra, ESTeSC-Coimbra Health School, Biomedical Laboratory Sciences, Coimbra, Portugal*

West Nile virus (WNV) infection is a mosquito-borne disease, classified within the genus Flavivirus, family Flaviviridae, antigenically related to the Japanese encephalitis virus. The time from infection to the appearance of first symptoms takes typically between 2 to 15 days, however approximately 80% of the individuals infected have few or no symptoms. The major risk factor is age, specially people of advanced age or very young, those with immunosuppression, such as those with pre-existing medical condition such as HIV infection. This virus was becoming an increasing issue in medicine transfusion, however, the intensified research and studies of the WNV infections in humans and animals resulted in the detection and isolation of many pathogenic isolates of WNV. The most widespread is divided into different subclasses: WNV-1a, WNV-1b and WNV-1c. In order to avoid the risk of transmission via transfusion, solid organ transplantations, intrauterine exposure; or breast feeding, several measures have been taken in the medicine transfusion area. Today, WNV can no longer be considered a minor risk for humans but rather a global threat. In the transfusion setting, the preventive measures implemented are the 28-day deferral and the WNV Nucleic Acid Testing, which have proved to be able to control the risk of infection until nowadays, since currently there are no vaccine for WNV.

Keywords: West Nile virus, WNV, Transfusion Medicine

Chikungunya virus and Medicine Transfusion

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Chikungunya virus (CHIKV) is a RNA virus of Alphavirus genus and Togaviridae family, being often compared to Dengue.

It was firstly isolated in Tanzania in 1952, then spreading to Asia and other countries in Africa and more recently throughout the globe, mostly found in endemic tropical regions in America.

This virus is transmitted mainly to humans by mosquito bites, although it can infect other animals. All humans are vulnerable to severe infections but the risk groups tend to be children, elderly and pregnant women due to the possibility of maternal-fetal transmission.

At an acute stage, the main symptoms are fever, polyarthrititis and rash. If symptoms persist for more than three months, the infection can turn into a chronic disease. It is believed that once exposed to CHIKV, individuals will develop long lasting immunity that will protect them against reinfection.

The main laboratory tests used in diagnosis are serological tests in which specific immunoglobulins are detected using ELISA method and also RT-PCR assays.

CHIKV can also be transmitted through blood transfusion if the donor is infected, having a major impact if the viremia is high.

Therefore, tests must be performed in donors who have travelled to endemic regions with known virus transmission and active Aedes mosquitos, paying extra attention to the ones who show suspicious symptoms.

In sumary, the CHICV must be considered in transfusion medicine due to possibility of being transmitted through blood donations but with implementation of simple practices that transmission can be avoided.

Keywords: Chikungunya, transfusion, virus

Trypanosoma cruzi and Medicine Transfusion

Cristiana Mourato, Joana Cordeiro, Júlia Ponte, Mariana Dias, Fernando Mendes

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Trypanosoma cruzi (haemoflagellate protozoan parasite) is responsible for the Chagas disease - a zoonotic disease that can be transmitted to humans. It was named after the Brazilian doctor who discovered it in 1909, Carlos Chagas, and it is mainly found in Latin American countries - where it is endemic - being mostly transmitted by vectors (triatomine bugs).

The transmission can occur by infected bug bite, food contaminated with their faeces, congenital, laboratory accidents, transplantation and blood transfusions. The possibility of Trypanosoma cruzi transmission to man through blood transfusion was first mentioned by Mazza et al. (1936) and Dias (1949). The existence of an asymptomatic, parasitaemic, chronic phase puts blood donations at risk, particularly because affected donors are frequently unaware of their status.

The migration of affected and asymptomatic individuals from endemic to non-endemic areas may lead to transmission of Trypanosoma cruzi by transfusion anywhere.

In Portugal, a blood safety protocol is under approval by the Portuguese Institute of Blood and Transplantation and is oriented to the exclusion of all at-risk donors.

The diagnosis of Trypanosoma cruzi infection is complex, since acute and chronic phases have different detection methods. In the acute phase and in case of reactivation of the disease, parasitological tests are the most performed. In the chronic phase, there is a decrease of parasite blood concentration, detectable with the ELISA method. It is the most sensitive test and it detects specific antibodies with two types of antigens: native from a parasite lysate or recombinant antigens.

Keywords: Trypanosoma cruzi, Medicine Transfusion

Human T cell lymphotropic virus and Medicine Transfusion

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The Human T-cell lymphotropic virus (HTLV) was the first human retrovirus to be discovered, belongs to the genus Deltaretrovirus in the Retroviridae family and predominantly affects T cells. Acute HTLV infection is rarely seen or diagnosed, as most infections are latent and asymptomatic. The infection might be diagnosed after an attempted blood donation or through workup of a disease caused by the virus.

The risk of seroconversion due to contaminated blood transfusion has been reported to be 40%-60% and increases in immunosuppressed recipients, thus screening of blood units is important to prevent the most cases infection, but the relatively long HTLV immunological window period (51 days) may lead to its transmission, it depends of type and time stock of the blood component, besides the proviral load of the blood donor.

Because of HTLV transmission by blood transfusion, different countries have introduced screening for the virus in blood banks. Our main goal is to understand the life cycle of HTLV, how it's transmitted and the importance of it in medicine transfusion.

Keywords: HTLV; medicine transfusion

References:

<http://emedicine.medscape.com/article/219285-overview#a5>

<http://emedicine.medscape.com/article/219285-overview>

<https://www.hindawi.com/journals/lrt/2016/1675326/>

<http://www.intechopen.com/books/blood-transfusion-in-clinical-practice/human-t-cell-lymphotropic-viruses-htlv->

<http://onlinelibrary.wiley.com/doi/10.1111/j.1423-0410.1998.tb05416.x/epdf>

Transmissible spongiform encephalitis; prions and variant Creutzfeldt-Jacob disease and medical transfusion***Mariana Alves; Nuno Simões; Olesya Bondarenko; Rita Fernandes; Fernando Mendes****Polytechnic Institute of Coimbra, ESTeSC-Coimbra Health School, Biomedical Laboratory Sciences, Coimbra, Portugal*

Transmissible spongiform encephalopathies, are a group of progressive conditions that affect the brain and nervous system of many animals, including humans. Regarding humans we have five major diseases. These conditions form a spectrum of diseases with overlapping signs and symptoms, and are all caused by prions, which are infectious agents composed only by proteic material.

They have the ability to fold themselves in distinct ways granting at least one form that has the ability to transmit itself to other prion proteins. It is believed that prions propagate by entering in a healthy organism and inducing the properly folded proteins of the organism to assume its own misfolded form converting them to a "prion form", later this re-folded proteins have the ability to do the same thing to other healthy proteins of the organism. Prions may cause a big problem to the organism they invade because of the extreme stability of its aggregates, and the ability that this aggregate have of causing tissue damage and cell death. In this work the focus will be the new variant Creutzfeldt–Jakob (vCJD) disease a human disorder related to bovine spongiform encephalopathy. vCJD is a novel human prion disease caused by infection with the agent of bovine spongiform encephalopathy (BSE). Even though Epidemiological evidence does not suggest that sporadic CJD is transmitted from person to person via blood transfusion, there are findings that suggest that this premise may not apply to the disease in interest (vCJD).

Keywords: spongiform encephalopathies, prions, variant Creutzfeldt-Jacob disease

Hepaciviruses, Pegiviruses And Medicine Transfusion***Maria Inês Costa, Mariana Pratas, Josiane Spencer****Polytechnic Institute of Coimbra, ESTeSC-Coimbra Health School, Biomedical Laboratory Sciences, Coimbra, Portugal*

Hepaciviruses and pegiviruses are two genera of the viral family Flaviviridae, both of which are single-stranded positive sense RNA viruses and contain species that infect humans. Hepacivirus is a genus of viruses which includes the type species of Hepatitis C virus (HCV), associated with hepatitis and hepatocellular carcinoma. Its main routes of transmission are sexual, blood and contact. HCV transmission was significantly reduced by preventive measures in transfusion medicine such as screening the donors' blood samples. Human pegivirus (HPgV) was originally called hepatitis G virus, as it was thought to be hepatotropic, but was then renamed to HPgV, since subsequent studies failed to find a conclusive association with liver disease. Although there are no directly associated diseases, it was observed in several studies an increased risk of developing non-Hodgkin's lymphoma in humans infected with this virus. HPgV is transmitted by exposure to infected blood, sexual exposure and vertical transmission. Due to the lack of association with known acute diseases, blood products in use for medicine transfusion are not screened, meaning that once the infection with HPgV in humans is considered non-pathogenic, viraemic blood donations are not excluded from transfusion. However, the recent confirmation that HPgV seems to be associated with non-Hodgkin's lymphoma raises awareness about the need for a vaccine and the question of whether screening of blood donors should be performed.

Keywords: Hepaciviruses, pegiviruses, transfusion

TT virus and medicine transfusion

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TT virus was first found in Japan in 1997, being identified in a patients' serum with post-transfusion hepatitis and it was classified as the cause of an non-A non-G hepatitis (later denominated TT Hepatitis).

It is a DNA genome virus (~3.8Kb) with negative polarity and icosahedral structures. It is a naked virus and has a single and circular strand. It is ubiquitous and it belongs to the paracircoviridae family.

Although TTV can be found on 90% of healthy population, in an asymptomatic way, it can eventually cause hepatic disease.

For transfusion purposes, the presence of this virus is not tested since is not proven that it can cause any substantial health risk to the receptor. However, in case of suspicious presence and pathogenicity on a host, it can be detected through Polimerase Chain Reaction and serum tests. In conclusion, it is still controversial whether the virus can cause disease or not. In spite of that, it is important to keep in mind the risk of TTV transmission by blood transfusion and therefore, blood banks should be aware that they can be a transmission vehicle.

Keywords: TT virus, infection, transfusion

Zika Virus and Medicine Transfusion

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Zika virus is a flavivirus (single-stranded, enveloped RNA viruses) spread mostly by the bite of an infected *Aedes* species mosquito (*aegypti* and *albopictus*). Initially identified in Uganda, in the Zika forest in 1947, hence its designation. It is transmitted to people primarily through the bite of the infected mosquito, then infected people can transmit the virus to other people through pregnancy (mother to child), sexual intercourse, blood transfusion and through laboratory and healthcare setting exposure.

Many people infected with Zika virus won't have symptoms or will only have mild symptoms (fever, rash, joint pain, conjunctivitis, muscle pain and headache). The infection can result in microcephaly, Guillain-Barré syndrome and several neurologic disturbs.

The donors selection in affected and unaffected areas are suspended in individuals with recent clinical diagnosis of Zika virus infection, residents in affected areas, travelers returning from affected areas, individuals after sexual intercourse with infected people, resident or returned from affected areas.

The laboratory detection is done through the detection of viral RNA (molecular test - Trioplex Real-time Polymerase Chain Reaction Assay) and/or specific antiviral antibodies (serological test - Zika MAC Elisa).

There is high prevalence of this virus in American continent mostly because of the non existence vaccine or medicine for Zika.

Keywords: Zika virus

Bronchiolitis in the first year of life

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It is known at an early age there are important differences in the pharmacokinetics of the newborn. Many of these are still unknown, proving there is a huge gap in the administration of drugs in neonates. It should be taken into account the risk/benefit when many diseases are manifested. Diseases that appear in the first year of life is associated with respiratory tract infections, depending their treatment with severity of the disease.

Bronchiolitis is a viral infection caused by respiratory syncytial virus in about 75% of the cases. It is characterized by obstruction of the airways of the lower respiratory tract. The disease itself isn't fully understood, but it's related to changes in mucus removal mechanisms in the airways. It's a leading cause of viral etiology that leads children being hospitalized (about 5%).

It is known that male infants between 2-5 months of age are most susceptible to the virus. Other risk factor include exposure to tobacco smoke, ex-preterm infants, maternal nutrition for less than 1-2 months, kindergartens frequency and immunodeficiency's under the age of 6 months. This disease is manifested by fever, rapid breathing, and shortness of breath, cough and possible vomiting associated with worsening of symptoms over time.

Treatment of the disease is largely symptomatic. It should be done by nasal washing, suction of secretions, paracetamol and proper hydration.

Keywords: Bronchiolitis; syncytial virus; treatment; infants; symptoms.

Gestacional Diabetes

Ana Portásio; Andreia Acúrcio, Bianca Pessoa, Mariana Mendes; Jorge Balteiro

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Gestational Diabetes corresponds to a glucose intolerance with onset or detection during pregnancy, since there is an increase in hormone levels with contrary action to insulin, which interferes with the metabolism of carbohydrates. Some authors believe that the main factor that leads this condition is the mother's inability to produce sufficient amounts of insulin to compensate the physiological glucose intolerance mainly triggered by the action of the human placental lactogen (hPL). The most frequent symptoms of Gestational Diabetes are: increased thirst, polyuria, blurred vision, recurrent infections and weight loss. The Gestational Diabetes diagnosis strategy should involve two phases: 1) Fasting blood glucose levels in the first prenatal consultation surveillance and 2) Glucose tolerance test at 24-28 weeks of gestation. The treatment of Gestational Diabetes aims to control the blood glucose levels. For this, the pregnant women should be monitored at least every two weeks until the 36th week and weekly thereafter, by a specialized team. The first option should be for a non-pharmacological treatment consisting of healthy eating habits and physical exercise and, if the levels are not re-established, it should be done by pharmacological via using the insulin administration which is considered the first-line treatment. The use of oral antidiabetic drugs such as metformin and glibenclamide are a good alternative to insulin therapy. We conclude that control of diabetes should be done rigorously in order to avoid serious consequences for mother and fetus.

Keywords: Gestational diabetes; glucose intolerance; therapy; insulin; human placental lactogen.

Hyperactivity Disorder and Attention Deficit Disorder (ADHD)

Bárbara Cruz; Damiana Chumbinho; Inês Silva; Jorge Balteiro

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The hyperactivity disorder and attention deficit disorder (ADHD) is the perturbation of childhood development most common in childhood, which can hold up to adulthood and whose diagnosis has increased in recent times, it is characterized by behavioral manifestations that affect the normal operation / child development in different contexts of life. Among the many difficulties that exhibit, we highlight the core of this disorder problems (hyperactivity, impulsivity and inattention). It is intended to describe the main characteristics of ADHD, highlighting aspects related to epidemiology, symptoms, diagnosis and the different forms of treatment applied to each child.

For information gathering scientific articles were analyzed and visualized some websites.

In drug therapy patients should be subjected to the types of drugs: stimulants such as methylphenidate and amphetamines (lisdexamfetamine dimesylate) and non-stimulants such as atomoxetine. The choice of drug to use depends on the clinical condition of each patient, depending on the release and drug action.

It is important to raise awareness among professionals who have responsibility in the evaluation / diagnosis of ADHD, regardless of the stage of development in which it is held to the rigor that a task of this nature entails, adopting all the necessary procedures.

Keywords: ADHD; childhood; hyperactivity; methylphenidate; atomoxetine.

Children and Antibiotics

Ana Rodrigues, Ana Silva, Maria Lebre, Sofia Morais, Jorge Balteiro

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The pediatric prescription should be meticulous considering the children's stage of development, pharmacokinetic / pharmacodynamic aspects, applied doses, clinical indication and dosage forms available in order to generate the desired efficacy and avoid toxicity. Antimicrobials are natural substances (antibiotics) or synthetic (chemotherapeutic agents) which act on microorganisms or inhibiting their growth causing their destruction. The inappropriate use of antibiotics is mainly due to diagnostic uncertainty between bacterial infections and viral infections. The basis for their prescription include: host, difference between colonization, contamination and infection, as well as the mechanism and spectrum of action, pharmacokinetics, pharmacodynamics and side effects of antibiotics. In children they are used as treatment of infectious diseases of respiratory disorders and in the most common diagnoses are: acute otitis media, acute tonsillitis, upper respiratory infection, pneumonia and urinary tract infection. The prescription of these disorders isn't always the most appropriate and the most prescribed oral antibiotics in the indicated conditions are: amoxicillin, amoxicillin and clavulanic acid, macrolides and there is inappropriate use mainly cephalosporin and quinolones. The excessive use of antibiotics leads to microbial resistance where the microorganisms can proliferate in the presence of higher concentrations of antimicrobials than the proving hand to human doses. The Portuguese reality there is prevalence of allergy related to β -lactam antibiotics and antibiotic consumption is highest between 6 and 24 months of age with a predominance of amoxicillin and the association of this the clavulanic acid.

Keywords: Antibiotics; children; microbial resistance; clinical indication; pharmacokinetics.

Respiratory Infections by *Mycoplasma pneumoniae* in children

André Marote, Bruna Pais, João Santos, Pedro Vieira, Jorge Balteiro

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Mycoplasma pneumoniae is a bacterial infection with a high responsibility causing the contraction of respiratory infections in children, it is crucial to have as much knowledge of the various clinical forms of infection for appropriate treatment to pediatric context.

The most frequent manifestation of the disease is in the respiratory system, such as aggravation of asthma, acute bronchitis, pneumonia and wheezing, with a varying severity by the speed in diagnosis and initiation of treatment, and in the pediatric context is already a high risk to the child. The symptoms of these disease can last for several weeks and include malaise, fever peaks, sneezing and coughing which can become quite annoying.

The diagnosis can be made by various imaging tests such as X-ray and CT scans computerized; clinical analysis with clinical and epidemiological basis, and serologic studies using stethoscope for detecting any noticeable audible and respiratory failure.

The first-line of treatment used for infection in children, focuses on the use of macrolides, although antibiotic therapy has been increasingly less effective because of resistance acquired by this bacterium. In worst cases it might be administered in association with antibiotics, corticosteroids. In conclusion, it is important to invest in awareness as to the steady hand hygiene of children, pay attention to the primary symptoms and protect the child as much as possible to prevent infections or even the worsening of clinical symptoms, as *Mycoplasma pneumoniae* is an acquired bacterial infection especially indoors.

Keywords: *Mycoplasma pneumoniae*; children; antibiotic therapy; resistance; clinical symptoms.

Use of Tetracyclines in Pediatrics

Inês Cortês, Isa Penas, Jéssica Gouveia, Jorge Balteiro

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Tetracyclines are bacteriostatic antibiotics of wide spectrum of action, acting against gram positive and negative bacteria, aerobic and anaerobic, some fungi and protozoa. Their mechanism of action focuses on the inhibition of protein synthesis in susceptible microorganisms to the drug.

In particular, they are used in the treatment of infections such as pneumonia, acute bronchitis, among others. They are contraindicated in individuals with hypersensitivity, to any gestation period and in children less than eight years old.

The prescription of tetracyclines in pediatrics should be carefully considered because of its undesirable effects, may cause a darkening of the teeth especially when children are in tooth formation phase, due to the interaction of these with calcium of dentines and possible deformation or bone development delay, due to chelating properties it owns. If high doses are administered, or its use is prolonged for some time can lead to effects such as tooth hypoplasia.

For successful treatment, the optimal dose is a key point, once a child's metabolism level is very low when compared to adults leading to different drugs processing modes. Therefore, doses should be calculated according to weight, age and immunosuppressive conditions of child, and not just the reduction of the dose that is intended for adult.

Keywords: Tetracyclines; pediatrics; spectrum of action; adverse effects; optimal dose.

Sedatives in geriatrics

Catarina Lourenço; Karina Garcia; Marlene Silva, Jorge Balteiro

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With aging occurs the decline of homeostatic mechanisms. In old-aged the quality of the sleep suffer an alteration, turning the initiation more difficult, the time and efficiency more reduce. Therefore, the insomnia is the more frequency complains leading, in a long-term, to a loss of sense of time.

To improve this situation we can use sedative-hypnotic drugs like benzodiazepines, barbiturates and non-benzodiazepine and also antidepressants and MT1/MT2 receptor agonists.

However, is more often the utilization of drugs to alleviate symptoms rather than an effective treatment of clinical causes, constituting a major public health problem.

The probability of toxicity in elderly grows with the continued administration of drugs, due to the fact that in this patients there are important physiological changes. In pharmacokinetics, occur alterations in distribution – reduction of plasma proteins with the increase of free drug fraction and increase of the body fat with decrease of lean body mass and water, amplifying the volume of distribution of fat-soluble drugs such as long term benzodiazepines.

However in pharmacodynamic there is a decrease of the expression of receptors and of the cellular signalization answers, that may reduce the efficacy and potentiate adverse effects.

The use of sedative drugs in geriatric can increase the cognitive problems and motor accidents among others. That way, is fundamental the treatment of the clinical causes of insomnia and the use of non-pharmacologic measures to decrease the utilization of that drugs.

Keywords: Sedative drugs; geriatrics; insomnia; benzodiazepines; adverse effects.

Treatment of Hipertension on Pregnant – Use of Methyldopa

Anabela Lopes, Paula Silva; Rita Peixoto; Jorge Balteiro

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Arterial tension is the force blood exercises in the arteries walls, affecting about 10 to 15% of pregnant women.

A pregnant woman can be hypertensive because she already was before pregnancy or because she as developed arterial hypertension during gestation. There are four types: pre-existing chronic hypertension; pre-eclampsia; chronic hypertension with pre-eclampsia; gestational hypertension.

There are many causes which condition and may increase risk for hypertension on pregnant women, such as obesity, familiar background, aging, use of birth control devices, sedentary lifestyle, among others.

Pregnant women who present an hypertensive state should be supervised, specially concerning incidence and its severity. Hypertension during pregnancy requires healthcare since both mother and foetus can be at risk.

Beyond the practice of physical exercise and a healthy nourishment, medication may be also required. Many drugs which are usually requested for hypertension treatment are contraindicated during pregnancy, which turns the control of arterial tension during pregnancy a hard task.

Methyldopa and nifedipine present similar rates of effectiveness, decreasing arterial tension in cases of smooth and moderate hypertension during pregnancy, however methyldopa as proved to be safer, once it doesn't damage the foetal development or placenta. Yet the mother can be associated with problems like anxiety or somnolence and also hepatotoxicity.

It is very important to keep the pregnant informed about secondary effects and contraindications of the drug she will use.

Keywords: Hypertension; pregnancy; treatment; Methyldopa; secondary effects.

Thyroid Disease in Pregnancy

Cláudia Fernandes; Tânia Lourenço; Telma Faria; Jorge Balteiro

Polytechnic Institute of Coimbra, ESTeSC-Coimbra Health School, Pharmacy, Coimbra, Portugal

The thyroid is an endocrine gland, in which can occur the dysfunction in secretion of hormones (T3 e T4), wherein hCG and estrogens are responsible for this deregulation in pregnancy. The first one stimulates the thyroid to produce more hormones, while the exacerbation of estrogen increases thyroxine binding globulin (TBG) levels.

Hypothyroidism in pregnancy is generally caused by Hashimoto's thyroiditis, pre-existing hypothyroidism, goiter generators substances, thyroid absence, iodine deficit and pituitary failure while hyperthyroidism is caused by Graves' disease, tumors, thyroiditis and thyroid storm.

Symptoms can mimic normal circumstances of pregnancy, however, in hypothyroidism stand out fatigue, alopecia, dry skin, constipation, intolerance to cold and problems with memory/concentration, while in hyperthyroidism there are palpitations, confusion, heat intolerance, weight loss, overeating, goiter, increased bowel movements and reduced muscle strength.

The deregulation of these disorders can lead to disturbances in the mother and fetus, as pre-eclampsia, anemia, abortion, stillbirth, congestive heart failure, prematurity, hypertension and fetal stunting/malformations.

The diagnosis of both is obtained by evaluation of symptoms and levels of TSH, T3 and T4 and it is essential that the treatment guarantee the pregnancy evolution. In hypothyroidism, it should be administrated L-thyroxine and in hyperthyroidism it is preferable Propylthiouracil in the first trimester, while in the second and third trimesters Methimazole is more adequate. It is also common to administer Propranolol for control of tachycardia.

After childbirth, this disorder tends to worsen in the first months, requiring close monitoring.

Keywords: Thyroid diseases; pregnancy; treatment; symptoms; adverse effects.

Digoxin in Eldery

Mariana Ramos, Rúben Santos, Jorge Balteiro

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Digoxin, belonging to the group of digitalis, is one of the most prescribed drugs in the world, especially in the older population. It is used for treatment of heart failure, along with atrial fibrillation, and supraventricular arrhythmias and some supraventricular tachyarrhythmias, specifically flutter and atrial fibrillation.

This digitalis has a narrow therapeutic window, so, the toxic dose is very close to the therapeutic dose.

Being polypharmacy something common in the elderly, drug-drug interactions with this digitalis is easily checked and this can lead to toxicity.

The risk-benefit ratio of the use of digoxin in the elderly should be carefully evaluated, because the probability of poisoning by this digitalis is much higher in the elderly population. Therefore, doses need to be adjusted in each case.

In case of poisoning, should be discontinued the use of digoxin and its importante the monitorization of serum levels.

Keywords: Digoxin; digitalis; geriatrics; toxicity; polypharmacy.

Health Care Associated Infections: The Importance of Hand Hygiene in the Context of Multiresistance

Ana Rita Tavares; Beatriz ; Carolina Nunes; Catarina Mendes; Chloé Delassossais; Elsa Resende; Inês Amado; Jéssica Saramago; Marta Sousa; Pedro Simões

Polytechnic Institute of Coimbra, ESTeSC-Coimbra Health School, Environmental Health, Coimbra, Portugal

Bacterial resistance is considered a global public health problem, a reality for which a number of control initiatives have been proposed. Over time, it has been observed that measures taken routinely have not had the expected effect. There are several factors that contribute to the context of multidrug resistance, such as infections associated with health care, poor hand hygiene, among others, affecting the health of users and professionals.

The methodology used in our study was the application of a questionnaire, to students and teachers of ESTeSC. Of the 30 respondents, 24 are students and 6 are teachers. Concerning the opinion on the impact of hand hygiene effectiveness on prevention of health-related infections, the majority considered it very relevant. Regarding the question about the minimum time required for the Alcoholic Antiseptic Solution to reduce the microbial flora of the hands, the majority answered 10 seconds, and the correct answer is 20 seconds. Regarding the multiresistance context, 53.3% of the respondents answered that this happens due to human resistance to microbial contamination, and the most correct answer would be the loss of the ability to control the growth or death of microorganisms, which was selected by 11% of respondents.

In conclusion, teachers and students understand that hand hygiene is extremely important in combating health care infections. They are not very informed about multidrug resistance, since Portugal is one of the European Union countries that prescribes more antibiotics. The more multiresistant microorganisms are, more aggressive the treatment will be and more expensive. Therefore, prevention is preferable.

Keywords: Bacteria; Multiresistance; Hand hygiene; Health Care Associated Infections

Demyelinating diseases

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Demyelinating disease is any type of disease that affects or damages the myelin sheath of the neurons, which allows a nerve signal to travel faster along the axons, debilitating the conduction of the signal through the affected nerves and slowing them. Depending on which nerves are impaired, it can lead to reduction of sensation, movement and cognition, among others.

This type of disorder affects the peripheral or central nervous system. The first kind includes diseases such as Copper deficiency and Charcot-Marie-Tooth disease. The second happens when myelin is not properly produced or when it is attacked by external substances, like in Multiple Sclerosis which is a consequence of an inflammation.

Besides inflammation, certain viral infections, metabolic problems, loss of oxygen and physical compression can also cause demyelinating diseases.

Hand in hand with the causes come the symptoms which can occur when nerves, that are key part of our body functions, are affected by demyelination, including loss of reflexes, uncoordinated movements, blurred vision, dizziness, raced heartbeat, memory problems or fatigue.

Although there is treatment that typically involves improving the patient's quality of life through the management of symptoms or by slowing the rate of demyelination, there is no cure for the disease. Even though new myelin growth can occur in areas of damage, this new myelin is thinner and not as effective.

Treatment includes medication, lifestyle changes, relaxation, physical exercise, and even deep brain thalamic stimulation. Research is underway to increase the body's ability to grow new myelin.

Keywords: Myelin, neuron, nervous system, diseases.

References:

<http://www.healthline.com/health/multiple-sclerosis/demyelination#Symptoms3>

https://en.wikipedia.org/wiki/Demyelinating_disease#Signs_and_symptoms

Hormonal function of bone: Osteocalcin

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The bones of our skeleton confer support, protection, movement and storage, behave like an endocrine organ.

Our bones are made up of the bone matrix and the bone cells, these cells are divided into osteocytes, osteoclasts and osteoblasts.

Osteocalcin is a protein that can behave as a hormone, once is encoded by a gene of osteoblasts, secreted as pre-pro-molecule that requires changes to be released into the blood and, finally, have a circadian rhythm release.

This protein may or may not undergo a γ -carboxylation, which is dependent on vitamin K, the larger fraction (γ -carboxylated) is deposited in the bone matrix and the smallest fraction (non- γ -carboxylated) is released into the blood circulation, exerting an effect at a distance on the β cells, adipocytes, muscle and other peripheral tissues.

Osteocalcin acts in pancreatic- β -cells, increasing their sensibility to insulin, while decreasing the levels of triglycerides and, therefore, lowering visceral fat quantity; In the muscles, the activity of this protein happens mostly during physical activity, since it helps muscle fibers capturing glucose and fatty acids, enhancing the muscle performance.

In addition to the behaviors above, there is an interaction between the bone and the reproductive system: osteocalcin binds to a specific receptor expressed in the Leydig cells of the testicles, increasing testosterone synthesis, which in turn promotes maturation and prevent apoptosis of germ cells, increasing their survival.

This concept that bone acts as an endocrine organ is a science breakthrough, and there may be further research leading to the discovery of therapeutic weapons.

Keywords: bone, osteocalcin, endocrin organ, pancreatic- β -cells, reproductive system

References:

<https://repositorio-aberto.up.pt/bitstream/10216/62297/2/O%20osso%20como%20rgo%20endcrino.pdf>

<http://medicalxpress.com/news/2016-06-bone-hormone-boosts-muscle-declines.html>

Chronic Pain

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We all know pain as a normal sensation triggered in the nervous system to alert us to a possible injury. The problem appears when the pain persists even after the elimination of what caused it, that's chronic pain. It's caused due an error in the nervous system, in which nerve impulses keeps alerting the brain about tissue damage that no longer exists.

The gate mechanism controls painful and non-painful signals in the spinal cord and only sent the painful signals to the cortex. People with chronic pain, have a dysfunction with this system, and all the signals pass through the "nerve gates", even the non-painful ones. There are also some studies that shows that this type of pain is related to the endorphin levels and the lower this levels are, the higher is the tendency to have chronic pain.

Chronic pain is defined as pain that lasts and that affects the individual well-being and quality of life. This pain can arise from an injury, backaches, tendinitis and often doesn't have a specific cause. It can limit movement by reducing flexibility, strength and resistance. Besides the physical impact in the patient life, it can also disturb emotionally and mentally. There isn't cure for this pain, the only treatment is to promote a more sustainable life: there are medications that offer significant pain relief; physiotherapy helps in rehabilitation, and psychological work is needed since chronic pain often leads to emotional changes. Scientific research also shows excellent results in the use of acupuncture.

Keywords: Chronic pain, lasts, gate mecanism, physical impact, no cure.

References:

<http://www.atlasdasaude.pt/publico/content/dor-cronica-e-dor-aguda>

<http://www.aped-dor.org/index.php/sobre-a-dor/a-dor/14-dor-aguda-versus-dor-cronica>

<http://www.spine-health.com/conditions/chronic-pain/modern-ideas-gate-control-theory-chronic-pain>

Angiogenesis

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Angiogenesis consists in the formation of new blood vessels from pre-existing. It's a phenomenon that helps in the healing of tissues, in the endometrium following menstruation and the formation of the placenta during pregnancy. It occurs in adulthood, the same process in embryonic stage it's called vasculogenesis.

Angiogenesis is induced by hypoxia (low oxygen concentration).

First is the breaking of the basal membrane of pre-existing blood vessels (through the metalloproteinase and activator of plasminogen systems.). Next, there is a migration and proliferation of endothelial cells. Finally, the cells establish efficient links giving stability to the new vessel through the warehouse of the basal membrane. Another factor that promotes angiogenesis is the angiopoietin.

In general, the angiopoietin (1 and 2-has higher affinity) connects to your receptor (TIE-2) and first angiopoietin 1 and then the 2 triggering destabilization of the pericytes stimulating the connection of VEGF (vascular endothelial growth factor) to the endothelial cell occurring angiogenesis.

The deregulation of angiogenesis gives rise to various pathologies. By excess: AIDS, cancer and blindness. By insufficiency : heart stroke, infertility and heart disease.

On the other hand presents several clinics applications. For example, in the treatment of diabetic foot disease, peripheral vascular disease, administration of simvastatin (drug belonging to leading the group of statins) induces the expression of vascular endothelial growth factor (VEGF). In this way contributes to the restoration and healing of tissues with scarcity resulting in vasodilation and angiogenesis, acting in the prevention and treatment of ulcers in the diabetic foot.

Keywords: VEGF, angiogenesis, diabetic foot

References:

http://users.med.up.pt/cc04-10/biopatteoricas/Aula7_Angiogenese.pdf

<http://www.rbfarma.org.br/files/rbf-2012-93-3-2.pdf>

Pulmonary Hypertension

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Pulmonary hypertension (PH) is defined by a mean pulmonary artery pressure ≥ 25 mm Hg at rest, measured during right heart catheterization. The term pulmonary arterial hypertension (PAH) is characterized hemodynamically by the presence of pre-capillary PH including an end-expiratory pulmonary artery wedge pressure (PAWP) ≤ 15 mm Hg and a pulmonary vascular resistance > 3 Wood units [1]. There are five groups of disorders that cause PH: 1) pulmonary arterial hypertension; 2) pulmonary hypertension due to left heart disease; 3) pulmonary hypertension due to chronic lung disease and/or hypoxia; 4) chronic thromboembolic pulmonary hypertension; and 5) pulmonary hypertension due to unclear multifactorial mechanisms [2][3].

This pathology is associated with some symptoms and risk factors. Symptoms: swelling of legs and ankles, pain in the anterior chest wall, fatigue, cough, unnatural heartbeat, cyanosis, syncope, abdominal pain, and decreased appetite [4][5]. Risk factors: patients with volume and pressure overload of the pulmonary circulation (i.e., with large ventricular or arterial shunts); chronic hemolytic anemia; thalassemia; venous thromboembolism and antiphospholipid antibodies/lupus anticoagulant. A number of drugs and toxins have been identified also as risk factors, aminorex; fenfluramine; dexfenfluramine; cocaine; chemotherapeutic agents; Interferon α and β and methamphetamines [6][7][2].

PH treatment main goal is to achieve a low risk status, which is usually associated with good exercise capacity, good right ventricle function and a low mortality risk. Moreover, it is no longer considered to be a simple prescription of drugs. In case of inadequate response to the first line of treatment (approved drugs for PH treatment), lung transplantation is proposed [8].

Keywords: Pulmonary hypertension; therapies; prognosis

Muscle adaptations to physical exercise

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The muscle, responsible for movement and made up of fibers, suffers muscle adaptations that result from two types of exercise.

The muscle fibers can be divided into two types due to capillary density and the content of myoglobin: type I (red or slow contraction) that have high numbers of mitochondria and oxidative enzymes; type II (white or rapid contraction) have a greater diameter and poor energy efficiency. Training can increase the capacity of both types to a more efficient performance.

Intense exercise (running 100m) that leads to anaerobic metabolism increases strength and muscle mass and has a larger effect on the fibers type I, this exercise uses a form of energy that doesn't depend on the use of oxygen. Conversely, aerobic exercise (running kilometers) increases muscle vascularization leading to enlargement of the muscle fibers type II, this exercise uses oxygen to produce the energy needed for the muscles. Thereby, depending on the type of effort, the muscle adapts by developing the type of fiber that are more requested.

The muscle contracts in two types, isometric (not occurs any movement) and isotonic (motion occurs), which can be divided into concentric (muscle shortening) and eccentric (increased muscle length).

In physical exercise to restore the body's balance some adaptations are necessary, this may have an immediate (acute) character aimed at a quick return to a state closer to balance baseline. Delayed (chronic) which aims to repair the body after physical, chemical and metabolic assault, and can take different time periods to re-establish themselves.

Keywords: muscle, fibers, exercise

Autonomic Nervous System and Exercise

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The main function of the Autonomic Nervous System (ANS) is the keeping of the internal homeostasis, acting involuntarily at the level of the cardiac muscle, and glands.

It's divided in the Sympathetic (acting directly when noradrenaline acts at the β_1 , β_2 and β_3 adrenergic receptors over target-organ) and the Parasympathetic (acetylcholine acts over the muscarinic receptors), which can act antagonistically or synergistically.

Physical exercise stimulates the acting of the ANS as far as the Sympathetic increases the heart rate (β_1 receptors), the contraction force, the blood pressure, the vasodilation of the blood vessels (β_2 receptors) and the dilatation of the airways, increasing the maximum volume of oxygen the heart is able to receive; while the Parasympathetic acts in order to decrease the heart rate, as well as the pulmonary ventilation.

At the hormonal level, there is stimulation of the adrenal medulla of the brain in way to segregate catecholamines such as noradrenaline (constriction and inhibition of the unnecessary systems during the activity), and the adrenaline (increasing of the cardiac activity, of the long muscle cells and of the skeleton itself). These are the catecholamines that, due to his stimulating action β_1 , β_2 , β_3 adrenergics, it is believed they participate in the process of lipolysis (fat elimination).

Regular physical exercise activates cell and molecule cascades which increase cell plasticity; decrease the activity of the Sympathetic and increases the activity of the Parasympathetic. Therefore, it lowers the risk of the development of heart diseases and it's beneficial to disorders in the ANS.

Keywords: homeostasis, adrenergic receptors, muscarinic receptors, catecholamines

Myokines – Hormonal Function of the Muscle

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Over the years, studies have been done in order to understand muscles' function.

It was found that muscle's cells produce, express and secrete hormones in response to muscular contraction. These hormones, called myokines (type of cytokines or other small peptides), bind on receptors that can be found in different parts of the human body. Due to this fact, myokines can act in the same cell which produced them (autocrine effect), they can act on the neighbour cells (paracrine effect) and they can generate behaviour changes on distant cells (endocrine effect).

There are multiple types of myokines, each one with specific functions: BDNF (brain-derived neurotrophic factor) regulate neurons' survival, growth and maintenance, interfering with the information processing and memory; BDNF and IL-6 also have a role on the increase of fat tissue oxidation; IL-6 increases the sensibility to insulin, and it has a role on anti-inflammatory processes; IL-7, IL-6 and IL-15 are involved on muscle hypertrophy; IL-15 has a role in lipid metabolism; IL-8 has a role in exercise-induced angiogenesis. This explains why exercise plays a huge role on metabolism and anti-inflammatory effects. A sedentary lifestyle inhibits myokines' production. That leads to loss of muscle mass, abdominal obesity, inflammatory processes, tumour growth and insulin resistance (which causes type 2 diabetes), neurodegeneration, atherosclerosis, cardiovascular diseases and bone formation decrease.

To sum up, the understanding of myokines as muscular hormones is crucial to understand the importance of regular physical activities, in order to avoid some common health issues in our society.

Keywords: physical activities, muscle

Electrocardiogram

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An electrocardiogram is one of the additional non-invasive diagnosis exams, that is, it doesn't involve skin penetration, frequently used to access cardiac activity and plays an important role in investigation and tracking diseases.

It's basically an exam that detects the heart's electrical activity. Each contraction of the cardiac muscle is controlled by electric impulses originated in the heart. These impulses are captured by electrodes spread across the body and are originated due to the change in the amount of sodium inside and outside the cardiac muscle cells. This changes generate differences in that ion concentration in the rest of the body which are registered in the electrocardiogram graphic.

There are three types of waves: P, QRS and T. The P wave represents the auricular depolarization, which means, it records the moment that auricular contraction occurs; QRS complex, formed by Q, R and S waves, represents the ventricular depolarization and T wave represents the ventricular repolarization.

As a result, the electrocardiogram is the most adequate examination to track cardiac arrhythmia and to an initial investigation on cardiac ischemia (insufficient blood supply to the heart). It's also very important to track other conditions such like arterial hypertension.

The exam can be done resting or in physical effort.

It can also be done in another way, in which the cardiac activity is registered for 24 hours, allowing to study the heart's behaviour throughout the day, comparing it to the activities that were done by the patient and to his/her symptoms. It is called the Holter monitoring exam.

Keywords: Electrocardiogram; Heart; Impulses;

Vector borne diseases: Yellow Fever

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Yellow fever is an acute viral disease. In most cases, symptoms include fever, chills, loss of appetite, nausea, muscle pains particularly in the back, and internal bleeding.

Yellow fever virus is mainly transmitted through the bite of an infected female mosquito (*Aedes aegypti*) that got infected from the blood of an infected human and after it reaches the mosquito's stomach and it has a high concentration of virus, the virions can infect the epithelial cells and replicate. From there it reaches the blood system of the mosquitoes and then the salivary glands which leads to the injection of its saliva in the wound and the bloodstream of the bitten person.

The virus is a 40-50nm wide enveloped RNA virus, belonging to family Flaviviridae. The virus infects, amongst others, monocytes, macrophages, and dendritic cells. It attaches to the cell surface via specific receptors which are taken by an endosomal vesicle. The capsid enters the cytosol, decays and releases the genome which is replicated in the rough endoplasmic reticulum (ER). At first, an immature form of the virus is produced in the ER but it is processed in the Golgi complex by the host protein furin, leading to the mature form.

There is no cure for the viral infection itself; medical treatment of yellow fever focuses on easing symptoms such as fever, muscle pain, and dehydration. Because of the risk of internal bleeding, avoid aspirin and other nonsteroidal anti-inflammatory drugs because of its anticoagulant effect. Hospitalization is often needed.

Keywords: Yellow fever; Yellow fever virus; *Aedes aegypti* mosquito

Vector borne diseases - Malaria

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The main goal of this assignment is to demonstrate how malaria is transmitted, enhancing the symptoms, diagnostic and treatment. Malaria is a parasitary disease, transmitted by the mosquito Anopheles, which can have a quick evolution and be harmful. In humans it can be caused by four protozoans of the type Plasmodium: Plasmodium vivax, P. falciparum, P. malariae and P. ovale. Malaria has a cure but it can evolve to other serious forms in a few days if not diagnosed and treated quickly.

The period of incubation can go from 8 to 30 days depending on the species, the injected parasitary charge and the host's immune system.

This disease is classified in 88 countries, the majority occurring in tropical areas. In Portugal the last acquired cases of malaria were reported in 1959.

The principal clinic manifestation of malaria is fever and the widespread malaise. To prevent it, all individuals travelling/living in this area should use drug prophylaxis associated to preventive measures like repellents, proper clothes and protective nets.

There isn't a vaccine yet and only chemotherapy can reduce morbidity and mortality. It is believed that these drugs can affect the glucose metabolism and block the parasite's capacity to digest hemoglobin, as soon as he feeds himself, or by poisoning it with high levels of ferriprotoporphyrin IX, that is one toxic byproduct from hemoglobin digestion.

In monkeys, malaria is caused by P. knowlesi, which prevails in Southeast Asia, although it can cause serious infections in humans too.

Keywords: Malaria; mosquito Anopheles; Plasmodium parasite

Vector borne diseases - Leishmaniosis

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Leishmaniosis is a disease that affects mostly dogs and is caused by a protozoan parasite, named Leishmanial which is transmitted through the bite of sandflies, being the *Phlebotomus perniciosus* and *P. ariasi* the vector species in Portugal.

Leishmania needs two hosts to complete its life cycle: the invertebrate host is an insect of the genus *Phlebotomus* and usually the vertebrate hosts are the humans or the dogs. The insect, by feeding on an infected host, receives the parasite along with the ingested blood and once these parasites establish on the intestine they start to multiply. When a sand fly bites again a healthy dog, it inoculates the *Leishmania* parasite into the new host, starting to infect the macrophages and to multiply, allowing the progression of the disease if the dog's immunity system doesn't act in time.

Geographic/climate appropriate conditions are necessary for the transmission; thus, in Portugal, it is more prevalent in the regions of Alto Douro (18.7%), Lisbon (3.8% and 8.8%) and Algarve (7%).

This parasite also multiplies on the bone marrow, the spleen and the lymph nodes originating kidney failure, conjunctivitis, and skin and ear tips ulcers, changes in coagulation, among others. The definitive diagnosis in the dog is achieved through blood or bone marrow analysis. The treatment is long, lasting at least a month and it consists on deworming the host with daily injections, pills and/or oral solutions. The most used medicines are the pentavalent antimonials, amphotericin B, paromomycin and pentamidine.

Keywords: Leishmaniosis; protozoan parasite *Leishmania*; *Phlebotomus* sandfly

Vector borne diseases: African Human Trypanosomiasis, Sleeping Sickness

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African human trypanosomiasis, sleeping sickness, is caused by the unicellular parasite called *Trypanosoma brucei*. This is the only vector transmitted parasitic disease whose geographic distribution is confined to the African continent. This parasite can be found in two forms, one caused by the Gambian subspecies (the most common), in which the parasite takes the chronic form and another caused by the Rhodesian subspecies. Both are transmitted by the bite of the tsé-tsé fly. Occasionally, the disease can be transmitted by pregnant woman to their child.

The infection comprises an initial phase, which can last for months, usually characterized by fatigue, headache, fever, and an advanced stage in which the central nervous system is affected, causing serious neurological and mental disorders.

Regarding the life cycle, the saliva of the flies contains the parasite and it's injected when they feed on human blood. The parasites multiply in the blood and are able to resist in the body of the hosts by having a glycoprotein in the membrane, allowing them to fight against the antibodies of the hosts system. This results in waves of multiplication and acute symptoms that increase until it provokes chronic symptoms, upon taking much damage.

The treatment depends of the stage. In the first stage, the drugs used (pentamidine, suramin) have low toxicity and are easy to administer. In the second stage the medication must cross the blood-brain barrier to reach the parasite, and then these medications may present more side effects (nifurtimox-eflornithine, or NECT).

Keywords: African human trypanosomiasis; Sleeping sickness; *Trypanosoma brucei* parasite; tsé-tsé fly

Vector borne diseases: Lyme disease

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Lyme disease is an infectious disease caused by the bacteria of the *Borrelia* genus, which is transmitted to humans by the bite of the vector ticks of the *Ixodes* genus and it does not appear to be transmitted among humans. Usually, the tick must be attached for 36 to 48 hours before the bacteria can spread.

This infection usually causes a rash which is typically neither itchy nor painful. The symptoms of this disease also include fever, headache and tiredness. If untreated, symptoms may include loss of the ability to move one or both sides of the face, joint pains, and severe headaches with neck stiffness, or heart palpitations, among others.

Diagnosis is based on the symptoms, the possibility of tick exposure and blood tests to find specific antibodies.

Prevention includes efforts to prevent tick bites such as by wearing long pants and using insect repellent and pesticides. Ticks can be removed using tweezers.

If the removed tick was full of blood, a single dose of doxycycline may be used to prevent the development of infection, but is not generally recommended since development of infection is rare. If an infection develops, a number of antibiotics are effective, including doxycycline, amoxicillin, and cefuroxime, this treatment is usually for two or three weeks. Some people develop fever and muscle and joint pains from treatment which may last for one or two days.

Keywords: Lyme disease; bacteria *Borrelia*; *Ixodes* vector

Vector borne diseases: Dengue

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Dengue is a disease whose etiologic agent is a virus of the genus Flavivirus. It is an acute febrile disease transmitted by the bite of the *Aedes aegypti* mosquito, which thrives in tropical and subtropical areas.

The World Health Organization estimated that 50 to 100 million people are infected annually in more than 100 countries from all continents except Europe.

The virus has four different serotypes: DEN-1, DEN-2, DEN-3, DEN-4, and infection by one gives permanent protection for the same serotype, but temporary and partial immunity to the other serotypes.

Clinically, dengue can manifest itself in the following ways: Classic Dengue, Hemorrhagic Dengue (DH) and Shock Syndrome associated with Dengue (SCD). SCD is the most severe form, once people have lower than normal body temperature and bleeding from the gastrointestinal tract and other organs.

The treatment for this condition is based on elimination of symptoms, since no specific antiviral medication exists. As a treatment for bleeding in DH, H2 blockers are administered. Since there is a high fluid loss due to bleeding, fever and vomiting, it is important to guarantee continuous fluid intake, keeping the body hydration. Paracetamol is used for the reduction of fever and may be combined with other analgesics when the response is not effective. In the case of severe vomiting, Domperidone is administered.

Keywords: Dengue; Flavivirus; *Aedes aegypti* mosquito

Implementation of the Food Safety System - HACCP in a beverage establishment

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HACCP is an internationally recognized acronym for Hazard Analysis and Critical Control Point. The Hazard Analysis and Critical Control Point (HACCP) system is based on a preventive methodology, with the aim of avoiding potential risks that can cause harm to consumers by eliminating or reducing hazards, in order to ensure that Unsafe foods are not placed at the disposal of the consumer.

Therefore, the objective of this work was to evaluate the implementation of the HACCP system, from the reception of the material to its confection, in order to not contaminate the products in a way that guarantees the safety of consumers.

We applied as a methodology to carry out this work the elaboration of a checklist used in the visit to the beverage establishment where all the hazards were identified, ensuring that all principles of implementation of the HACCP plan are being fulfilled. A bibliographic review was also made on the subject.

There are four distinct zones, a common area, interior and exterior, sanitary zone and delivery zone. In the place we find some nonconformities, of which we highlight: walls of difficult cleaning, absence of non-slip floor and freezer cabinets with excess ice. In terms of more positive aspects, we highlight foot-operated handwashing, easy hygiene counters and the presence of mosquito nets.

By identifying these critical points, we aim to ensure that food safety and quality are always present in this type of establishment.

Keywords: hand washing; hygiene; HACCP; risks; unsafe food

Implementation of the HACCP System in a collective canteen***Elsa Resende; Patricia Coelho, Tânia Correia****Escola Superior de Tecnologia da Saúde de Coimbra (ESTeSC), Instituto Politécnico de Coimbra, Saúde Ambiental, Coimbra, Portugal*

The implementation of the HACCP system falls under the framework of the regulation 852/2004 of April 29th, which forces the implementation of a Food Safety System in all food-related activities. The aim of the present paper was to implement this system in a canteen of an educational establishment, being it applied through 14 logical and sequential steps. The HACCP plan presented in this paper was constructed according to the reality of the canteen. In it different products such as meat, fish, fruit and vegetables are eaten by the school community during the lunch period. To eliminate the hazards produced throughout this process, it is necessary to establish Critical Control Points. In what the canteen is concerned, two CCPs were found: the reception of the raw material (ingredients) and the cooking of foodstuff. These must be established and when they are not under control, a plan of action should be created in order to reduce or eliminate them. Finally, the verification procedures aim to determine if the HACCP system is implemented according to the established plan and corrective measures. It is necessary to review it in order to verify whether it is appropriate or if a new verification process is required. This paper aimed to highlight the enormous importance of food safety, namely the good practices of handling, preparation and cooking of food, always bearing in mind the quality and safety of the meals served.

Keywords: Food Security; HACCP System; ESTeSC

Implementation of HACCP in a food establishment - bakery

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The HACCP (Hazard Analysis and Critical Control Point) promotes the prevention, so that potential risks won't harm the consumers. This means that is necessary to eliminate or reduce the dangers so the consumers don't have any unsafe food at his disposal.

This paper had as objectives: understand the implementation of HACCP in a food establishment; check if the food handlers follow the good personal hygiene practices; check if the facilities and equipments are in agreement with legal requisites.

The methodology used it was a checklist available on a platform that verify the following parameters: outside area, reception / storage / service area, gas installation, equipment verification, changing rooms and sanitary facilities, employees, exits, lighting, ventilation, water control and waste system.

Generally the establishment has good conditions in terms of food security, however there are some areas / aspects to improve, like the storage and service area, the cold storage area, the production area and the employers.

The bakery is month old, so it would be expected that all the requisites observed would be in compliance, both in hygiene and safety conditions and in structural conditions.

Keywords: HACCP, bakery study, hygiene and sanitary conditions

Implementation of the HACCP system in a pizzeria

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The meals we serve should be healthy in the sense that they should not cause disease or, more specifically, food poisoning. That is why we must eliminate all the factors that contribute to this. HACCP - Hazard Analysis Critical Control Points, consists of a system based on the identification and evaluation of specific hazards and the implementation of measures for its control, focused on prevention and not analysis of the final product in order to ensure the food safety.

The aim of this work is based on the identification of hazards in a pizzeria, namely in the reception stages of the products, in cold storage and at room temperature, in the cutting of the ingredients, in the preparation and confection of pizza dough, cold leavening and ambient temperature, in the mass molding, in placing the ingredients on the base in the cooking and portioning. After identification, it is intended to apply the measures aimed at preventing contamination.

As methodologies, a bibliographic research was carried out with the HACCP theme and to what extent this system can prevent food contamination.

This process identified the critical points where the dangers are most evident, the types of contamination, the microorganisms that cause food poisoning and the preventive measures to be applied.

In conclusion it should be noted that a correct implementation of the HACCP system can prevent many of the food-borne illnesses that can affect the clients and ensure the good quality of the foods that are served.

Keywords: HACCP, pizzeria, food poisoning, preventive measures

Implementation of the food security system - HACCP in a restaurant in Lousã

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Contamination of food occurs due to the presence of microorganisms (bacteria, fungi, yeasts, viruses, among others), causing bad smell, degradation of taste and modifying the natural appearance of food. In some cases, the food is contaminated, but the modifications are not noticeable, which is even more dangerous.

HACCP has been created, which is an important instrument in food protection, objectively consisting of a preventive method. Its implementation seeks to prevent by reducing the risks of food poisoning. Control is essentially carried out by sampling of raw materials, intermediate and final products, and subsequent verification for confirmation of the parameters. This analysis identifies potential public health hazards for consumers in food health activities.

The objective of this work was to verify all the conditions of the establishment related to food quality and safety and the evaluation of the requirements according to the legislation in force in order to provide a safe production and handling of foodstuffs.

As a methodology, a bibliographic review of scientific articles on the subject and the application of a checklist to evaluate the hygienic conditions of the establishment were carried out.

We can see that there were situations that should be improved for the sake of food safety and quality, of which, food handling, hygiene practices, food storage.

In short, it is necessary to emphasize that a correct implementation of the HACCP system is necessary, as well as its application to prevent contaminations, which can degrade public health.

Keywords: HACCP, public health, contamination, protection, prevention

Implementation of HACCP system on self-service restaurant

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Eating is a basic necessity for any society, being of extreme importance the need to follow the guidelines for food hygiene and food quality, in order to obtain food that meet good quality standards and promote healthy practices among consumers. Bad hygienic conditions of food managers, food tools and places where food is prepared can cause severe diseases. In order to promote a better and healthy lifestyle, we should implement the HACCP system to reduce the risk of contracting diseases, guaranteeing higher safety standards and assuring consumers that food is safe to eat.

As our main objective, we intend to evaluate the implementation of a HACCP system on a self-service restaurant by using a checklist.

After gathering and analysing the data, we found that food managers have training in Food Hygiene and Safety; however, they used personal accessories while preparing meals. Clothing was not suitable, making it difficult to identify dirt. In the self-service area, light supports and wall decoration are conducive to accumulate dust, contaminating both exposed food and the dishes. We also verified that there is no cargo entry area. Nevertheless, positive aspects were also identified, such as the existence of a hand-held lavatory for handwashing, the walls, floors and stands are easily cleanable, the lamps are protected and there is an annual pest control plan.

We conclude that special care is needed as far as self-service is concerned, since food is constantly exposed, creating a risk to public health, with hygiene and consumer handling being of primary importance.

Keywords: hygiene and food quality, HACCP system , promote healthy practices

Safe and healthy workplaces contribute to the management of stress

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Current economic uncertainty necessitate that companies maintain production capacity, and the efficient management of health and safety in the workplace constitute a major benefit to both employer and employee.

Given that an employee subjected to stress and pressure maximizes the risk and frequency of workplace accidents occurring, workplace stress is to be minimized and managed at all costs. This necessitates the effective management of psychosocial risk causes and the creation of workplaces that that are healthy, appreciative and which create a sense of security for employees. This article seeks to demonstrate that a safe and healthy workplace contributes to the mental health and wellbeing of employees and in so doing reduces risks and ensures quality of life.

Guided by the “Management of stress and psychosocial risk in the workplace”* campaign guidelines a questionnaire was developed, distributed to and completed by 40 employees.

The major finding were that a lack of: definition of workplace tasks; recognition for work completed; dissatisfaction of positions occupied, constitute the greatest risk factors.

When workplace demands exceed an employee’s ability to cope, in the absence of compensatory factors, stress induced increases psychosocial risks. Risk prevention demands an active and dynamic involvement by both employers and employees in the design, organization and management of workplace tasks and their interaction with social and environmental factors and needs affecting the employee.

* (“Gestão do stress e dos riscos psicossociais no trabalho”)

Keywords: health, safety, workplace, management of stress, psychosocial risks

Do not turn your back on musculoskeletal disorders at work

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Occupational Health consists of promoting conditions in the work place that guarantee a good quality of life for the worker, having as main purpose the prevention of occupational diseases and accidents that can originate in the workplace and aiming at the quality of life of the worker, offering all employees a physical, psychological and social well-being, preventing and controlling accidents and diseases that may occur in the workplace.

Therefore, we cannot turn our backs to the musculoskeletal disorders at work, which are the main cause of chronic pain and physical incapacity. Although the components of this system develop well through use, they can wear out, injure themselves or inflame. These injuries are very common in workers who are subject to heavy labour for the human body. The preventive part is of high value for a Higher Occupational Safety Technician, since this is aimed at preventing the appearance of these and other diseases.

It is therefore imperative for this Technician, as part of an Occupational Health team, to inform the worker about the risks of these diseases, whether they are part of the medical team at work or through training.

Keywords: Occupational Health, Musculoskeletal Disorders, Prevention, Employer

Warning! No more excessive weight (skeletal muscle injuries)

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The pain and discomfort at the skeletal muscle level, especially due to situations and/or jobs with high requirements at the postural level, application of force, repetitiveness or incorrect distribution of pauses, is accepted as an indicator of risk situations of being found in the genesis of skeletal muscle injuries related to work.

With this work we intend to make known the objectives of this campaign and how it relates to Occupational Health and the injuries that are caused by work.

For our investigation we use as methodology the revision of scientific articles already published. The need to monitor and anticipate the occurrence of skeletal muscle injuries, especially those related to work, involves prevention and the existence of a set of procedures, “ergonomic program for the prevention of skeletal muscle injuries”. Skeletal muscle injuries are the most common work related health problem in Europe and affect millions of workers. In Europe, 25% of workers complain of back pain and 23% complain of muscle pain. Employers should manage the maintenance, rehabilitation and reintegration of workers who are victims of work related skeletal muscle injuries.

Therefore, towards the information we have obtained, we can conclude that musculoskeletal injuries affect many workers and, so it is important that there is a program of intervention of the skeletal muscle injuries oriented to an ergonomic intervention, especially in the work, fundamental for workers to have not only better jobs, but also a better quality of life and standard of living.

Keywords: skeletal muscle level, Occupational Health, quality of life

Shut up that noise

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Noise is "any unpleasant or disturbing auditory sensation in the human ear, that is, it is all uncomfortable and unwanted sound". Prolonged exposure can severely affect the physical, psychological, and safety of workers, resulting in decreased productivity and social problems, as it reduces hearing capacity and the ability to communicate.

The objective is to clarify the concept of occupational noise, to identify those jobs that are heavily exposed to this problem and its effects on health, as well as to advise ways of protection to avoid future damages.

This work is based on scientific articles, with a special focus on the effects of exposure to noise on the worker's health and well-being and, consequently, on the obligations of the employer, in relation to Decree-Law no. 182/2006 of 06 September 2006.

According to studies, it is estimated that around 20% of the European population is exposed to unacceptable sound pressure levels, leading to sleep disturbances, psychological disturbances and other adverse health effects. In the 1980s, noise was found to cause Vibroacoustic Disease, a condition caused by prolonged (> 10 years) exposure to high amplitude (≥ 90 dB) and low frequency (≤ 500 Hz, including infrasound) noise.

Therefore, it is important to reduce the exposure to noise, so employers should provide training and information to workers, because the safer and healthier the work, the lower the likelihood of accidents at work and the decrease in work income.

Keywords: Noise, vibroacoustic disease, workers, low frequency, high frequency

Medicines Administration Errors in Hospitals

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Background: The medication error is defined as a preventable incident that could lead to inappropriate medication use or cause damage to the patient. The medication is in the control of the healthcare professional, patient or consumer and in hospital settings medication errors are causes of morbidity and mortality. There are reporting systems so that health professionals can collect data on errors and find opportunities for improvement.

Objective: The article aims to evaluate the evidence on the causes of errors in medication administration (MAEs) in hospital settings.

Methods: A systematic review article was used "Causes of Medication Administration Errors in Hospitals: A Systematic Review of Quantitative and Qualitative Evidence" published August 24, 2013.

Results: Were used 54 studies whose main information collection methods on MAEs were: direct observation and self-report. The causes of MAEs more reported were unsafe acts: slips and lapses, errors based on knowledge and violations. Reported also factors such as health staff and high workload, difficulties with written communication (prescription, documentation, transcription), poor supervision, distractions and interruptions, general working environment, problems with supplies and medicine storage.

Conclusion: It was concluded that the MAEs is due to several factors that can lead to only cases of errors. There are some limitations on research that does not allow to determine how errors arise. So, it is necessary to continue research on the errors focusing on the origin and complexity of these to improve patient safety.

Keywords: Errors, Medication, Hospitals

Efficacy of Bar-Code in Hospital Medication

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Introduction: The occurrence of medication errors in hospitals is very common. In order to avoid such errors and the associated costs, have been developed bar-code systems, evaluating its effectiveness since prescription to drug administration.

Objectives: Comparison between the error rate before and after bar-code system implementation, evaluating the severity of errors and the impact on patient safety.

Material e Methods: Bibliographic research, based on English articles dated to 2010-2015.

Results: Before the bar-code system introduction, the error occurrence rate at the level of prescription, transcription, dispensing, distribution and administration drug (timing errors and nontiming errors) was higher. After the bar-code system introduction, there was a decrease in occurrence of these errors, thereby minimizing the adverse drug effects and costs.

Therefore, this system ensures the six patient rights: Right drug, right dose, right patient, right route, right time and right documentation.

Conclusion: It highlights the importance of a multidisciplinary team, which includes physicians and nursing and pharmacy teams, that ensure the bar-code system viability, because it is not totally viable. Although all advantages that this system allows, it is necessary to improve it, because sometimes it is erroneously used or the professionals trusted it too much.

By the other hand, the system implementation costs are high, however, in view of the prevention of errors and long-term profitability, it would be a surplus value in economic and financial terms, not devaluing patient safety and welfare.

Keywords: Bar-code systems, Patient safety, Medication errors in hospitals

References:

Citation: Higgins T, Heelon M, Siano B, Douglass L, Liebro P, Spath B, Kudler N, Kerr G: Medication Safety Improves after Implementation of Positive Patient Identification. *Appl Clin Inf* 2010; 1: 213–220

Eric G. Poon et al. Effect of Bar-Code Technology on the Safety of Medication Administration. *N Engl J Med* 2010;362:1698-707

Khammarnia M, Kassani A, Eslahi M. The efficacy of patients' wristband bar-code on prevention of medical errors: a meta-analysis study. *Appl Clin Inform* 2015; 6: 716–727

Joseph Bonkowski et al. Effect of Barcode-assisted Medication Administration on Emergency Department Medication Errors. *Academic Emergency Medicine*. Volume 20, Issue 8, 15 AUG 2013

Evolution and contribution of the medication distribution systems in hospital circuit

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Background: The use of technology-based equipment in medication circuit in hospital context had a significant evolution in last decades. In order to track the progress of technology and give satisfactory answers to patients, hospitals rely on automated medication distribution systems.

Objective: Describe and compare the traditional, centralized, decentralized system and unit dose used in hospitals.

Methods: In order to prepare this work, we resorted to various sources, like databases and scientific magazines. This research focused on references restricted to 2003-2016. After analyzing 15 scientific articles in Portuguese and English, we used only 6, because the others were not related with the pretended subject.

Results: The traditional system was the first to be implanted and it has more disadvantages than advantages, while the centralized and decentralized systems have more advantages for both, the patient and hospital. For a rational distribution of medication there are 5 essential factors, namely, efficacy, safety, speed, control and cost.

Conclusion: In short, although Portugal does not present the best financial conditions and resources to acquire new technologies and be able to evolve in this area, it is important that the next step after the economic crisis be put into practice the strengths, in order to improve the quality of services provided to the patient and increase their security.

Keywords: hospital pharmacy , medication distribution system, medication errors, Patient safety, pharmacy

References:

Novek, J. Hospital pharmacy automation: collective mobility or collective control?. *Social Science & Medicine* 51 (2000) 491-503

PEDERSEN, C et al. ASHP national survey of pharmacy practice in hospital settings: Dispensing and administration—2002. *Am J Health-Syst Pharm*—Vol 60 , Jan 1, 2003

Higgins MD, T. Medication Safety Improves after Implementation of Positive Patient Identification. *Appl Clin Inf* 2010; 1: 213–220

A Survey of the Medication Error Experiences of Pharmacy Technicians

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Medication errors involves human causes or can be caused by the system. Major errors are associated with incomplete requirements or lack of standardization of several variables from the system in which pharmacy is inserted.

It's known the medication error is any unintended errors occurring in prescribing, dispensing or administration drugs, so human resources are importante in the issue of medication. In this sense, it's of little knowledge the influence of Pharmacy Technician (PT) in detection, reporting and prevention of medication errors in community pharmacy.

Objective: Summarize the importance of PT in the area of medication errors.

Methods: Literature analysis of scientific articles in english language understood between 2003 to 2015.

Results: This study was conducted through telephone call to all pharmacies in Vermont between August and October 2004. 128 active community pharmacies, 72 were given a PT to participate in the study (56.3%). However, only 2 showed already have filled a medication error notification. It's believed about 70% of medication errors occurs due to system failures.

Conclusion: We conclude, therefore, the pharmacy should be prepared to work, showing flexibility and creativity to anticipate and accommodate future changes. In this part, it's concluded the PT is a surplus value, promoting the proper use of medicinal product and public health.

Keywords: Pharmacy Technician, Medication Error, Notification, Pharmacy

References:

ARONSON, J.K. , 20 May 2009, Medication errors: what they are, how they happen, and how to avoid them, Department of Primary Health Care, Rosemary Rue Building, Old Road Campus, Headington, Oxford OX3 7LF, UK

Diz, Elisabete de Fátima Dinis, Gomes, Maria José Almendra Rodrigues, 2008, Causas de Erros na Medicação, Revista Investigação em Enfermagem 5-14

KENNEDY, AMANDA G, AIKEN, CHERYL A, 2006, A Survey of the Medication Error Experiences of Pharmacy Technicians, J Pharm Technol, 22:42-7

Linwood F. Tice, D. Sc., Dean, 2002 White Paper on Pharmacy Technicians, January/February 2003, Journal of Managed Care Pharmacy JMCP Vol. 9, No. 1

Pharmacy Today, Janeiro 2014, The pharmacy technician's role in medication error prevention, Institute for safe medication practices, 76

The Future Vision and Challenges for the Pharmacy

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Background: Currently, a hospital pharmacy presents several problems that need to be corrected to improve quality and health conditions.

Objective: To gather solutions to answer the problems that a hospital pharmacy presents.

Methods: Review of scientific articles, in Spanish and English, published between 2009-2015.

Results: Initially, there was a need to develop a universal database capable of covering the whole health system, in a way that it is possible to analyze clinical information, including the medical history of each individual, preventing medication errors.

Besides that it's necessary the participation of pharmacy professionals in commissions, for example WHO and FIP in order to improve the pharmaceutical good practices.

The pharmacy domicile is another vision for the future of pharmacy in order to respond to all users, especially groups with motor disabilities and older age groups.

With the integration of pharmacy professionals in research projects, clinical trials and ethics committees, occurs the improvement of safety and use of the drug. It is also important, inclusion of these professionals in infection control teams, thus reducing a major public health problem, the antibiotic resistance development.

Other strategies include a continuous formation, to allow the development of professional, and greater investment in prevention.

Conclusion: It is expected that the pharmacy will acquire a fundamental role in the distribution and in the rational use of drugs contributing to the improvement of the entire health system.

Keywords: Pharmacy future, drugs, health system

The impact of electronic distribution systems in Pharmacy

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Introduction: Therapeutic drug use is a complex process which can lead to errors with consequences for the patients. Clinical pharmacy is the designation for to the discipline of health sciences dedicated to the optimization of drug therapy, lowering the medication errors and increasing the security for patients. In this context, there are some electronic systems that contribute to the decrease of errors with medication dispensing is concerned: Unit dose (UD), Automated dispensing cabinets (ADCs) and Barcode (BC) associated with product labeling and intensified staff training. UD systems allow the effective reduction of medication errors, avoiding their inadequate use, improving quality of life, which requires the need to invest in this area.

Therefore, is intended to determine the incidence and types of technical errors committed during the preparation of the patient-specific medication and to compare the accuracy of conventional and electronic procedures for filling the medication.

Methods: This review is based on information gathered from different published scientific articles.

Results: There has been an improvement in the rate of errors occurrence related to the distribution of medication. When using the UD the error incidence was 0,157% and after the implementation of BC associated to staff training there was still a decrease, and the value was 0,050%.

Conclusions: The use of automated systems along with the available distribution systems has led to increased productivity, minimized error occurrence, and hence patient safety. It has also contributed to an improvement in stock management and rationalization of drug costs in hospitals.

Keywords: Electronic distribution systems, Pharmacy, Automatization, Error rate

Different Drug Delivery Systems in Hospital Pharmacy

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Introduction: Medication distribution at hospitals is responsibility of pharmaceutical services, representing an important process in the medication circuit. It allows a better economic management, higher security of the diseased which contributes to diminish errors associated with dispensation and administration, ensuring the availability of medicines, contributing to adhesion to therapy and certifying the fulfilment of legal procedures which involve the medicine.

Material and methods: Our study was based on scientific review articles from 2012 to 2016.

Results: There are four types of medication distribution systems: bulk ward stock, individual medication order system, unit-dose medicine distribution and automated medication dispensing. Through bulk ward stock it is possible to obtain crucial information for medicines planning and control, ensuring the quality of shopping programming and work related to prediction of the hospital needs.

Individual medication order system is the dispensation of medicines for each patient, usually for a 24 hour period.

Unit-dose medicine distribution reduces incidence of medication errors and ameliorates harnessing of the professionals involved and the level of assistance offered to the internee patient. Automatic medication dispensing is a system which controls and follows electronically dispensation of doses.

Conclusion: Even though there are differences between all four systems, each one shows advantages and disadvantages ensuring a better management, higher security and effectiveness of the medicines circuit from the hospital pharmacy to the patient.

Keywords: Pharmacy, Distribution System, Drugs, Hospital

The role of the pharmacy technician in the distribution sector of the hospital pharmacy

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Background: Currently there are still pros regarding the expansion of the activities of a pharmacy technician in hospitals. With the rise of technology associated with pharmacies and greater use of the product there is a greater need for human resources and pharmacy technicians. It seems appropriate to be the pharmacy technician himself responsible for drug distribution sector management. This expansion of functions can be a positive step for the whole industry and should be controlled and made with supervision and care, so that the outcome revealed itself as beneficial to the patient.

Objective: To assess the role of Pharmacy Technicians on drug distribution system in the hospital context.

Methods: To this work, we acceded to a review article and web sites, in English and Portuguese, with references between 2003-2016.

Results: The pharmacy technician functions have been developed, making it an essential factor for the functionality of this sector. These changes brought advantages not only for the functioning of this area but also to the patient himself, taking advantage of a more efficient and safe service.

Conclusion: After the assessment of the current role of Pharmacy Technicians in the drug distribution system, in the hospital, it was concluded that is quite beneficial and important. Comparing the functions of Pharmacy Technician in the past and at the present it can be concluded that professionals must have a great responsibility at distribution system in the hospital context. It's also responsible for the efficiency, control and compliance process surrounding the adherence to therapy.

Keywords: Hospital pharmacy, drug distribution, pharmacy technician

References:

Raymond, Colette B; Santos, Christina E; et al; "Should Pharmacy Technician Managers Be Responsible for the Drug Distribution System within Hospital Pharmacy Departments?"; CJHP – Vol. 64, No. 3 – May–June 2011

Pita, João Rui; A farmácia e o medicamento em Portugal nos últimos 25 anos; DEBATER A EUROPA, Periódico do CIEDA e do CIEJD, em parceria com GPE, RCE e o CEIS20., N.2/3 Janeiro/Dezembro 2010 – Semestral, ISSN 1647-6336, Disponível em: <http://www.europe-direct-aveiro.aeva.eu/debatereuropa/>

OpenFarmTech - Pharmacy Technician Guide: <http://openfarmtech.org/job-description/>

Modulators of psychological disorders

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Neurons communicate with each other through synapses and transmit electrical impulses through chemical signals called neurotransmitters. Examples are dopamine, noradrenaline, histamine, GABA, etc.

Modulators are chemical substances that stimulate or inhibit the neurotransmitters receptors. An example of these chemical substances are neurotransmitters. The action of pharmacotherapy occurs through interaction with receptors of these neurotransmitters.

There are drugs for the treatment of psychological disorders that use neuromodulators as a way of acting, among them, anxiolytics, antidepressants and mood stabilizers. Here are some examples of psychological disorders and drugs with neuromodulators used in their treatment:

Benzodiazepine is an anxiolytic and has a sedative and hypnotic effect. It acts on gamma-aminobutyric acid – GABA - an inhibitory neurotransmitter of the CNS, potentiating his action. There is an opening in the chlorine channels, hyperpolarizing the cell membrane and consequently decreasing her excitability, causing a relaxing effect.

Antidepressants, used to treat depression, will act on the limbic system. These medicines act at the level of neurochemical transmission, trying to normalize neuronal synapses with an increase of neurotransmitters (serotonin, noradrenaline, dopamine).

Mood stabilizers are used in the treatment of bipolar diseases. Bipolarity causes changes in the CNS and limbic system. There is an increase in noradrenaline metabolite levels in the cerebrospinal fluid and a decrease in GABA levels. Bipolar patients have altered areas related to emotional control. Most mood stabilizing medications have modulatory effects on GABA function. Valproic acid (type of mood stabilizer) acts through mechanisms that would increase inhibitory brain activity. There is an inhibition of the catabolism of GABA, increasing its release.

Keywords: Modulators, psychological, disorders

If Corrent- inhibitors

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Every cardiac muscle cell has the capability to generate cardiac action potential, meaning that the heart has intrinsic mechanisms that command and generate contractions, spontaneously.

Its found at phase IV, the If corrent also known as funny. This corrent, is slowly activated by the hyperpolarization of the membrane, potenciating entrance of potassium into the intracellular environment and the release of sodium and calcium to the outside of the cell. The ionic flux's speed increases the more negative the potential difference of the membrane is.

This way, a slow and expontaneous depolarization of the membrane is generated, until a threshold is reached, from which the calcium and sodium channels reactivate and depolarization occurs. Its the expontaneous depolarization, caused by the If corrent during phase IV of the potential of action, that allows cardiac cells, such as sinusal node cells(generator and controller of heart rhythm) and cells of Purkinje fibers, at the band of His, possess the capacity of determinating a heartbeat. After repolarization, it is reached the limit of potential to the begginging of a new estimation, garanteeing heart rhythm.

The blockage of the channels responsible for the If corrent modifies the velocity of the spontaneous diastolic depolarization of the cellular membrane.

The ivabradine is one molecule with the capability of blocking the If corrent. The effect of this molecule awakened the interest of the Humanity due to it's capability of reducing the heart frequency, being this critical in certain diseases and specific situations.

Keywords: Phase IV, Ivabradinelf, Inbitors, depolarization, hyperpolarization

Physiology of drug abuse and the effect on the central nervous system

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Drug is any substance, natural or synthetic that modifies its functions once it's introduced into the body. Drugs that act on the CNS are called "psychotropic". The psychotropic drugs alter the way people think, feel and behave by disrupting neurotransmission which is the process of communication between brain cells. The physiological effect of drug abuse depends on the type of drug.

Stimulants, such as amphetamines and cocaine, can delay sleep and elevate a person's mood. This drugs act on the nervous system with anorexic effect, accelerating the release of amines in the synaptic cleft. High amounts can cause anxiety in the user.

Depressants slow neural activity in the brain, such as alcohol. The alcohol will produce inhibitory effects on NMDA glutamate receptors, reducing the excitatory action. It also activates the GABA- α receptor that when they open the chloride channels, they will have a sedative effect because they slow down the rhythm of action potentials.

Narcotics such as opium or heroin, after some time of using them, the body can build a tolerance in which it adjusts to the drug's presence. When an abuser stops taking the drug, the body experiences withdrawal symptoms, such as feeling weak or sick.

The disturbing drugs produce qualitative changes in the functioning of the CNS causing delusions and hallucinations. They act by inhibiting the Sympathetic NS, preventing the neurotransmitters to release acetylcholine, which exerts a stimulatory action on the Parasympathetic NS.

Keywords: Drug, Central Nervous System, Neurotransmission

Parkinson's disease - L-dopa

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Parkinson's disease is a neurological disorder that affects nerve cells which are present in the substantia nigra and are responsible for muscle control and movement. The neurons involved produce dopamine, a neurotransmitter responsible for controlling the body movement. The production of dopamine breaks when those neurons die causing the first disease symptoms.

There are two systems that control the body movements: the pyramidal system, that controls the precise voluntary movements, leading the impulses from the medulla oblongata up to the spinal cord, and the extrapyramidal system that controls the synchronization of the movements and consists on the pathways that regulate the motor areas in the cerebral cortex, cerebellum, brainstem, mainly substantia nigra, and spinal cord.

Lesions in the extrapyramidal system cause abnormal involuntary movements, like in the parkinson's disease. The symptoms are tremors, muscle rigidity with consequent slowness of movement, difficulty with walking and coordination.

Levodopa, also called L-dopa, has been used in the treatment of Parkinson's disease. L-dopa is converted to dopamine in the brain, increasing the levels. It is probably the most effective drug for controlling symptoms. It is usually combined with carbidopa, which improves the action of l-dopa and reduces the side effects that may be physical, like low blood pressure, arrhythmia or psychiatric, such as confusion, anxiety and hallucinations. L-dopa is very good at improving motor problems, like rigidity and slowness, but in the other hand it increases the risk of involuntary movements.

L-dopa effectiveness tends to decrease after 4 or 5 years of usage.

Keywords: Parkinson, neurons, dopamine, l-dopa

Alzheimer's Disease – Cholinesterase Inhibitors

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Alzheimer is a type of dementia that causes problems with memory, thinking and behavior. Symptoms develop progressively and get worse over time, interfering with daily tasks.

Acetylcholine it's a neurotransmitter synthesized by the action of the Choline-acetyltransferase enzyme that will connect Acetyl coenzyme to the choline. This neurotransmitter is found in the brain and neuromuscular junctions, making part of the parasympathetic nervous system. There are also other mutations regarding this pathology. The senile plaques are extracellular plaques that are formed with fragments from the incorrect rupture of the amyloid protein (APP). This way the metamorphose in the presenilin proteins 1(PS1) and 2(PS2) genes increase the release of amyloid- β protein and increase the formation of neuritic plaques. The neurofibrillary tangles are intracellular residue that contains hyperphosphorylated Tau protein. This mechanism induces changes in the synaptic transmission.

Currently, there are several methods for the treatment of Alzheimer, but none have been fully effective for this condition. The administration of acetylcholinesterase inhibitors such as tacrine is one of those methods. Acetylcholinesterase inhibitors modify central cholinergic function by inhibiting acetylcholine-damaging enzymes; increasing the ability of acetylcholine to stimulate nicotinic and muscarinic brain receptors.

In conclusion, the pathophysiological mechanisms have contributed to the development of new drugs for the treatment, however the selective neurohormonal loss hasn't yet been fully understood. So, the goal of neuroscientists is to investigate new drug agents that may delay or block the progression of Alzheimer's disease.

Keywords: Alzheimer disease; Cholinesterase inhibitors; Senile plaques; Neurofibrillary tangles

Degenerative Retinal Diseases: VEGF inhibitors

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The retina is a photosensitive tissue located in the inner layer of the eye, where the vision process begins. When retinal cells (photoreceptors) degenerate, they lose the ability to transmit images to the brain, this is what happens when someone suffers from a degenerative retinal disease. There are two main types of diseases associated to this problem: Age-related Macular Degeneration and Pigmented Retinopathy.

ARMD affects the macula (found in the center of the retina). The patients with this disease lose their central vision, however, peripheral / lateral vision remains unchanged. Angiogenesis is the growth of new blood vessels from existing ones. It is controlled by VEGF proteins and is the main cause of ARMD. Currently the most effective anti-angiogenic medicine against AMRD is pegaptanib sodium.

PR, contrary to ARMD, is a set of abnormalities caused by genetic mutations, leading to the loss of peripheral and nocturnal vision but the integrity of the central vision is maintained. VEGF is a signal protein whose function is to stimulate the proliferation of blood vessels. Increased VEGF signaling will, therefore, weaken vessel walls and increase their permeability, causing an edema in the retina. The increase of this protein levels is due to an inflammatory response and lack of oxygen.

This increase can be treated by ocular injections of VEGF protein inhibitors. Although this procedure doesn't cure the disease, it can control the proliferation of the disease.

Currently, the approved inhibitors for this treatment are Macugen, Lucentis, Eyla and Avastin.

Keywords: Retina;VEGF;AMRD;PR

Angiotensin and Arterial Hypertension – AT1 Inhibitors

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The Renin-Angiotensin-Aldosterone system has a key role on the blood pressure regulation and on the renal homeostasis electrolytic, as it directly influences the organic functions. It involves countless mediators, receptors and intra cellular signal mechanisms. This system is very sensitive to the variations of the renal blood flow. The SRAA is an important target on the blood pressure treatment because when there is a decrease of the effective blood volume, the renal cortex is stimulated due to the reduction of the renal perfusion, which leads to an increase of the sympathetic flow. The activation of the SRAA generates a systemic vasoconstriction, and a stimulation of the Sympathetic Nervous System, leading to a vascular and cardiac hypertrophy. After this the Renin enzyme is released, catalyzing the conversion of the angiotensinogen to angiotensin I, which is transformed to angiotensin II by the angiotensin conversion enzyme. To exert its action, the angiotensin II connects to the angiotensin I receptor, this is where the vasoconstriction occurs, and it also operates on the angiotensin II receptor, responsible for the vasodilation. All this mechanism causes a homeostasis process. The use of this system in the reduction of hypertension has been demonstrated by the pharmaceutical inhibition of the angiotensin II conversion enzyme or the antagonism of the angiotensin I receptors. The angiotensin II is a biological peptide related to the hypertension etiology, which is formed by the sequential cleavage of angiotensinogen. The angiotensinogen is unfolded in the decapeptide angiotensin I and then hydrolyzed in the octapeptide angiotensin II. This last one creates its effects due to the connection with the angiotensin I receptors, which reduces the cardiovascular Morbidity and mortality.

Keywords: JLMV

Arterial Hypertension – Beta Blockers

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The hypertension is a chronic disease is a long term medical condition in which the blood pressure in the arteries is persistently elevated. Blood pressure is expressed by two measurements, the systolic and diastolic pressures (maximum and minimum pressures, respectively). Normal blood pressure at rest is within the range of 100–140 millimeters mercury (mmHg) systolic and 60–90 mmHg diastolic. High blood pressure is present if the resting blood pressure is persistently at or above 140/90 mmHg.

High blood pressure usually does not cause symptoms. Long term high blood pressure, however, is a major risk factor for coronary artery disease, stroke, peripheral vascular disease, vision loss, and chronic kidney disease.

There are two types of treatment, non-pharmacological (lifestyle changes such as diet and physical exercise) and pharmacological (antihypertensives, such as beta-blockers). Beta-blockers are indicated as one of the fundamental groups of antihypertensive drugs, for example: propranolol, atenolol, among others. Beta-blockers act directly on the sympathetic nervous system, reducing the negative effect of its activation and it also increases the renin-angiotensin system, with consequent reduction of the blood pressure. About the effects on the cardiovascular system, they inhibit chronotropic, inotropic and vasoconstrictor responses to the action of epinephrine and norepinephrine on beta-adrenergic receptors. Beta-blockers are used to reduce heart rate, so the heart beats slower and the pressure itself is relieved. Hypertension is uncomfortable, so users may feel that drug treatment can lead to exhaustion and fatigue. To decrease these effects of the drugs, they should be administered gradually.

Keywords: Beta-Blockers , hypertension , sistolic pressure, distolic pressure

Endothelial Dysfunction and Atherosclerosis

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Cardiovascular diseases are one of the leading causes of death in the world. Often, the clinical manifestations of these, such as myocardial infarction and stroke, are caused by an atherosclerotic process. This process itself appears associated with the development of endothelial dysfunction.

The endothelium, the layer of cells that lines the inside of blood vessels, is the main regulator of vascular homeostasis and has vasoprotective functions mediated largely by nitric oxide, which is one of the most potent endogenous vasodilators produced by the endothelium itself. Endothelial dysfunction is caused by a deficit in the production or activity of nitric oxide in the human body, and can be determined by the lower availability of vasodilators derived from the endothelium. The development of endothelial dysfunction is associated with several vascular changes, such as arterial hypertension, diabetes mellitus and atherosclerosis.

Atherosclerosis is an inflammatory disease characterized by the formation of atheromas in the blood vessels. One of the main mechanisms proposed for the atherosclerotic process is the oxidation of low density lipoproteins, LDL, which leads to its deposition in the wall of the blood vessels, leading to the appearance of the atheromas. Nitric oxide prevents the oxidative changes of these lipoproteins, so that if there is a deficit in their production, the organism will have a certain predisposition to the atherosclerotic process. This process associated with unhealthy eating and behavioral practices leads to the progressive accumulation of fat in the vessels, which can lead to their total obstruction, which may, in certain situations, be fatal.

Keywords: Endothelial dysfunction, Atherosclerosis atheromas

Physiology of osteoclasts and osteoblasts: deposition and bone resorption

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Osseous tissue is a specialized conjunctive tissue, built from a mineral phase, formed essentially by calcium phosphate crystals, in a hydroxyapatite form. The mineral and organic phase combination gives the osseous tissue unique properties, which make it resistant to mechanical changes. Bones are dynamic structures, in constant remodeling, so that it keeps its mechanical properties and metabolic capabilities. Osseous tissue cells can be grouped in two different series: osteoblastic line cells, responsible for the formation and mineralization of the osseous matrix and the osteoclastic line cells, related to its reabsorption.

The differentiation of the osteoclastic line's cells is very controlled by the osteoblastic cells line, through a common regulation axis, commonly known as RANKL/RANK/OPG. The balance between osseous formation and reabsorption depends on local fluctuations of the RANKL/OPG ratio.

Bones grow in length at the epiphyseal plate, by mitosis. The chondrocytes age and degenerate. Osteoblasts move in and ossify the matrix to form bone. When cartilage growth ceases, the epiphyseal plate completely ossifies so that only a thin epiphyseal line remains and the bones can no longer grow in length.

Even though bones stop growing, they can continue to increase in thickness or diameter, called appositional growth. Osteoblasts in the periosteum form compact bone around the external bone surface. At the same time, osteoclasts in the endosteum break down bone on the internal bone surface, around the medullary cavity.

Osseous tissue makes a remarkable biological building material with the capability to create very resilient self-remodeling and self-repairing structures.

Keywords: osteoclasts, osteoblasts, absorption , bone resorption

Calcium and Vitamin D: Calcitonin and PTH

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Calcium moves into the bone as the osteoblasts (bone forming cells) build new bone, and out as the osteoclasts (bone resorbing cells) degrade the bone tissue. Vitamin D is involved in the active transport of phosphate and it may also increase the renal reabsorption of calcium and phosphate in our body. UV radiation is the easiest form to obtain vitamin D, which can also be found in many food products. Humans have four parathyroid glands which are small endocrine glands located behind the thyroid gland in the neck. Those glands produce parathyroid hormone (PTH) and control the amount of calcium in the blood and within the bones. PTH has a half-life of approximately 4 minutes and is formed by 84 aminoacids. PTH acts to increase the concentration of calcium (Ca^{2+}) in the blood by acting on the parathyroid hormone receptor. While calcitonin (a hormone produced by the parafollicular cells (C cells) of the thyroid gland) acts to decrease calcium concentration. When PTH is associated to vitamin D (which is produced in the kidneys) it can cause the loss of calcium in the bones.

Keywords: Calcium, Vitamin D, Calcitonin, PTH

Oxidative stress and antioxidants

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Oxygen is an element that is found in abundance in the atmosphere, and is considered essential for the production of energy in animal cells. However, when they are exposed to it at higher concentrations found in the atmosphere, it can lead to cell death. To combat this effect, antioxidant mechanisms that are in permanent activity in the body are emerged, because the production of energy is one of the major causes of formation of reactive oxygen species (ROS). When antioxidants and ROS are not in balance occurs oxidative stress.

Oxidative stress can result from natural and unnatural factors. As an example of natural factors we have extreme exercise, inflammation processes that occur naturally in the body and pollution. Drugs, tobacco and alcohol are examples of unnatural factors.

When excess ROS are located in the body, they oxidize and damage cell lipids, proteins and DNA. Thus, they can be the cause of diseases such as cancer, diabetes, cirrhosis, Alzheimer's disease, neurological disorders, cardiovascular diseases, and changes in the aging process.

To counter this process, the body has antioxidant defenses that are responsible for removing the ROS. These defenses can be enzymatic (superoxide dismutase, and catalase) or non-enzymatic (lipoic acid and ascorbic acid). The presence of these antioxidants is possible to ensure, by having a balanced diet rich in vegetables, legumes and fruits, avoiding smoking and drinking habits and excessive exposure to environmental pollutants.

Keywords: Oxidative stress and antioxidants

Vitamin C- Implications in the production of collagen

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The collagen is an important protein in our organism that takes part of 30% of all the proteins. It is a structural protein of the connective tissue and the extracellular matrix that is responsible of the elastic capacity and skin's resistance.

Vitamin C, also known as ascorbic acid (AA) is water soluble (the organism uses the necessary quantity and excretes the excess) and it is not resistant to high temperatures (thermolabile). The human being is not able to produce it. This vitamin may exist in the oxidized form and reduced (AA) and participates in the process of oxidation such as prevents scurvy and it is fundamental to the formation of collagen fibers almost in all the tissues of the human body. When in disability causes scurvy, and it causes, appetite and growth loss, weakness, anemia, edema, subcutaneous hemorrhages and decreasing urination.

The AA is vital to the functioning of the cells and this is particularly evident in the connective tissue during the formation of collagen. Regulates the synthesis of collagen type I and II and is a cofactor essential in hydroxylation of proline and lysine, producing the procollagen that is converted into collagen at the extracellular fluid. Although the proliferative capacity and the synthesis of collagen are age dependent, AA allows the ability for cell proliferation, as well as collagen synthesis, regardless of age. So the ascorbic acid has a beneficial and advantageous role in the healing process. In this way, vitamin C should continue to be studied in its application in the production of collagen.

Keywords: Vitamin C, collagen, ascorbic acid (AA), scurvy

The endocannabinoid system

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The endocannabinoid system

The endogenous cannabinoid system was named after the plant that led to its discovery. Most phytocannabinoids have been isolated from *cannabis sativa*, they are plant substances that stimulate cannabinoid receptors. Delta-9-tetrahydrocannabinol, or THC, is the most psychoactive and certainly the most famous of these substances.

The endocannabinoid system is a lipid signalling system, consisting of CB1 and CB2 receptors that bind with G-protein. They are stimulated by endocannabinoids which are substances that our bodies naturally make to stimulate these receptors. The two most well understood of these molecules are called. (anandamide AEA and 2- arachidonoylglycerol 2 – AG)

The two receptors differ on the amino acid sequences, intracellular signaling mechanisms, tissue distribution and sensitivity to agonists and antagonists, however they are both metabotropic bind to G-protein.

The CB1 receptor, predominantly present in the central nervous system (Cerebral Cortex; basal ganglia; cerebellum; hypothalamus; hippocampus) and in the peripheral nervous system. The CB2 receptor is predominantly found in the immune system and its associated structures.

The endocannabinoid system is one of the most important physiological systems for the maintenance of homeostasis at every level of biological life. It also takes part of physiologic process, such as the modulation of the endocrine axis mediated by the hypothalamus, regulation of the motor activity, control of cognitive processes. The CB1 receptor stimulation leads to modulation of the release of some hypothalamic orexigenic and anorexigenic mediators, in order to stimulate appetite. At the mesolimbic system the ECS interacts with the reward system, reinforcing the motivation to seek and consume foods with high hedonic value. It is suggested that alterations of the endocannabinoid system could be involved in the pathophysiology of eating disorders.

Keywords: The endocannabinoid system, Delta-9-tetrahydrocannabinol, anandamide, arachidonoylglycerol 2

The Pineal Gland

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The pineal gland is an endocrine gland located in the top of the third ventricle of the encephalon, in the central part of the human brain. It's covered by a pineal capsule, has a gray-red structure and her size resembles a pea grain, being bigger in the childhood than in the adult age.

This gland is classified as a gland activated by the presence of serotonin in the human brain, when sleeping.

It's main function is to produce melatonin, the hormone responsible for sleep regulation. It's production is cyclical, complying daily rhythm of light and darkness called Circadian Cycle, which means that at night, the pineal gland works more, producing an higher quantity of melatonin, while during daylight, a smaller quantity of this hormone is produced.

Besides the sleep regulation, melatonin also controls the rhythm of other physiological issues, and it's deficit induces discomfort and can lead to other diseases, weakening the immune system. A healthy life is crucial for the pineal gland development and there are several foods that you can eat for this purpose, such as cabbage, banana and honey, among others.

A while ago, people believed that this gland didn't have any function but currently, the pineal gland is the reassuring structure that supports the body's balance.

Keywords: pineal gland; anatomophysiology; melatonin; sleep; circadyan cicle; healthy life

Vitamin A

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Vitamin A, also called retinol, is a micronutrient with antioxidant functions. It is a fat-soluble vitamin that has several important functions in the body.

Vitamin A comes from two sources. One group, called retinoids, comes from animal sources and includes retinol. The other group, called carotenoids, comes from plants and includes beta-carotene. The body converts beta-carotene into vitamin A. Most of carotenoids, such as lycopene (pigment responsible for red color, for example, in tomatoes), lutein (pigment that causes yellow/orange color in papaya, among others), have important biological properties, including antioxidant and photoprotective activities, like occurs in retina.

In view of the abovementioned aspects, vitamin A has several benefits in our organism. It helps cells reproduce normally - cellular differentiation; It is essential for good vision; It is needed for the proper development of an embryo and fetus; It helps keep skin and mucous membranes, that line the nose and mouth, healthy. Furthermore, vitamin A also plays a role in immune system function, bone formation and wound healing.

In one hand, lack of vitamin A, called hypovitaminosis A, could cause sorts of health problems including dry eyes, night blindness, diarrhea and skin problems (dermatitis). In other hand, an excess of vitamin A causes health damage, such as headaches, tiredness, blurred vision, drowsiness, nausea, loss of appetite and hair loss. Though vitamin A is essential for good health, it can be toxic in high/low doses, so a diversified and balanced diet is enough to achieve the daily recommended dose of vitamin A.

Keywords: Vitamin A, retinoids, carotenoids

Cardiovascular Adaptations In Athletes

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Currently it is considered that all athletes independently of the type of exercise develop a combination of cardiac adaptations, which include the dilation and increased thickness of the left ventricular wall.

These adaptations are not only on heart, the nervous system is evolved too, these are also changes the level of autonomic nervous system, where there may be an increased tone parasympathetic and decreased sympathetic tone causing the athletes there is bradycardia in rest, sinus arrhythmia and atrioventricular conduction delay.

These changes can be seen through electrocardiogram, such as increased QRS voltage and early repolarization patterns.

Sinus bradycardia, with a change mainly seen in athletes, are closely related to the cardiac output, wherein cardiac output is given by stroke volume and higher average in athletes can say that for the same cardiac output athletes need a heart rate that non-athletes.

In terms of the left ventricular hypertrophy, another aspect often seen in athletes, we can use a variety of indexes and scores for values of this of this hypertrophy.

The high resolution electrocardiography has been used to identify patients at high risk for sustained ventricular tachycardia, or sudden death, through detection of late potentials of low amplitude and high frequency in the end portions of the QRS complex, related to electrical activity fragmented and delayed the ventricles.

The heart rate variability is recognized as a powerful instrument for stimulating heart modulation, this describes the variation between consecutive heart beats. The peaks at various frequencies reflect differences in the sympathetic nervous system and the parasympathetic nervous system.

Keywords: Athletes, electrocardiographic adaptations, left ventricular hypertrophy, late potentials, heart rate variability

Effects of Tonal Music on Autonomic Responses

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The tone is the main component of change on musical structure. Realizing that music caused emotional and psychological changes, progress was made for a pshysiological assessment. The distinction between the types of music (tonal and atonal) is made by its effect on the human being, since one of them causes a feeling of anxiety in the individual, like if some information was missing in the music. The other one causes a feeling of comfort and relaxation. This study aims to understand which type of music is linked to physiological relaxation and what is its influence on cardiorespiratory and vascular component.

Keywords: Tonal music; heart rate; blood pressure; breathing rate.

Variability of Heart Rate in Athletes and Non Athletes

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Physical exercise is responsible for several structural and hemodynamic changes in the cardiovascular system, and also promotes adjustments in the autonomic nervous system. Athletes who practice more intense activities, demonstrate changes as greater functional capacity and a greater magnitude of sinus bradycardia, leading to important anatomical and electrophysiological changes.

This project aims to investigate the electrophysiological and autonomic adjustments that control the heart in soccer athletes and compare the data with individuals who do not practice any sport. The heart rate variability will be analyzed, measured by the variation between RR intervals, reflecting the change in heart rate due to the joint action of the sympathetic and parasympathetic divisions of the autonomic nervous system, by two different methods, the short-term ECG and the cardiofrequencimeter in resting.

The present investigation will serve as a future comparison to the investigations involving individuals of the same age of the present individuals, it aims to establish a characteristic pattern of cardiac autonomic behavior in controlled resting conditions between athletes and non-athletes. As the high variability indicates good physiological adaptation of the body, while its reduction has been identified as an important indicator for the emergence of diseases or complications in patients with known underlying diseases, its analysis through this research may help in understanding increased clinical cardiac complications in athletes and assist in the conduct of cardiology clinical practice in this population.

Keywords: Eletrocardiograph, Heart Rate, Cardiofrequencimeter, Athletes, Non-athletes, Sport modality

The Influence of Black Chocolate Flavonoid Intakes on Blood Pressure Behavior

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Introduction: Currently, there are several published studies that demonstrate the relationship between the intake of dark chocolate and blood pressure, showing consensual and confident results.

Objectives: Review and summarize published studies that demonstrate and analyze the evidence intake of flavonoids present in dark chocolate in tension profile of healthy individuals and hypertensive.

Methods: A systematic review of prospective studies of literature to investigate the effect of black chocolate, food or drink as compared to a placebo, the values of systolic and diastolic blood pressure in healthy individuals or with hypertension.

Results: There is some discrepancy of values between the various studies analyzed. However, this is justified in view of the conditions under which each was carried out, the type of sample used, the age, the daily amount of dark chocolate and the amount of active ingredients per dose, since they were quite different.

Still, there is a significant tendency of decrease in blood pressure due to the intake of dark chocolate compared with white chocolate ingestion or with a reduced flavonoid content.

There was a reduction of 12.0 in SBP and DBP of 9.6, and a minimum of 2.9 in SBP and DBP of 1.9, the treatment group, have been very few studies where no registered difference or, on the contrary, there was an increase.

The dark chocolate used dosages ranging between 6.3 and 100 g / day with an amount of active ingredients between 30 and 1008 mg / dose, and studies lasted between 2-18 weeks.

Conclusions: This systematic review suggests that the effect of dark chocolate intake is greater than the white chocolate or less rich in flavonoids, SBP and DBP in healthy subjects, pre-hypertensive or hypertensive.

Keywords: Dark chocolate; blood pressure; flavonoids

Effects of a Grana Padano-enriched diet on blood pressure

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Functional foods contain active substances that benefit the body, helping to slow down the progress of diseases such as diabetes or high blood pressure.

This type of food can bring health benefits, improving primary prevention of disease and allowing a decrease of expenses at the pharmacy, in consultations or medical examinations.

The functional food this study will address is an Italian cheese, called Grana Padano.

This cheese contains in its Constitution the tripeptides Valine-Proline-Proline (VPP) and Isoleucine-Proline-Proline (IPP), two peptides with antihypertensive properties.

High blood pressure (Hypertension) is a recognized risk factor of cardiovascular disease and a growing problem, with a prevalence in Portugal located in 26.9%, according to the study "hypertension Arterial in 2013 Portugal", led by professor Mario Macedo cob and carried out within the framework of the work developed by the National Program for brain-Cardiovascular diseases.

This study aims to verify if the intake of Grana Padano brings significant benefits to the health of Normotensive individuals.

The sample of the study will be collected at Coimbra Health School.

The methodology will consist in the collection of the biographical data of each individual, as well as of their blood pressure through clamp, in the brachial artery, every 15 minutes throughout the day and every 20 minutes throughout the night with recourse to the ambulatory blood pressure measurement (ABPM).

The collection of arterial pressure with the ABPM is a painless, noninvasive and relatively simple method, without secondary effects for the individuals subject to the measurement.

After collected all the data of the sample, these are statistically processed and after treatment the respective conclusions will be drawn.

Keywords: Functional foods; Grana Padano; Blood pressure; Valine-Proline-Proline; IsoleucineProline-Proline

Heart Rate Variability: Long-Term ECG vs Short-Term ECG

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Introduction: HRV is used in the assessment of autonomic nervous system in diverse pathologies. It is determined by the activity of the sinus node, being influenced by the interaction of the sympathetic and vagal activity. A high heart rate variability can result in over activity of the sympathetic or reduced vagal activity. Its measurement includes two components: the time domain and the frequency domain. HRV is influenced by physiological factors such as age, gender, changes position and certain diseases.

Objective: To compare two methods of assessment of heart rate variability: short-term ECG versus long-term ECG, according to the variables of interest in study.

Methods: Systematic literature review through the PubMed search engine. Among the total number of found articles on the subject were chosen 3 articles, selected according to specific criteria of inclusion and exclusion.

Results: The mean age of the patients is 36 years. The time-domain parameters are more reproducible than those in the frequency domain. As for the analysis in the frequency domain (Fast Fourier Transform) measurements at baseline showed good reproducibility for TP and LF. There is a difference in the long and short-term analysis: over a period of 24 h several factors can affect the frequency domain measurement and as a consequence the results represent an average of all types of influence.

Conclusions: HRV measures derived from five minute recordings are stable and can be considered as a feature of an individual. It was also concluded that although HRV decreased with age, it occurs in both sexes and it can start earlier in men.

Keywords: Heart rate variability; ecg;holter

Thermal Waters

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In Portugal, there are currently about 36 thermal places, in various parts of the country and its existence and all its benefits are not generally knowledge.

The most distinct characteristics that the hot springs have are their special mineralizations, certain different specific particularities than usual or high temperatures.

With this work we intend to evaluate the knowledge of population about the benefits of hot springs, identify the role of an environmental health technician in this area, get to know the different uses of thermal waters and its importance and also make a comparison with the results obtained last year by the same instrument application.

For our research we used as methodology the application of an questionnaire on hot springs and the review of articles already published.

As research results obtained, in 142 answers, results as a 7.5% increase of individuals who attend thermal places, and of these, 58.3% do so for leisure (21 individuals), and 19.4% for health reasons (59.4% less than in the previous year). Regarding the knowledge of the benefits of these waters, it was found that 72.3% are aware of these benefits, increasing 4.3% over the previous year. We also found that 50.4% think that the treatment areas of these waters must be cleaned and disinfected every day and 41.1% at the end of each treatment.

Finally, we saw that 92.9% think that this water can prevent future diseases and 64.5% knows some of the types of water used in spas, increasing 41.8% over the previous year.

In conclusion, these results in relation to the knowledge of the respondents about hot springs have undergone a significant change compared to the previous year, so is necessary to intervene in order to improve the percentages and inform people about the benefits of these waters.

Keywords: thermal water, public health, environmental health

Water Supply and Wastewater Treatment

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"The water and the health of the population are inseparable", which is reflected in a "growing requirement for the quality requirements of urban effluent discharges" and "greater pressure to increase efficiency in the operation of water treatment station and Waste water treatment plant", to ensure a good quality of water supplied.

The objective is to clarify the existing concepts of water treatment and supply, through the types of water supply and wastewater, quality parameters, forms of contamination and, finally, the process of treatment and resolution of pollution problems.

The elaboration of this work involves the application of a questionnaire, conducted through Google Drive and in the street, which consists of simple and objective questions about the knowledge of the quality, supply and confidence in the water that consumes.

This questionnaire was applied to 105 individuals, of both sexes, living in the municipalities supplied by the Boavista water treatment station and by the water treatment station Retiro dos Caçadores (Ronqueira), aged between 17 and 89 years. It was found that the majority of respondents consumed tap water (74.3%), saying they did it "because water is of good quality and does not cause problems" (62.7%). In general, 89.5% of the respondents know that the water they consume is treated, 62.9% know where the water they consume comes from and they have confidence in what they drink (92.4%).

According to the data in the study, we can conclude that public water is the most efficient and good quality, and the treatment of wastewater is important to maintain water quality throughout the cycle.

Keywords: water, quality, water treatment station, drinking water, wastewater

Waterborne diseases

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One of the relevant issues in water quality management is the identification and characterization of various waterborne diseases. "Untreated water is an open door to various diseases." The development of this type of disease is mainly due to the socio-economic conditions of an individual and the demographic conditions.

The objective of this work is to inform the population about waterborne diseases, how to transmit their symptoms and the main stages of prevention and treatment, to avoid and or reduce the occurrence.

The methodology used in the work was based on scientific articles, book "The Modern Public Health" and research online, related to the topic.

Diseases of water origin originate in water and may be caused by pathogens or other contaminants present in water; Are caused by lack of basic sanitation / hygiene. It is important to know how they affect the health of the population and how to prevent and reduce their impacts. The routes of transmission of these diseases may be characterized by ingestion (typhoid, cholera, hepatitis A, gastroenteritis); By inhalation of aerosols (legionella); By contact (Skin and ocular infections).

In conclusion, water is an essential good for human life, but it can be responsible for the development of many diseases. In underdeveloped countries, basic sanitation conditions are precarious, ie they do not have the same capacity for treatment and availability of water, by necessity sustainable management of disease prevention is needed.

Keywords: water quality management, Public Health, Diseases

Water Sustainable Management

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H₂O, a small molecule that is very important to us, but it looks like it doesn't have that much value nowadays. The human being uses it without worrying about the consequences of its actions. All ecosystems being closely linked, by affecting the hydrosphere we are affecting ourselves. Water covers about three quarters of the Earth's surface, and the part that is not covered by water has a diversity of habitats that depend on it, besides that, it is part of 70% of the Human body. Water Management is an important issue to the society since it is related to sustainable development. A development that meets the needs of the human being in the present, without compromising the capacity of future generations to satisfy their needs. This water management can be done in many simple ways in our everyday lives, like, for example, the simple act of closing the tap while we are brushing our teeth, or while we apply soap in the shower. For this, a simple questionnaire was developed in order to understand if the general population is aware of what a good water management is and in what ways they save water.

Thus, we are looking to elaborate a paper that approaches the key spots of this theme of a better hydrological future, something that is essential to life.

Keywords: sustainable development, Water Sustainable Management, public health

Methods of treatment of water for human consumption

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This work is essentially to indicate and define the methodologies for the treatment of water for human consumption. These are desalination, disinfection, filtration and PH correction.

Desalination works through methods such as reverse osmosis, thermal desalination, freezing, multistage distillation, solar oven distillation and is characterized as the most expensive method.

Filtration is considered to be the cheapest and most widely used method in the world. It consists mainly of slow and rapid filtration. It's also worth products such as the "Life Straw" that has come to try give different ways of drinking water to those who don't have access to clean water. Regarding disinfection there are 2 possible measures, namely by boiling or using chemicals. In chemical disinfection, disinfection by chlorine, chlorine dioxide, ozone, sodium hypochlorite and UV radiation are the most common ones.

Finally, pH correction consists of the addition of hydrated lime to maintain water between 6.5 and 8.5, thus ensuring not only the most adequate parameters to the human organism, as well as preventing corrosion of the pipe network.

Since there are so many different methods for treating water for human consumption, it is important to note that one method can be identified as more important than the others. It is necessary to make an assessment of the methods that are most beneficial to use.

If any of these treatment methods are absent, it will lead to the onset of pathogenic diseases, which can be from a simple disease, easily treatable to something more serious that can even lead to the death of the individual.

Keywords: Methods of treatment, Water, Human consumption

Water Footprint

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Water is an essential good and constitutes an indispensable necessity for the health and survival of mankind and is therefore considered one of the basic rights.

The impact of the Water Footprint in a certain location and in a certain time will depend on a variety of factors, including the assessment of water resources in the area under consideration, the level of local competition among different water users, the "flow of environmental requirement" to Local level and the "assimilation capacity" of the local water system. A moderate level of freshwater consumption in a region with low water availability may have a greater impact on the environment (eg biodiversity) than a higher level of water consumption in an abundant water region.

The water footprint is defined as the total volume of water used during the production and consumption of goods and services, as well as direct and indirect consumption in the production process. Most water use occurs in agricultural production, and there is also a significant amount of water consumed and polluted, derived from the industrial and domestic sectors. Therefore, determining the Water Footprint is to make it possible to quantify the total water consumption along its productive chain.

The Water Footprint considers the use of surface water and groundwater (blue water), groundwater (green water) and the volume of graywater entering the system after its use in different activities.

Keywords: Water Footprint, water consumption, blue water

Combination Therapy Tolerability to Oral Antidiabetics, Antihypertensives and Lipid-Lowering in Type 2 Diabetes

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Type 2 diabetes mellitus is a high incidence chronic disease, with a tendency to increase the number of patients. This disease is characterized by deficits in the secretion and action of insulin hormone.

As a metabolic disease it is associated with the development of blood pressure and lipid changes. The association of these disorders implies an increase in cardiovascular risk, leading to a faster development of microvascular and macrovascular consequences. Therefore for the correct therapy of type 2 diabetes mellitus is advised the use of oral antidiabetic, antihypertensive and anti-dyslipidemic drugs. Each group of these drugs causes distinct adverse reactions, so when used simultaneously they can potentiate a decrease of the tolerability, and consequently diminish the adherence to therapy, which can cause serious health problems to the patient if he does not take the medication properly.

The aim of this study is to see if the adverse reactions that each drug group individually registered are overlapping in these patients.

Keywords: Diabetes mellitus, antihypertensive, anti-dyslipidemic

Development and Validation Method for Determination of Fluoxetine by UPLC With Fluorescence Detection

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Fluoxetine is an antidepressant of the selective serotonin reuptake inhibitor (SSRI) class. Is indicated for acute and maintenance treatment of Major Depressive Disorder, Obsessive Compulsive Disorder, Bulimia Nervosa and Panic Disorder. Common side effects may include: insomnia, headache, dry mouth, loss of appetite, among others.

The aims of this research are the development and validate of an ultra-performance liquid chromatography (UPLC) method with fluorescence detection for determination of fluoxetine. The limit of detection and quantification, linearity, system precision, accuracy and robustness tests will be performed in order to achieve a method more adequate for the quantification of fluoxetine.

A literature research of articles published through search engines, in English, using keywords such as fluoxetine, UPLC, HPLC and fluorescence detection will be used.

Keywords: Fluoxetine, fluorescence detection, UPLC, HPLC

Adherence to therapy in elderly

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In the last decades, the elderly population has grown significantly, leading to increased number of chronic diseases and, consequently, an increase in the need to use more than one drug (polymedication) for diseases control. Polymedication refers the use of multiple medications that can cause adverse reactions / drug interactions depending on the number of drugs administered. In older adults with high number of pathologies associated or not with age, complex therapies are instituted which may lead to non-adherence to therapy. This situation can impair the aim of treatment, worsen the disease, add errors in diagnosis and treatment itself or even can lead to the failure of therapy.

Non-adherence to therapy which is the non-compliance with the prescribed therapy is related to several factors where the high number of daily medications, forgetfulness, the inability to swallow and economic difficulties constitute the main factors for non – adherence.

Since the control of the disease or even the success of the treatment is only achieved by effective adherence to therapy, health professionals have been implementing measures to minimize the non-adherence to therapy. For that they are doing a personalized follow-up to each patient which will allow to the patient to understand how beneficial is the compliance with the medication implemented.

Keywords: Old man; medication; Adherence to therapy; polymedication

Anti Fibrinolytic Therapy Associated With Stents and Scientific Evidence

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Background: Coronary angioplasty is a procedure that allows the arteries to be unblock, caused by cholesterol plaques. There are two types of balloon or stent angioplasty. It is called cardiac stent, the metallic stent, and expandable tube form in order to lessen the obstruction of the coronary arteries. Currently there are also so called pharmacological stents, coated with fibrinolytic drugs, which are slowly and gradually released into the artery.

Objective: The aim of our study is to make a review of the various types of drug-eluting stents, as well as its safety and efficacy and researching new types of stents to be used in the future.

Material and Methods: In this review study, Pubmed database was searched for relevant publications not only about pharmacological stent, but also various types of coronary angioplasty, with keywords: stents and angioplasty.

Results: Pharmacological stents have three components: a metal platform, a polymer coating and an anti-proliferative agent. There are two generations of endoprostheses, the first in which the stents are coated by sirolimus or paclitaxel. And the second generation shows improvements compared to the first. They exhibit reduced thickness, improved flexibility/release ability, improved polymer biocompatibility/drug perfusion profiles and superior re-endothelialization kinetics.

Conclusion: In conclusion, the second generation of stents improved clinical outcomes, both early and late. There are new techniques under study, with biodegradable polymers and stents with free polymers that bring a new approach in the near future.

Keywords: Stents and Angioplasty.

Nanotechnology

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Nanotechnology is considered a modern science although its origin comes from the late twentieth century. The characteristics of the nanoparticles, especially the reduced size, allow their application in different areas such as, industry, medicine, food and others. Pharmacology is one of the recent applications of nanotechnology, through the formation of particles that transport drugs to target tissues, reducing toxic effects.

The properties of the nanoparticles, such as, charge, conformation and chemical composition cause changes in their biological activity, causing unpredictable reactions. Nanotoxicity may occur when contact with the human body occurs. Nanotoxicity depends on the properties of the particles and the exposure conditions, namely the dose and the route of absorption. The study of Nanotoxicity in cell cultures, in vitro, and in animal models, in vivo, allows to define correlations between dose / response of the nanoparticles, in order to condition and legislate the production and consumption of the nanoparticles. Despite the scientific knowledge about nanoparticles, the toxicity study has some limitations and it is difficult to obtain systemic responses in human organisms.

Keywords: nanotoxicity; nanotechnology; nanoparticles; pharmacology

***Clostridium difficile*: The usefulness of in vitro rapid diagnostic tests in the prevention of healthcare associated infections**

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Clostridium difficile is an anaerobic Gram-positive bacterium, rod-shaped, spore-forming and capable of producing multiple toxins. It is responsible for colitis, an inflammatory disease of the bowel, quite frequent in healthcare associated infections.

The most common risk factor for *C. difficile* infection is the use of antibiotics, especially in the case of ampicillin, clindamycin, third generation cephalosporins, and fluoroquinolones.

The elderly and hospitalized patients are at higher risk due to prolonged use of antibiotics.

The diagnosis of *C. difficile* infections is controversial because some tests are very sensitive but take some days to complete, while other tests are rapid (hours) but are not very sensitive or specific: the immunoenzymatic assay is the most commonly used; the classical testing of stool samples is the standard method but it's expensive and 2 days are needed for results; toxin testing in stools can also be used to help the diagnosis, but it shows lesser sensitivity.

The aim of this project is to discuss the sources of *C. difficile* and the consequences in public health, to address the routes of exposure of patients to antibiotic medicines leading to this infection and, mainly, to critically evaluate the available types of in vitro rapid diagnostic tests, drawing attention to its importance in the prevention of healthcare associated infections.

Keywords: *Clostridium difficile*; healthcare associated infections; colitis; in vitro rapid diagnostic tests

Rheumatoid Arthritis

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Rheumatoid arthritis (RA) is a chronic, inflammatory, autoimmune disease of unknown cause which is characterized by inflammation of the joints, and whose absence of treatment could lead to the destruction and consequent loss of function. This inflammation, primary characteristic of the disease, mainly affects the joints of the hands and feet, with symptoms such as swelling, pain, redness and feeling hot.

It is estimated that in Portugal RA affects between 0.5% and 1% of the population and has an incidence from 2 to 4 per 10 000 people each year. It affects three times more women, especially after menopause. It is diagnosed in Portugal about 40 000 cases.

The diagnosis of RA must be as early as possible in order to quickly discover the symptoms of the disease, however, this is quite difficult because of the different clinical manifestations of disease.

Treatment of RA involves a multidisciplinary approach - pharmacological treatment, non-pharmacological and surgical whose main objective is to prevent and control joint damage, prevent loss of function and decrease pain, to control the progression of the disease and increase the patient's quality of life. It is important to note that drug treatment only controls the symptoms of the disease, in addition has numerous side effects, it is therefore important to look for alternative medicines in order to reduce these negative effects and further increase the quality of life of patients.

Keywords: Rheumatoid arthritis, alternative medicines

Depression associated with Professional Activity

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Mental health is an important issue regarding the active population. The workplace environment is recognized as an important source of psychological stress due to its demands and pressures. In turn, stress can lead to negative outcomes on the mental health of the worker, consequently leading to a state of depression. Depression is an emotional disorder that causes mood changes and is characterized by a set of symptoms such as insecurity, social and family isolation, apathy, demotivation, sadness, irritability, that is, loss of interest and pleasure in everyday activities. This disease can also lead to loss of memory, appetite and concentration as well as insomnia.

Depressive symptoms and anxiety are accompanied by nonspecific behavioral changes, whose treatment involves the use of drugs such as anxiolytics, benzodiazepines and antidepressants. Studies also suggest that mental disorders associated with occupational activity may lead to increased consumption of addictive substances, such as alcohol and tobacco, and that regular physical exercise is a good way to overcome the symptoms and the 0

Portugal is the european country with the highest rate of depression and 7% of the portuguese population suffers from this disease. Workplace demands and stress lead the individual to early stages of depression that, without an early therapeutic approach, can progress to more severe and advanced stages of mental illness. Research in this area uses instruments to measure the quality of life of the individual with depression and the progression of the disease, which may be a strategy to be considered to measure, act and prevent, and consequently reduce the rate of depression among the working population.

Keywords: Depression, antidepressants, disorders

Musks

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The Personal Care Products (PCPs) are chemical organic synthetic that are present in a great variety of bath products, dentifrice folders, cosmetics, solar protectors... UV filters, antiseptics, parabens, musks are examples of PCPs. Of these compounds, musks are the ones that cause the most concern to the scientific community.

Musks are used as fixing substances of the fragrances. These had appeared of natural origin but they had been gradually substituted by synthetic musks. These compounds can be divided into four main classes according to their chemical structure.

Nitromusks (NMs) were first class produced commercially and dominated this market for many years until the o sprouting of a new group with bigger stability and minor cost, polycyclic musks (PMs). Currently this musks class still remain the most used (particularity, the galaxolite), even after the appearance of the macrocyclic musks (MMs), those who have a more similar chemical structure to natural musks, and of the acyclic musks (AMs), which are the latest and differ from all other musks as the molecular structure as they are the only ones that have a linear structure. These compounds represent a research area in growing, because the musks are considered emerging pollutants. Besides the fact of being the unknown long-term effects of human exposure and environmental impact caused by these chemicals used daily by the entire population.

Keywords: Musks; Synthetic fragrance; Personal Care Products

Socio-Professional Identity of Pharmacy Technicians of the Central of Portugal

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The professions in the health care area, namely Pharmacy Technicians, have undergone structural, legislative and technological changes over the last years. These changes have consequences in the socio-professional identification and later in the provision of health care. The constant evolution in the provision of health care, both in terms of theoretical knowledge and technology, demands the adaptation of the Pharmacy Technicians to this reality. Thus, the professional identity is not stable, being a process in development and being also an individual and collective process that builds and defines the health institutions. In order to follow this evolution, as well as identify and characterize the Pharmacy Technicians, it is necessary to know them, namely how many there are, their gender, age group, literary qualifications they possess, employment legal relationship, professional categories, performed duties in the exercise of their profession, both at Community level and at hospital level.

For this purpose it is intended to conduct an observational study in the central region of Portugal. Through a survey designed for this purpose and applied in different professional contexts, we aim to access the various dimensions of professional identity.

Keywords: Pharmacy Technicians; professional identity

Assess Security In Context Real Class New Therapies Antidiabetic Oral: DPP-4 Inhibitors, GLP-1 Mimetics and Sodium-Glucose Co-Transporter 2 (SGLT2) Inhibitors**Joana Feiteira**

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The Type 2 Diabetes Mellitus (T2DM) is a chronic and progressive disease. It is a complex metabolic disorder characterized by hyperglycemia resulting from both the resistance to insulin action such as dysfunction of the cells. It is currently one of the major public health problems, in fact, particularly affects older individuals and, therefore, more susceptible to the risk of adverse drug events.

In recent years, there have been new therapeutic classes in the treatment of T2DM, particularly GLP-1 analogs, DPP-4 inhibitors and sodium-glucose transporters cotransporter-2 inhibitors (SGLT2). Despite the increase of burdens they cause, these new classes are new therapeutic options with different mechanisms of action, therapeutic benefits and profile of adverse effects with important advantages in the pharmacological treatment of T2DM.

With the use of DPP-4 inhibitors, active GLP-1 levels increase. This increase represents a lower biological activity than that obtained with the use of GLP-1 analogues, which, through the use of DPP-4 inhibitors, no significant delayed gastric emptying or reducing weight. Together, these therapeutic strategies constitute a promising development in the treatment of diabetes, increasing insulin synthesis and reducing glucagon production. The SGLT-2 inhibitors reduce the absorption of glucose by the kidney, increasing the excretion of glucose and reducing sugar levels in the blood.

Thus, it is important to analyze the safety of these new therapeutic classes in a real context to assess the actual impact of the adverse effects of these drugs in the elderly.

Keywords: Type 2 Diabetes Mellitus, GLP-1 analogs, DPP-4 inhibitors and sodium-glucose transporters cotransporter-2 inhibitors (SGLT2)

Ototoxicity induced by drug treatment in childrens

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Ototoxicity is a toxicity caused by any drug with the potential to cause toxic reactions to structures of the inner ear. This drug induced damage can result in hearing loss, tinnitus, and dysequilibrium or dizziness.

Aim of this work is to characterize a pattern of drug-induced ototoxicity in children through Academic Google and Pub Med, online database. Data were extracted with the following keywords: "Ototoxicity in childrens" and "Ototoxicity induced by drugs in childrens".

Ototoxicity is associated with several types of therapeutics, from antineoplastic therapy, aminoglycoside antibiotics to loop diuretics.

Keywords: Ototoxicity; childrens; drugs

Evaluation of ibuprofen content in oral formulations

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Ibuprofen is a substance, derived from propionic acid, with anti-inflammatory, analgesic and antipyretic action, presumably acting by inhibition of the prostaglandin synthesis. It belongs to the pharmacotherapeutic group of Non-steroidal anti-inflammatory drugs (NSAIDs).

This substance has been commercialized in the Portuguese market in several dosages (200mg, 400mg and 600mg) and by several similar brands.

An assessment of the content of ibuprofen in oral formulations of different brands considered OTCs will be carried out by two different analytical methods (UV spectrophotometry and HPLC) with the purpose of assessing the equality of dosages between different brands and the compatibility of the different methods.

Absorption spectrophotometry is the measurement of the absorption, by substances, of electromagnetic radiation of definite and narrow wavelength range, essentially monochromatic.

The ultraviolet and visible spectra of a substance generally do not have a high degree of specificity. Nevertheless, they are highly suitable for quantitative assay, and for many substances they are useful as additional means of identification.

High Performance Liquid Chromatography (HPLC) is an analytical technique of high impact with a wide range of applications. It consists of the separation of different chemical species present in a sample. The separation is carried out by means of a mechanism of selective interaction between the molecules of the solute (sample) and two phases, one stationary and the other mobile. The different migration rates of the substances allow the development of the chromatographic separation, thus allowing the quantification of substances present in different products.

Keywords: ibuprofen, HPLC, UV spectrophotometry

Medication errors in high alert medications

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Medication errors are events, mostly avoidable that can occur for different reasons and in any part of the drug circuit, from prescription medicament to the administration of it. These may or may not harm the patient.

Associated with these errors are the high alert medications that are those who are at increased risk of causing significant harm to the patient, as a result of failures in the use process. Although the errors that may occur with these drugs are not the most frequent, the consequences tend to be more severe and deadly.

The hospitals should develop strategies and implement measures to minimize the occurrence of medication errors, promoting the development of safe practices in the medication management process.

This work aims to describe the occurrence of medication errors in the group of high alert medications as well as minimization strategies and critically analyze the alternatives.

Keywords: Errors medication; High alert medications; Pharmacovigilance

Use of Medications for Attention Deficit Hyperactivity Disorder in Children

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Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder. This disorder has come up with various names such as Minimal Brain Injury, Hyperkinetic Childhood Reaction, Attention Deficit Disorder or Attention Deficit Hyperactivity Disorder. Persistent patterns of inattention, hyperactivity and impulsivity are the core symptoms that characterize ADHD. These symptoms are sometimes only recognized when the child enters school. ADHA is subdivided into three types: those with predominantly attention difficulties; those that prevail impulsiveness and hyperactivity; and what combines the previous two. However, the diagnosis is complex, and therefore, it is necessary that the information collected by the teachers and parents are considered evaluation criteria by the health professional. The etiology of this disorder is multifactorial, that is, ADHD results from interactions of several environmental and genetic factors. With regard to the proposed treatment for these children, this includes multiple approaches such as psychosocial and psychopharmacological interventions. At present, psychostimulants, which relieve symptoms by increasing intra-synaptic dopamine, norepinephrine and serotonin, are the first-line treatment and the mainstay of ADHD treatment. Stimulant drugs approved to treat ADHD are amphetamine-based psychostimulants (Dexedrine, Adderall, and Vyvanse) and methylphenidate-based psychostimulants (methylphenidate, Biphentin and Concerta). Other agents that have been used off-label for ADHD treatment include tricyclic antidepressants, bupropion, selective serotonin reuptake inhibitors, buspirone, and atypical antipsychotic drugs. To sum up, it is necessary to continue to pay attention to the appearance of the symptoms of this disorder in children in order to be able to provide immediately the support that this needs.

Keywords: Attention Deficit Hyperactivity Disorder; Symptoms; Treatment

Therapeutic Complexity in the Elderly Population

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The increase of the average life expectancy in Portugal translates into an inevitable expansion in the proportion of the elderly and, consequently, a higher prevalence of chronic diseases, such as: cardiovascular diseases, dementia, hypertension, diabetes mellitus, arthritis and cancer. The continuing decline of the body's functions in the oldest people leads to the needs for multiple drugs exposure for prolonged periods.

Polymedication, defined as the simultaneous use of 5 or more drugs, maybe improve the patient's quality of life, either by relieving the symptoms of the disease, by slowing its progression or even by healing. However, increasing the complexity of therapy predisposes the elderly to a greater risk of adverse interactions and reactions and also problems related to inadequate medication use and lack of adherence to therapy.

Therefore, adherence to the therapy may become even lower because it is a geriatric population, which in itself already causes problems, such as: cognitive changes, decreased vision and / or hearing, and disabilities or motor coordination problems.

In addition to medicines taken for chronic conditions, the elderly population self-medicates with a large quantity of non-prescription medicines without advice from the health professional and without proper knowledge of the consequences which may result from their association with the prescribed drugs.

The complexity of the therapy in the geriatric population makes it difficult to comply with the treatment, predisposing the elderly to a lower adherence to the therapy. It is then necessary to concerted efforts involving the patients, caregivers and health professionals in the periodic review of therapy in order to simplify regimens and to use medicines more safely and efficiently.

Keywords: Polymedication, geriatric population, complexity of therapy

Irritable Bowel Syndrome: Pathophysiology and Treatment

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Irritable bowel syndrome is a chronic functional gastrointestinal disease associated with abdominal discomfort, colic's, bloating, altered bowel habits, diarrhea or constipation, especially affecting the female sex.

It is estimated that 7 to 22% of the world population is affected, and the pathophysiology is not well known. However, the evidence suggests that it may have a relation with psychological, environmental, immunological, genetic factors, altered motility intestinal, visceral hypersensitivity and alteration of the intestinal flora, being thus a multifactorial syndrome.

The diagnosis is complex, being based on symptoms and the exclusion of other pathologies. Because of the impacts on quality of life and economic costs, an early and accurate diagnosis is essential, so symptoms and their duration should be correctly evaluated, such as the predominant characteristics of stool, which present several subtypes according to the Intestinal changes.

Having a significant impact on the quality of life, it does not have definitive treatment, reason why the therapeutic strategy is directed to the dominant symptomatology, the degree of the manifestations and the associated clinical and psychological factors. Treatment can be carried out through pharmacological and non-pharmacological methods, such as medications, diets, probiotics, psychological counseling and alternative medicines, which over time have gained prominence.

Keywords: irritable bowel syndrome

Cancer's therapy by genetically engineered T-cells

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We live in a world where cancer, characterized by abnormal cell growth, is present in millions of people. These cells, capable of damaging tissues and organs, may circulate through the lymphatic system or the bloodstream and attack other organs or tissues, different from those in which the primitive tumor is located, a mechanism known as metastasis formation. To combat this terrible reality we need to move forward in scientific research hoping that in the future will be possible to know fully the cause and progression of cancer. It's also important to improve areas like prevention, diagnostic and oncological therapies. Nowadays different types of therapies are available and the choice is made according to the stage and characteristics of the tumor. The different therapeutic approaches currently available include surgery, radiotherapy, chemotherapy, hormone therapy, undifferentiated stem cell transplantation and immunotherapy. Immunotherapy is a therapeutic area that uses the immune system as a weapon against cancer. This is an area that has evolved quite a lot in recent times and recently some studies presented positive results for the use of genetically engineered T-cells as therapy. T-cells are present on our immune system and they are responsible for inducing apoptosis in cells that are somehow damaged. In this therapy T-cells are removed from the organism and modified by genetic engineering to be later reintroduced in the body with the capacity to recognize the tumor that often escapes from the most common defense/attack mechanisms.

Keywords: Cancer; Therapy; Immunotherapy; T-cells

Manipulation of Cytostatics (ergonomics and individual protective equipment)

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Cytostatics, commonly known as cytotoxic or antineoplastic, are drugs used to stop the proliferation and growth of a neoplastic cell. They are used in the treatment of neoplasms when surgery or radiotherapy is not possible or ineffective, or as adjuncts to surgery or radiotherapy as initial treatment.

This class of drugs has a carcinogenic, mutagenic and teratogenic character for the human. Exposure to these drugs requires a set of procedures / equipment for handling them. The personal protective equipment gives maximum protection in handling, minimizing the risk of contamination of the manipulator technician.

Ergonomics consists of the science that studies the relationship between man and the work he performs, looking for to develop techniques for adapting to his work. Physical and psychological well-being and increased productivity are the key points of Ergonomics at work.

The aim of the paper is to highlight the importance of personal protective equipment and ergonomics in cytostatic manipulation through PubMed, Scholar Google and online databases.

Keywords: Cytostatics; ergonomics; individual protective equipment

Drug-food interaction in the elderly

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Interactions between food and drugs occur frequently and is the elderly population who often suffers, because of the consequent physiological changes of aging. These can influence the pharmacokinetics of drugs in its absorption, distribution, metabolism and excretion, and also it happens when the pharmacodynamic effect of the drug is altered by food or their nutrients. In fact, this population is subjected to a polypharmacy regimen, often presenting a state of malnutrition, makes them a group with more interactions of this type.

Concomitant administration of drugs and food may have a marked effect on the rate and extent of their absorption and are administered because of three key reasons: to increase absorption, to minimize the irritant effect of some drugs on the gastrointestinal mucosa and to assist in the accomplishment of the therapy.

However, in some cases, concomitant intake is not advised because of the reduced bioavailability of the drug in the presence of food or the occurrence of pharmacokinetic and pharmacodynamics interactions between food and drugs.

Thus, this project essentially allows us to know the type of food that is consumed by elderly patients and the medication they do and also to evaluate if this specific population is aware of those interactions.

Keywords: interaction; drug; food; elderly

Medication Errors in Hospitals: Problems and Solutions

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Medication error is any preventable event, which can lead to the misuse of drugs or cause damage to the patient while his under the control of the professional health care, patient, or consumer. The increase in the incidence of medication errors in hospitals is worrisome and encourages professionals to search for alternatives to minimize them. Medication errors can be classified as prescription errors, transcription, preparation, dispensing and administration. The considerable increase of studies related to patient safety and medication errors led to an exponential increase of knowledge on the subject, classifying it as a global public health problem. According to this worrying picture, the World Health Organization launched in 2004 the program World Alliance for patient safety. This is a permanent program that invokes all Member countries to take measures to ensure the quality of care provided in health units around the world. Medication errors should be adequately addressed, not denying their existence, but acting appropriately when they occur.

Keywords: Medication errors

Understanding workload in chemotherapy units

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Introduction: Cancer is one of the most common disease and has a large impact worldwide. Currently, chemotherapy with antineoplastic agents plays a major role in oncologic treatments and chemotherapy preparation units have their work increased with constant staff. As a consequence safety is therefore threatened. The purpose of our study is to measure the effect of work overload on preparation accuracy and error.

Methods: A simulation study using chosen tracers will be conducted in an operational context. After determining the simulation set, individuals will prepare it at a given time. The preparations will vary in dosage and volume so that, afterwards, it would be possible to control the final preparation (quantity and quality).

Results: With increasing workload and reduced handling time, it is expected that there will be changes in accuracy of the preparations.

Conclusion: Thus, reaching these results and based on the professional course of the individuals, it would be possible to conclude the necessity to increase the workforce, ensuring greater accuracy and, consequently, the safety of the patient.

Keywords: Workload, Chemotherapy Preparations Units, safety

Pernicious Anemia: Pathophysiology and Treatment

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Pernicious anemia is characterized by a decrease in red blood cells when the gastrointestinal tract doesn't adequately absorb vitamin B12. This condition can result from hereditary factors, and also may be, associated with some autoimmune endocrine diseases, congenital pernicious anemia being inherited as an autosomal recessive disorder.

Gradually vitamin B12 deficiency affects the motor and sensory nerves causing neurological problems. This anemia also affects the gastrointestinal and cardiovascular systems.

Autoimmune endocrine disorders, family history and some ethnic groups are identified as the main risk factors that predispose to pernicious anemia. The overall incidence is 1 in 1,000 people. Patients with pernicious anemia may have gastric polyps and thus have twice the incidence of gastric cancer than the normal population, persistent neurological defects may also be present if treatment is delayed.

The treatment of pernicious anemia includes increased levels of vitamin B12 in the body, reduction of signs, symptoms and the prevention of complications, such as cardiovascular and neurological injury.

The aim of this research project is to perform a literature review of pernicious anemia and its pathophysiology, as well as the advances on the treatment of this disease.

Keywords: Pernicious anemia, vitamin B12, complications, pathophysiology, treatment

Primary Care Indicators – Hospital Pharmacy Management

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Healthcare sector expenditures are high and in recent years they have increased at an economically unsustainable pace. These issues compromise the financing and efficiency of healthcare systems and also the quality of services provided. In this socio-economic context the national and international health policies have evolved and tend to adopt new management models that focus on performance evaluation and decentralization, placing the patient at the heart of the healthcare system.

The hospital structure changeover towards the merging aims to control expenses, increasing the system efficiency. However, the increase of institutional competition, the media pressure and the growing demand for information by the society, makes the hospital management process even more complex.

It is well known that drugs expenses take a big part in a hospital budget, putting the pharmacy under special analysis. It is increasingly necessary to ensure the monitoring and evaluation of all activities in the hospital pharmacy management process. It is in this context that emerges the need for a selection of indicators that allow identifying flaws, updating the efficiency guidelines, assisting management decision-making to optimize hospital performance.

The aim of this literature review is to obtain a panel of primary care indicators used as a hospital pharmacy management tool. It is intended to understand how the indicators are build, how to use them and the importance of information quality which they are based on.

Keywords: Indicators, Hospital Management, Quality of health care, Pharmacoeconomics, Monitorização SNS

Polypharmacy in Elderly: Facts and Solutions

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Polypharmacy is the simultaneous use, and the chronic way, of various drugs, by same person. The definition of polimedicated patient isn't consensual, varying the number of prescribed medications between two to five or more. Multimorbidity, defensive prescription, multiplicity of prescribers, devaluation of symptoms that may be due to others drugs and media influence are the main factors leading to the polypharmacy. It potencies the risk of drug interactions, the occurrence of adverse drugs reactions and the risk for medication non-adherence.

The increase of average life expectancy implicates a high incidence and prevalence of chronic diseases, that making the elderly like main consumers of health cares and medications in Portugal. The ageing process is responsible for several physiological modifications that changes pharmacokinetic and pharmacodynamic and, in turn, determine the therapeutic effects of drugs. On the other hand, the loss of functional and cognitive skills, more pronounced in elderly people, makes difficult the right medication taking behaviour.

It's, in this way, crucial to take strategies that reduce the impact and risks of polypharmacy in elderly; such strategies, in focus on the patient, also require the intervention of all the social environment, whether they are the family or neighbours, whether they are prescriber physicians or the pharmacy technicians.

Keywords: Polypharmacy, elderly, medication

Diabetes Mellitus

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Diabetes mellitus is defined as a metabolic disorder characterized by chronic hyperglycemia with disorders in the metabolism of carbohydrates, lipids and proteins resulting from the deficiency of insulin secretion or action.

There are several causes that can give rise to diabetes, being them: diet rich in concentrated carbohydrates, menopause, stress, surgeries and some medications.

Diabetes mellitus has symptoms such as thirst, recurrent infections, blurred vision, and weight loss. In the long run this can have several effects as damage, dysfunction and failure of various organs.

In order to make a clinical diagnosis and before deciding the appropriate therapy for each patient it is necessary to take into account additional factors such as ethnicity, family history, age, obesity and concomitant pathologies.

The two main clinical forms with the highest incidence and which prevail most are of genetic origin, being type 1 and type 2 diabetes.

Currently diabetes is relatively associated with increased mortality and the high risk of developing micro and macrovascular complications.

Keywords: diabetes, mellitus, type 1, type 2

Determination of the concentration of sucrose in oral liquid formulations

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The vast majority of oral liquid medications developed is referred to as maple syrup. These are pharmaceutical preparations, clear water containing a high concentration of sugars such as sucrose, at concentrations close to saturation. This gives the sugar preparations a energy value and has the function of sweetener and preservative, thus making their intake more enjoyable, giving however a high risk factor for tooth decay in children.

Dental caries is an infectious disease, being the most prevalent disease in the oral cavity of children and may by general health or even life-threatening.

The drugs designed for Pediatrics, contain mostly, some kind of sugar in their composition in order to improve its taste, which may mean damage to your dental health.

Keywords: oral liquid medications, sucrose

Excessive use of antibiotics in aquaculture - Impact on Public Health

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The population growth in the last decades has led to discovery of solutions for the production of food in sufficient quantity to satisfy the populations needs.

Aquaculture plays an important role in the production of fish for human consumption, however, healthy fish growth is a major factor for the consumer health – the Man. In order to increase productivity is used an intensive fish culture, which can lead to a higher incidence of diseases caused by fungi, bacteria, viruses and parasites. To inhibit the growth of these mycobacteria, for the purpose of treating or preventing infectious diseases, antibiotics are used in such cultures.

Overuse of antibacterial drugs in aquaculture can lead to serious consequences for the environment as well as for the human being. The anti-infectives can act as micro-pollutants by bioaccumulating in the water causing pollution and change the microbial site.

In the food chain, humans introducing fish contaminated with antibiotic residues into their food may affect their health through the possible underlying bacterial resistance.

Keywords: Aquaculture; Antimicrobial; Micropollutants

Ketogenic Diet Effects in Epilepsy

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In the 1920s' world of clinical neurology, momentum gathered behind the idea of treating epileptic seizures not with the few and rather inadequate medications available at the time, but by a radical change in diet: elimination of all but a tiny amount of ingested carbohydrate and substitution mostly by dietary fat, a so-called 'ketogenic diets' (KDs).

First designed and tested as an anticonvulsant dietetic protocol in 1921, after nearly a century KDs are still used for the treatment of epilepsy, especially the refractory paediatric forms. In fact, with dozens of new anticonvulsant drugs, approximately one-third of patients with epilepsy still fail to achieve significant relief from seizures with pharmacological treatment.

KDs consist in high-fat and low carbohydrate alimentary regimens (4:1 ratio) able to induce systemic ketosis by raising the haematic level of ketone bodies. Recent theories on these metabolic interactions on cortical hyperexcitability comprise disruption of glutamatergic synaptic transmission, inhibition of glycolysis and activation of ATP-sensitive potassium channels.

Clinical interest in the ketogenic diet was renewed during the 1990s mainly in children with drug-resistant seizures. Its efficacy has been sustained in retrospective and prospective studies, as well as in a recent randomized trial, and many major centers now offer dietary therapy for epilepsy.

As said, the endogenous mechanisms of KDs are not yet fully understood, mainly through its scarce use due to struggle in tolerability, compliance with the strict diet, training in diet administration, and a general reluctance on the part of neurologists to use dietary therapy.

Keywords: ketogenic diet, seizures, ketone bodies, epilepsy

References:

1. Kossoff, E.H., Zupec-Kania, B.A., Rho, J.M. (2009). Ketogenic diets: an update for child neurologist. *J. Child. Neurol.* 24, 979–988.
2. Kwan, P. and Brodie, M. (2000). Early identification of refractory epilepsy. *N. Engl. J. Med.* 342, 314–319.
3. Neal, E. et al. (2009). A randomized trial of classical and medium-chain triglyceride ketogenic diets in the treatment of childhood epilepsy. *Epilepsia* 50, 1109–1126
4. Peterman, M. (1925). The ketogenic diet in epilepsy. *J. Am. Med. Assoc.* 84, 1979–1983
5. Wilder, R.M. (1921). The effects of ketonemia on the course of epilepsy. *Mayo Clin. Bull.* 2, 307–308.

Ensure Food Safety in Natural Disasters

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Natural disasters are events that more or less often, have come to affect societies around the world. They occur with greater or lesser degree by floods, volcanic eruptions, earthquakes, tsunamis or other geological phenomena.

Natural phenomenon raises food safety issues; not the lack of food available, but the increase of food-borne illness risk (Food safety). Often the number of casualties caused by consumption of unhealthy food is higher to that caused by the disaster itself, like toxicological health problems such as diarrhea, dysentery, cholera, hepatitis A and typhoid fever.

The difficulty of maintaining food safety in a scenario of this nature is related to the complexity of logistics, the distribution of food that is safe and nutritional.

The risk increases when we have food that will be consumed without heat treatment, with package damaged, poor hygienic practices or food handlers with poor health condition.

Therefore, it is addressed the risk assessment and suggestion of preventive measures aiming the elimination or reduction of biologic, physical and chemical hazards to acceptable levels, to prevent food-borne illness in natural disasters events.

In this work we designed a food safety hazards analysis induced by natural disasters, to prevent the reaction/action in the moment of the natural phenomena.

We conclude that every natural disaster as particularities, however the main proposed of this general hazards analysis is to create and improved the risk assessment in organizations, populations or countries that are or may be victims of this natural phenomenon.

Keywords: Food Safety Natural disasters
