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Antibiotics, overuse and prevention

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Abstract
Anti-microbial prophylaxis in oral and maxillofacial surgery procedure rules out the anticipation of the contamination of the careful injury, either because of the qualities of the medical procedure or the general condition of the patient. This hazard increments with the sullying of the careful activity zone, making it important to suggest a prophylactic treatment of the disease in clean-polluted and tainted medical procedures and treatment of the contamination in filthy surgeries. Moreover, a legitimate careful strategy decreases the advancement of the postsurgical contamination. The elective anti-infection therapy ranges from penicillin-derivates with beta lactamase inhibitors (amoxycillin-clavulanate, ampicillin -sulbactam) to second or third era cephalosporins, quinolones or clindamycin. The sign for the utilization of these anti-infection agents relies upon the kind of medical procedure in oral and maxillofacial medical procedure, as per the level of tainting. Thus in oral surgery and surgery of the salivary glands the literature demonstrates that there is not a better prognosis when using prophylactic antibiotherapy instead of not using it in healthy patients. In traumatology this prophylaxis is justified in compound fractures and those communicating with paranasal sinuses. In orthognathic surgery there is disagreement according to the criteria of using antibiotic prophylaxis, but short term treatment is preferred in case of using it. In oncological surgery it has been demonstrated the reduce in incidence of postsurgical infection using prophylactic preoperative antibiotherapy, mostly in those cases in which oral mucosa and cervical area contact.

Keywords: Antibiotics, Anti-infection therapy, Prophylaxis, Post-operative therapy

Introduction
The aim in surgical antibiotic prophylaxis is to prevent the possibility of an infection in the surgical wound, creating an area of resistance to microorganisms by means of antibiotic serum concentrations that may avoid the multiplication and spread of bacteria through the surgical injury. The prophylaxis is always indicated when there is an important risk of infection, because of either the features of the operation or the local or general conditions of the patient. Among the factors that could be the cause for this infection, the ones that should be emphasized are the type and duration of the surgery and the surgical risk of the patient (ASA risk) due to his comorbidity: diabetes, nephropathies, hepatopathies (cirrhosis), cardiopathies, immunosupressors (corticoids, radiotherapy, chemotherapy, previous infections undertreated or mistreated with other antibiotics). Minor surgical procedures in healthy patients may not require prophylaxis. In Orthognathic medical procedure there is difference as indicated by the criteria of utilizing anti-microbial prophylaxis, however momentary treatment is favored if there should be an occurrence of utilizing it. In oncological surgical procedure it has been exhibited the diminish in frequency of postsurgical contamination utilizing prophylactic preoperative antibiotherapy, for the most part in those cases where oral mucosa and cervical region contact [1].

Historical Background
As an English specialist advancing the possibility of clean medical procedure during the 1860s, Joseph Lister utilized phenols to sanitize careful instruments and clean injuries. Developing Louis Pasteur's ideas of annihilating smaller scale living beings in wounds, Lister acquainted antisepsis with medical procedure and made specialists wash their hands and wear

Clean gloves, a novel idea at the time. Before his principles were accepted into use, surgery commonly resulted in postoperative fevers and infection, which often lead to sepsis and death. Lister was surrounded by contemporaries that echoed his sentiments of antisepsis. Ignaz Semmelweis, a Hungarian physician in the 1800s, discovered that puerperal fever could be decreased if physicians washed their hands in a chlorinated lime solution.US Surgery data states that there were approximately 28.5 million surgical procedures performed in 2004. The is number is estimated to reach more than 38 million by 2012. From the most recent available data from the National Nosocomial Infections Surveillance (NNIS), there were 274,100 surgical site infections (SSI) in the US in2002, roughly 2 infections per 100 procedures. Surgical site infections cause significant morbidity for patients and are costly for hospitals, thus making prevention an important topic. Preoperative techniques include proper scrubbing of hands prior to surgery and appropriate patient selection as well as patient preparation prior to surgery. Intraoperative techniques include proper sterile procedure with avoidance of unnecessary tissue destruction along with optimizing the operating room environment to decrease the chance of infection by monitoring patient aspects such as temperature and the sterile environment. Postoperative patient careis important to maintain the integrity of the surgical wound. The use of perioperative antibiotics should only be seen as an adjunct to careful technique and proper procedure [2].

The hazards of Antibiotic Overuse

The overuse and misuse of antibiotics has been linked to organism resistance that leaves physicians with limited tools to use against these bacteria. Complications such as ventilator associated pneumonia (VAP), candidal infections, catheter-associated infections such as urinary tract infections and central line infections, and clostridium difficile colitis have been linked with antibiotic overuse as well. Increased surgical site infections occur more often when associated with older age, poor nutrition, obesity, smoking, diabetes, immunosuppression, preoperative hospital stay, and colonization coexistent with infection, thus each patient should be reviewed on acase by case basis for prophylaxis.

Antimicrobial resistance (AMR) is recognized asone of the greatest threats to human health worldwide. Just one organism, methicillin-resistant Staphylococcus aureus (MRSA), kills more Americans every year than emphysema, HIV/ AIDS, Parkinson's disease and homicide combined [Infectious Diseases Society of America *et al*. 2011 [31]]. Globally, 3.7% of new cases and 20% of previously treated cases of tuberculosis are estimated to be caused by strains that are resistant to isoniazid and rifampicin. Infection with antibiotic-resistant bacteria maycause severe illness, increased mortality rates, and an increased risk of complications and admission to hospital [Kollef, 2008 [32]; Paul *et al*. 2010 [33]; Livermore, 2012 [34]]. According to the European Centre for Disease Prevention and Control, 25,000 people in Europe die each year as a direct result of resistant infection [European Centre for Disease Prevention and Control, 2011 [35]]. Most of these adverse effects are mild, but some life-threatening adverse effects have been reported, such as hepatotoxicity due to amoxicillin and clavulanate [Chang and Schiano, 2007] [21]. Antibiotic overprescribing has been shown to increase patient re-attendance as it medicalizes conditions, which are self-limiting [Little *et al*. 1997 [36]]

Table 1: According to C Llor and L Bjerrum [3]

Risks that have been shown to be associated with overuse of antibiotics.
• Increase of antimicrobial resistance
• Increase of more severe diseases
• Increase of the length of disease
• Increase of the risk of complications
• Increase of the mortality rate
• Increase of healthcare costs
• Increase of the risk of adverse effects, some being life-threatening
• Increase of re-attendance due to infectious diseases
• Increased medicalization of self-limiting infectious conditions

Prevention

Enforcement of governmental laws prohibiting over-the-counter sale of antibiotics

Self-medication with antibiotics is common in many parts of the world. In several countries, antibiotics are sold, illegally, without a prescription [Morgan *et al*. 2011 [37]]. This is particularly common in many countries in Asia, Africa, South and Central America, and even in Southern European countries, such as Italy, Spain, Greece and Malta [Borg and Sciclunca, 2002; Väänänen *et al*. 2006 [38]; Carrasco-Garrido *et al*. 2008[19]; Plachouras *et al*. 2010 [39]]. In some countries, antibiotics are also available on the free market, i.e. outside pharmacies. Law enforcement to prohibit the illegal over the-counter sale of antibiotics at pharmacies and the sale of antibiotics for humans and animals on the free market should be promoted worldwide [3]

Antimicrobial stewardship programmes, campaigns and audits

In many countries, there have been educational campaigns that aim to change healthcare professional and patient behaviour in antibiotic consumption. Interventions include the publication of guidelines, educational sessions on appropriate prescribing of antibiotics, educational sessions on the diagnosis and management of infectious diseases, review of prescribing data for practices, local interviews by pharmacists, messages included on TV, radio and other mass media, etc. Although the effects of these public campaigns and primary-care projects are positive, they are not sufficient to reduce the problem of AMR. In Sweden, the Strategic Programme for the Rational Use of Antimicrobial Agents (STRAMA) and Surveillance of Resistance antimicrobial stewardship initiative reported a reduction in antibiotic use and lowered AMR rates over 10 years, without measurable negative consequences [Mölstad *et al*. 2008] [3].

Promoting the use of valid point-of-care tests

If you visit a primary-care consultation in a Scandinavian country and compare it with a similar consultation in a Southern European country, you soon realize that the most important difference is the number of diagnostic tools available in Scandinavia. GPs in Northern countries usually

use rapid antigen detection testing for the diagnosis of streptococcal pharyngitis, C-reactive protein (CRP) devices for ruling out serious respiratory tract infections, equipment capable of determining the number and type of leukocytes and agar plates for urine culture and susceptibility testing of bacteria (e.g. Flexicult plates, Petri plates that give clinicians knowledge about the bacterial aetiology of a urinary tract infection and the susceptibility pattern of the involved microorganisms in less than 24 hours).

The utilization of rapid antigen-detection tests or Strep A has been associated with a lower prescribing of antibiotics for patients with sore throat. McIsaac and colleagues reported a 45% reduction in antibiotic prescribing in adults using rapid tests compared with empirical treatment [McIsaac *et al*. 2004 [40]]. Worrall and colleagues reported a proportion of antibiotic prescribing of 58% among physicians who did not use these rapid tests and 27% among those who did use this rapid test [Worrall *et al*. 2007] [3].

Promoting delayed prescribing of antibiotics

Delayed antibiotic prescribing means that the prescriber delivers an antibiotic prescription, but recommends the patient not to redeem it the same day. The prescription should only be redeemed if the patient feels worse within a few days. If symptoms reduce spontaneously, the prescription should be discarded. Delayed antibiotic prescribing is a widespread practice in the UK and its use is enforced by national guidelines [National Institute for Health and Clinical Excellence, 2008 [41]], but it has been difficult to implement in other countries. However, recent evidence from Norway also indicates that delayed prescribing may lead to a reduction in antibiotic use, mainly for sinusitis and otitis media [Høye *et al*. 2013 [42]].

Table 2: According to C Llor and L Bjerrum [3]

Communication tips that can help with patients with self-limiting respiratory tract infections
Discuss with the patient that antibiotics do not significantly reduce the duration of symptoms of self-limiting respiratory tract infections and that they may cause adverse effects and lead to antibiotic resistance.
Back up the information provided with a leaflet or brochure given to the patient highlighting the most important information. Set realistic expectations for symptom duration, including the average total duration of symptoms (after seeing the doctor): 4 days for acute otitis media, 1 week for acute sore throat, 1½ weeks for common cold, 2½ weeks for acute rhinosinusitis and 3 weeks for acute cough/bronchitis.
Define the diagnosis as a viral respiratory infection, chest cold, or sore throat instead of using the medical terms ‘acute bronchitis’ and ‘acute tonsillitis’. Clearly explain the red-flag symptoms patients should know about infectious diseases.
Consider delayed prescription of antibiotics in those situations in which an aetiology cannot be clearly established. Consider the use of rapid tests in cases of doubt, such as C-reactive protein rapid testing or rapid antigen detection tests, and discuss the results with the patient.

Discussion

In addition to the achievement of the expected operative result, the prevention of complications is the most important cofactor for surgical success. The oral cavity is defined as a clean-contaminated site. Whereas many authors support antibiotic prophylaxis even for otherwise healthy patients, many other reviewers perceive no evidence for its use, for example, in teeth extractions, even though these are one of the most frequently performed operations in the head and neck region. As implants have become increasingly important for replacing missing teeth, several studies deal with the effect of antibiotics on wound infection and early implant failure. For maxillofacial trauma, especially mandible fractures, many randomized and retrospective studies have beenperformed to evaluate the effect of antibiotic prophylaxisto minimize SSI. Unfortunately, important information islacking concerning the type, duration, dosage, and route of administration of the applied antibiotic agent and the time between injury and definite treatment. However, the wide spread use of antibiotics in the treatment of closed fractures of the central midface and the ascending ramus of the mandible is declining; in contrast to the recommendations given during previous decades, the tendency nowadays is to support the use of antibiotic prophylaxis in orthognathic surgery.

Conclusion

The use of the strategies discussed in this paper will help GPs to reduce prescribing of antibiotics. Our duty is to prescribe antibiotics only when they are necessary, i.e. in less than 20% of the infectious seen in primary care. Evidence exists for the beneficial use of antibiotics in tympanostomy, orthognathic surgery, and operative tooth extractions. The Systematic review does not allow broad conclusions on the use of prophylactic antibiotics in clean or clean-contaminated head and neck surgery.

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