

The Role of a Pharmacist in Dental Care Services.

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This article brings to surface the existing but underutilised interrelationship of pharmacists and dentists. The apparent gap between these two professions is thought to be due to partial ignorance of each other's scope, ability and duties. The scope of the services of both pharmacists and dentists are thus discussed, and areas in dentistry where a pharmacist could be utilised are identified. Appreciation of these scopes by both parties is expected to enhance the practice of their respective professions for the betterment of patients and the community. Finally, there is a need to include the formulae of drug preparations pertinent or salient to dentistry, in hospital formularies.

Key words: Pharmacy practice, Dental pharmacotherapy, Compounding, Drug Information.

Introduction.

It is a rare occasion for a dentist or a dental surgeon to consult a pharmacist on a profession basis. When this happens, it is probably to do with availability or cost of drugs. How many dental clinics have services of a pharmacist? Probably none! Our hospital formularies do not include preparations salient to dentistry. The reasons for the above observations might be due to a partial ignorance of the scopes of each other's profession. The objectives of this article are to bring to the attention of these professions the abilities of each other, and to identify areas where a dentist could utilise the services of a pharmacist to ease, facilitate and improve his/her dental care services.

Scope of A Pharmacist.

Pharmacists have traditionally been regarded as drug compounders and dispensers. Technically, in addition to compounding and dispensing, pharmacists are entrusted with participation in drug selection and utilization, the proper and safe storage of drugs and medical devices and maintenance of proper records (1). Other activities pertinent to pharmacy practice include provision of drug information as regards therapeutic use, values and hazards and patient counseling on use and misuse of drugs (2).

Whereas the physicians, dentists and veterinarians are interested in the effects of drugs they prescribe, the pharmacist has a legal and professional responsibility to handle the drugs in terms of procurement, distribution, supply and use.

The practice of pharmacy is subdivided in various specialities. Community pharmacists, the category that serves in pharmaceutical shops or drug stores constitute the majority (about 70%) (3). Others include hospital, wholesale and industrial pharmacists. There are other pharmacists who are engaged in government services (policy making and licensing), education, drug

information, journalism and organizational management.

The increase in population coupled with a greater utilization of available health facilities, make the need for pharmacists greater than ever before, because of their involvement in assuring better and safer use of drugs (4). The expansion of the knowledge on disease and their pathophysiology and improved technology in therapeutic management calls for specialization of medical personnel, pharmacists included, in various anatomical organs. There now exist clinical pharmacists specializing in cardiology, gastroenterology, respiratory systems and hormonal disorders.

Dental Practice in Tanzania and probably in many parts of the world is yet to realize the potential that a pharmacist has in store that may contribute to more successful dental and oral health care. The pharmacist being a valuable resource of current, accurate drug information, an expert in prescription services, pharmacotherapy and compounding technique is an asset to dentistry if properly utilized.

Scope of a Dentist.**Diseases and surgical interventions applicable in dentistry.**

To a lay person, a dentist is a person who removes teeth and constructs dentures for teeth replacement. But a dentist is much more than that. Dentistry is concerned with the health of the mouth, head and neck (1). A dentist is responsible for diagnosis, treatment, care and management of diseases afflicting these anatomical parts. Malformations of oral and jaw structures, effects of chronic and genetic disorders and surgical procedures such as correction of cleft lip and palate also fall in the scope of dentistry. There are many systemic diseases and side effects of drugs that are manifested by oral symptoms. Referred pains of the jaw associated with angina, oral fungal infections from long term antibiotic therapy or gingival

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hyperplasia due to use of anti-convulsants exemplify such manifestation. Symptoms of numerous systemic diseases are observable in the mouth prior to their appearance elsewhere in the body. Examples in this regard include the pallour of the gingival in anaemia, the pigmentation of oral mucosal tissues in Addison's disease, glossitis in vitamin B deficiency and gingival enlargements in acute leukaemia. Table 1 shows a list of some of the local and systemic diseases respectively which a dentist may be called upon to manage or treat. A comprehensive list of diseases and operations pertaining to dentistry is available elsewhere (5,6). Not only should the dentist be thoroughly familiar with such diseases but also the drugs used to control them, whether supportive, protective, symptomatic or curative. The side effects and adverse reactions of such drugs are paramount as well.

Dentistry being a wide field has specialties as well. Thus a dentist may specialize in restorative dentistry, prosthodontics, endodontics, periodontics, pedodontics or orthodontics. Others may major in oral pathology, oral surgery or public health dentistry. The definitions and description of these specialties are explained in Alvin et al.(7).

The mutual relationship between pharmacy and dentistry for can only exist if both professions understand each other's expertise. In summary, dentistry is a profession that deals with diagnosis and treatment of diseases affecting the tissues of the mouth and jaws. Pharmacy on the other hand embraces all aspects pertaining to drugs from their preparation, manufacture, distribution, storage and use. A dentist can, for instance, call upon a pharmacist for a preparation of specific requirements, ingredients, consistency and other physical characteristics that is otherwise unavailable on the market. Pharmacists may also be of service in matters pertaining to dental health of public. Such services include dissemination of information on values of fluoridation of public water supplies, fighting dental caries with dentifrices, oral hygienic measures in periodontal diseases and caries, and dental implications of halitosis. Pharmacists sell dentifrices, toothbrushes, water propellant mechanical devices, toothache drops and analgesics. Proper advice to the users of these substances, including the need to consult a dentist if necessary, can be given by the pharmacist.

Table 1: Some :Local and systemic diseases in Dentistry

Local Diseases

Acute Ulcerative gingivitis	Local infections (Actinomycosis, candidiasis, pulpal infections, focal infections, causes of bacteremia and septicemia, actinomycosis, pericoronitis etc)
Allergy	Osteoradionecrosis (due to X- or gamma rays)
Angular stomatitis	Periapical infections (Tooth abscess)
Chemical burns	Periodontal infection
Cysts	Periodontitis
Dental caries	Recurrent ulcerative stomatitis
Denture stomatitis	Sialoliths (salivary calculi)
Halitosis	Traumatic ulcers (canker sores)
Hyper- and hyposalivation	Tumors or neoplasms (malignant and benign)
Keratolitic diseases including	
Hyperkeratosis and leukoplakia	

Systemic Disturbances with Oral Manifestations

Allergy	Recurrent ulcerative stomatitis (systemic background)
Hypovitaminosis A, B, C, D, and K.	Herpes labialis
Tumors and neoplasms (including Kaposi's sarcoma)	Serum and infectious hepatitis
Hormonal aberrations (e.g. Addison's Disease, hyperparathyroidism,	Keratotic decease (hyperkeratosis, leukoplakia)
Hypo- and hyperthyroidism,	Toxic lesions (Bisthmuth, Gold etc)
Diabetes mellitus, Hyperpituitarism,	Osteoradionecrosis
Pregnancy gingivitis	Neurological disturbances (Parkinson's disease,
Dermatological diseases (erythema	Trigeminal neuralgia, Convulsive disorders etc.)
Multiforme, psoriasis, pemphigus,	Maxillary sinusitis
Systemic lupus erythromatosus	Tonsillitis
	Laryngitis
	Angular stomatitis (systemic background)

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Steven-Johnson syndrome etc	Denture stomatitis (systemic background)
Malnutrition deficiencies sprue, Avitaminosis, cystic fibrosis etc	Hypo- and hypersalivation
Haematologic disorders (leukemia, Polycythemia, anemia, Haemophilia)	Sialoliths
Infectious disease (syphilis, TB, Infectious mononucleosis)	Glossodynia
	Halitosis

Oral Disturbances Directly Related to Drugs

Dryness of the mouth related to intake of drugs, including major tranquilizers.
Fluorine intoxication (endemic or iatrogenically induced fluorosis of teeth).
Mucosal lesions following cancer chemotherapeutic agents.
Phenytoin hyperplasia.
Tetracycline discolouration of teeth.
Toxic lesions resulting from therapy with bismuth. Gold etc.

Systemic Diseases which may influence Dental care

Cardiovascular diseases	Gastrointestinal diseases
Rheumatic heart disease, sub- Acute bacterial endocarditis etc	Skin diseases
Respiratory tract disease	Neuromuscular disturbances
Urinary tract disease	Malignances
Central nervous system diseases	Serum and infectious hepatitis
Haematopoietic disturbances.	Pregnancy

Drugs, pharmacology and therapeutics in dentistry

The diseases of the mouth and jaws are treated by a number of drugs some of which are in a dental/oral specific formulae, but mostly are commonly used elsewhere (8,9). A dentist therefore must have the basis of pharmacology and therapeutics like all other medical specialties. Of particular interest in this aspect include the drugs pharmacological action, therapeutic indices and disposition kinetics. Adverse effects, allergic reactions and salivary excretion of drugs are of paramount concern. Antibiotics may affect the oral microbial flora, which in turn may, influence caries incidence, calculus formation or predispose to oral candidiasis. A dentist may prescribe drugs that may potentiate, antagonize or synergize drugs prescribed by other physicians or over-the-counter (OTC) drugs.

Analgesics, Anaesthetics and related drugs:

Pain is a common problem in dentistry (10,12). Cavitated teeth, abscessed teeth, poor fitting dentures, periodontal diseases or orthodontic appliances all cause pain. Phobia to dental treatment due to pain often leads to dental neglect with unpalatable consequences. It is therefore very important to minimize or prevent dental pain. There are a number of drugs employed in dentistry for this purpose. Anaesthetics (General and local), analgesics (non-steroidals, steroidals and opiates), anxiolytics, antidepressants and antipsychotic

drugs are widely used to relieve pain of one kind or other. Several formulae are available for liquids and pastes employed by the dental surgeon for the symptomatic relief of pain arising from postextraction alveolitis (dry socket). Examples include compound Acetylsalicylic acid paste and benzocaine - guaiacol solution both of which can be prepared extemporaneously in the pharmacy.

In addition to the drugs already mentioned, tranquilizers; sedatives and hypnotics are widely used in dentistry (11,12,13). They are important in reducing anxiety, lower reflex excitability, improve patient cooperation and facilitate post-operative sleep.

Antibiotics:

Infection is another problem that is frequently encountered in dentistry. Antibiotics are used routinely to control superficial infections of the skin, mucous membranes and bones either curatively or prophylactically. A dentist therefore must be able to choose rationally the proper antibiotic from an evergrowing array of available products in the pharmaceutical armamentarium. The use of broadspectrum antibiotics calls for a thorough knowledge in pharmacology. The pharmacist will furnish the dentist with up-to-date information regarding new products on the market, their costs, adverse reactions and complications.

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Antihistamines.

Antihistamines are commonly used in dentistry to control allergic reactions. A careful choice of an antihistamine, the mode of its use and whether beneficial or not may be best advised by a pharmacist. There now exists a wide choice of antihistamines, including those without drowsing effects such as astemizole.

Haemostatic agents.

Tooth manipulations are usually accompanied by bleeding. Deliberate attempts are employed to control bleeding episodes in dentistry. These include use of vasoconstrictors (e.g. adrenalin and vasopressin), pressure packing techniques, sutures and refrigerants. Haemostatic agents are commonly used in dental procedures. They include absorbable gelatin, carboxymethylcellulose, ferric chloride, collagen and thrombin. Furthermore dentists are called upon to treat patients already on anticoagulant therapy. Close collaboration with both physicians and pharmacists is paramount in this respect.

Vitamins:

Vitamin supplements are also used in dentistry as therapeutic agents in deficiencies or as diagnostics in non-specific clinical features.

The Role of a Pharmacist in Dental Therapeutics.

Pharmacists, being experts in all matters pertaining to drugs have a big role to play in the practice of dentistry. Considering the number of drugs in routine use in dentistry, there is a need of pertinent information on their rational use, rational choice, drug-interactions and adverse reactions. This information is best extractable from the drug information centres that are run by pharmacists. In the absence of such centres, the hospital pharmacist has most of the answers. Additionally the pharmacist will tell the drug availability, cost, new products and the best formulation.

Sweetening agents have been implicated in the formation of dental caries. Sucrose is a major culprit in this regard. Fructose and saccharin have also been implicated although to a lesser extent. Aspartame a relatively new sweetening agent is preferred in view of its negligible influence in caries formation. However it is considerably more costly compared to the conventional sweeteners. Pharmacists need to be aware of these facts, and must recognise the vast utilization of drugs requiring sweetening in dentistry.

Pharmacists should strive to look for alternative sweeteners not only in dental medications but all drugs.

Extemporaneous preparations in dentistry.

Many preparations used in dentistry can and are prepared by dental technicians in dental laboratories. However, the services of a pharmacist can be utilized to compliment, supplement or facilitate compounding of less readily available products for dental use. For instance a pharmacist may be called upon to prepare extemporaneously any formulation with required specifications, in a given consistency or dosage forms. It should be noted that the treatment of lesions of the oral mucous membranes (e.g. chronic marginal gingivitis, keratosis, desquamative stomatitis or drug eruptions), is faced with difficulty to maintain topical medication long enough at the site of application. For this purpose, a pharmacist may use an adhesive vehicle protectant, orabase. This base is composed of gelatin gel and sodium carboxymethylcellulose in plastibase. It adheres tenaciously and remains in intimate contact with mucous membranes of the mouth and the gums, protecting the afflicted area in the mouth against further irritation from chewing, swallowing and other frictions. It has been shown to adhere to oral mucous sites up to two hours or longer, depending on the mobility of oral tissues, the "washing action" of saliva, the amount of vehicle applied and the size of the lesion. Denture adhesive powders have also been employed for the same purpose. They may be used to incorporate active ingredients and then applied by a spray insufflator. Properly manipulated, the spray dispenser allows access to every specific site of the oral cavity. Pharmaceutical consultative function in these groups of drugs cannot be overemphasized.

Preparations for dental plaque.

Dental plaque preparations may contain antibiotics, quaternary ammonium compounds, essential oils, enzymes and fluorides. Variation of the quality or quantity of the components in the formula may be called upon to fortify their strength.

Cavity liners, pulp cappings and varnishes.

In order to protect the pulp from acid containing dental cement during filling, cavity liners or varnishes are used. Several commercial preparations are available. They contain calcium hydroxide that neutralises the acid in dental cements. These can be prepared in the pharmacy at a lower cost. Likewise pulp capping (temporary cements) need not be ordered if the cost is high. Zinc oxide and eugenol or thymol cement are easily extemporaneously prepared

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Disinfectants.

Penetrating and non-penetrating instruments need to be sterilized or disinfected before use, to avoid infection. Among the common disinfectants for instruments include alcohol, isopropyl alcohol, formaldehyde, hydrogen peroxide, chlorhexidine and surface active agents. Prior to the insertion of a filling material in teeth, pulp capping, pulpotomy or endodontic procedures, tooth cavities must be disinfected. There are numerous antibacterial agents for use as antiseptics or disinfectants on the market and others are being "discovered". They may be available as topical solutions, paints or mouthwashes.

Disinfectants are also routinely used in endodontic therapy for irrigation of root canals. A 5% solution of sodium hypochlorite is one such preparation. A weaker solution (0.5%) is useful as denture cleaner. Chlorazodine, creasote and guaiacol also have cleansing activity.

Denture preparations, prophylactic pastes, mouthwashes and dentifrices.

Pharmacists are also able to prepare denture preparations, prophylactic pastes, dentifrices and mouthwashes, all being complimentary components for reduction of supragingival calculus. Denture preparations consist of suitably flavoured adherent powder (such as karaya gum, acacia and tragacanth), capable of swelling many times their original volume on addition of water. Prophylactic pastes are applied to teeth to remove stains and polish teeth. Dentifrices are substances used with a toothbrush for the purpose of cleaning the accessible surfaces of the teeth (13). They are made of abrasives and binders with appropriate flavours and humectants. They are available in form of pastes, powders, gels or slurries. Mouthwashes flush loose debris from the mouth and provide pleasant taste and smell to mask bad breath (halitosis) (14,15).

Reduction of supragingival calculus can be effected with dentifrices or mouthrinses containing tetrasodium or tetrapotassium pyrophosphate, disodium dihydrogen pyrophosphate or zinc oxide (13). Patented products available in this category include Colgate and Crest tartar control dentifrice/mouth rinse. Fluorides (sodium or stannous fluoride) are added to reduce dental caries. Formaldehyde solution, Zinc chloride, liquefied phenol, Strontium chloride and Potassium nitrate are added in dentifrices to prevent pain due to hypersensitivity to heat or cold. These agents are postulated to act by occluding dentine tubules, thus preventing stimuli from the oral cavity from irritating the dental nerve via the tubules. Sensodyne and

Denquel are examples of products used in hypersensitive teeth.

Other dental remedies of local application include artificial saliva and dental plaque preparations. Artificial saliva is useful as a mouth softener and oral lubricant in patients with salivary dysfunction. (xerostomia). These usually contain carboxymethylcellulose, sorbitol potassium chloride, sodium chloride, phosphates and a flocculating agent. Commercial preparations include Moi-Stir, Orex and salivant. However, if needed artificial saliva can be prepared on bench. Reference (16) is a rich source of formulae used in dentistry and is recommended to both pharmacist and dental technicians.

Pharmacists in community and hospital pharmacies.

Pharmacists working in hospitals (hospital pharmacists) and those working in pharmacy shops (community pharmacists) can make various preparations as mentioned above. Many community pharmacies have a "dental care corner" where products applicable in dentistry are displayed. Toothpastes, tooth brushes, mouthwashes and oral deodorants, denture and dental plaque preparations are but a few examples of such items. However, pharmacists may do a lot more than displaying and selling a few dental items. With a close collaboration between dentists and pharmacists, a more comprehensive list of dental medicine and appliances may be stocked in community pharmacies. A two-way communication between pharmacists and dentists is essential for the two professions to update each other on new drugs and formulations. Community and hospital pharmacists may be part of dental public health teams where they may participate in various public campaigns and education in oral and dental care. Encouraging oral hygiene, discouraging use of sucrose containing syrups and candies, and disseminating leaflets for various health campaigns (in dentistry and other medical fields) are part of patients' education amenable in both community and hospital pharmacies. Pharmacists have an advantage of being closer to patients than other health professionals because they are easily available and no consultation fee is necessary.

Pharmacists in research and pharmaceutical industries.

The need to have cheap and safe alternatives to sucrose, sorbitol and fructose sweeteners cannot be overemphasized. It is the duty of researchers in pharmaceutical technology, particularly in formulations to make available convenient products to the public. But for researchers, discoveries are usually

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based on problem identification to invent a new product or improve on the current one. With this in mind, dentists are advised to echo problems on dental therapeutics or formulations to respective researchers in universities or industries.

Conclusion

This discussion is a representation of but a small scope of the pharmacotherapy practised by a dental surgeon. Both the pharmacists and dentists are well conversant with the activities and preparations that have been mentioned. However the interdependence of the two professions may have not been apparent before this presentation. It is hoped that this paper will be an eye-opener to the dentist and the pharmacist. The dentist will be aware of the capability and potentials of a pharmacist in dental practice. The pharmacist on the other hand will appreciate his potential and the assistance he could deliver to the dental care practice. Last but not least, the formulae of the preparations commonly used in dental care should be included in the hospital formulary. However, for these professionals to work together effectively and profitably, a close and deliberate collaboration between them is a must.

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