

# Routes of drug administration



## **Routes of Drug Administration**

Every disease has a cure; every cure needs medicine and each medicine can be introduced to the body through different routes. There are various routes to administer the drug. The main role of any route is to deliver the drug to the target part of the body so it can give its therapeutic effect.

This essay includes the brief description and discussion of the advantages and disadvantages of major routes of drug administration; oral, vaginal, ocular, Parental and transdermal. These are dispensed according to the patient's age, sex and capability of taking their prescribed medicine. All these routes are made for the patient's convenience to restore their health. The main target of all these routes is to deliver the medicines to the site of action in the patient's body; thus helping the person alleviate symptoms or to heal their wound. However every route has different ways of affecting the target site, some take effect quickly and others are prolonging in treatment. This could be determined by analysing the drug concentration in blood plasma and by the rate at which the drug enters and exits from the body.

The first route for discussion is enteral route which is basically an oral method of taking medicine. This takes effect either through or within the intestines or the gastrointestinal tract. Possible ways of administering oral drugs are antibiotic tablets, syrups, chewable tablets. In each case, they should be dispensed according to the patient's ability to take in the drug. Tablets are recommended when it is not difficult for the patient to swallow. For instance a one year old is not capable of swallowing a tablet. Furthermore, there is a high chance of choking, which can cause death. This

can be likened to people who are suffering with chronic diseases and have a disability. They are unable to swallow due to a stroke or coma and are in critical conditions.

The implication is that in such situation the patient can be given syrup using a measuring spoon in order to give the right dosage. Therefore it will be practicable for them to take the medication. In the case of children chewable tablets can be provided. These tablets are sweet and children are prone to sweet flavouring agents, hence they are more likely to take the medicine. Some medication can be given in the form of powder to be spread on the food. Each packet is quantified correctly therefore there is nil error in dosage.

In general, the oral route is very common and widely used by practitioners. Most of the health care professionals prefer oral techniques as there are more advantages than disadvantages. As Helenbeck states that oral medications are 'Easy to use,.. medications are generally cheaper' [1]. Information about the drug paracetamol supports this comment. It is very cheap. Patients do not find it difficult to take and do not need any method or technique. These two factors contribute to why they are available all over the world. It is well known over the drug counter and is well known to many users. It does not necessitate sterile methods as the tablets will go through the gastrointestinal tract. If they have any microbes then it will be simply dealt with by the body's immune system. All the antibiotics and analgesics have good absorption through the gastrointestinal tract. Patients do not have to carefully quantify their dose as each tablet is solidly weighed exactly the

same either in milligrams or grams. This lowers the chance of the patient taking a high or incorrect dose.

The limitation in this route is when drugs going through the gastrointestinal tract do not affect the target rapidly. This is because they have to be absorbed by membranes first and then go to the liver via hepatic portal vein. When the drug finally arrives in the bloodstream it travels in the body to hit the active site. This process involves different stages once the drug is taken. Thus, it takes time. Medicines are dependent on the gastrointestinal system. For example, if the stomach is upset due to pH or the temperature imbalance then the absorption will be disturbed. Additionally, this reduces the bioavailability.

Conversely the Viginal route of taking medicine works through the viginal rugae. The rugae wall absorbs the drug in a form of cream to treat any yeast infections. It has specific elastic features which cause the viginal wall to expand . This enables intercourse and the placing of a viginal ring for birth control without it breaking. Menopausal atrophic vaginitis (viginal dryness) is another infection that is treated in the form of viginal rings. They have a small dose of oestrogen which dissolves and absorbs slowly through the wall. Douche instrument is used to clean the viginal areas for birth control and other infections.

According to Kurt Thomas ‘ Viginal drug administration is becoming an increasingly attractive option for the delivery of medication’ [2] This is because it is ideal for absorbing drugs and allows the insertion of the medicine without damaging the wall. This route also lessens the side effects

as compared to the tablets taken orally by mouth. It brings calm and soothing effects to the patients allowing patient relief from the symptoms. They only affect the vagina and do not cause unwanted symptoms moreover; they do not harm the vagina and are non-invasive.

The limitation is that only women can benefit from this route therefore dependent on sex. The application of gel and creams can be very messy . Sometimes it is inconvenient and/or uncomfortable for patients to apply. Consequently, they need to learn the method or technique to apply it correctly. Vaginal related pills affect the whole body causing side effects. The absorption of the medicine through the rugae wall is very slow so the drug affects the target site gradually in days. Some of the medical instruments used for treatment require health care professional. It is a result; the patient has to see their health care professional to change their medicine or washing their vagina with a douche.

Another route is transdermal. It is the way of delivering the drug through the skin to bloodstream; thus the drug delivery is reliant on the skin and membranes. It diffuses itself through the membranes into the blood circulation and finally to the targeted site. These stages have to happen in order to attain the full effect. Medicines in this route can be given in the form of creams, gels and patches.

In this route the patches for nitroglycerin (for angina) and gels for the treatment of hormone replacement therapy (HRT) are widely used. These patches work by attaching to the skin for an entire day or month. They are adhesive which makes them less likely to come off. A strong advantage of

this particular route is it does not cause any side effects. It is Non-invasive and works without breaking the skin. It is continuous and the effects are long lasting.

The drawback in this route is slow rate of up taking the medicine because the skin has low permeability to most drugs. This is due to that fact that only certain medicines can pass through the skin, not all drugs are permeable.

As like vaginal route the ocular route of taking medicine are directly applied into eyes. The way they work is via eyes conjunctiva. The conjunctiva is the clear tissue that protects the white part of the eye. It is usually associated with the most of the contagion. The medicine can be in the form of a gel or as an ointment. Ocular route is specific to the eyes causing fewer side effects in the body. Eyes absorb medicine at a rapid rate that is why it is effectiveness dependent on how chronic the disease is.

Eye drops are effective if it is taken accurately. Therefore, it requires the technique to place the drops in the eyes perfectly. As each drop that comes out must be precise dosage. Due to some disabilities patients sometimes require nurses to apply the eye drops. For example, old people with arthritis condition or mentally disabled. There is also a solid form of eye medicine but it is hard to insert and keep in place. This is why it is less likely to be used and prescribed by the doctors. A disadvantage is that liquid usually comes out so the precise amount of medicine is not received by the patient.

Gels and ointments can be messy and uncomfortable. They can trigger a side effect like blurry sight for few minutes and intolerant to light. Hands need to be rinsed and the medicine needs to be sterile as it is applied

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directly to the eye so if it is contaminated then it will aggravate the infection. As James C. Boylan mentioned in his article that ocular route was considered to be sterile in 1947 by the company name 'Alcon pharmacy were the first provider of sterile ophthalmic solution in 1947 non sterile ophthalmic solution was considered adulterated" [3].

Lastly Parental way of taking the medicine into the body is via injection into the vein or muscle. As R. Shulman said " The use of Injectable drugs is part of everyday practise in hospitals and increasingly so in the primary care."[4] The reason this route is very common in hospitals is because it provides a hundred percent drug delivery; as it runs directly in the bloodstream therefore it is effective quickly giving the patient relief in minutes. Patients only have this treatment when they tried all the other routes are in bad pain or when their life is in danger. This is because Diane S said that " Drugs given by IVP may be used for treating emergencies, such as cardiac arrest."[5]

Continuous intravenous infusion is one of the parental ways of giving medicine to the patient. It is given to the patient during surgery; it is effective in seconds and thus allowing quick result in the body. The theory behind the fast action of this drug is the dose is very concentrated and usually given in one or two millilitres. As suggested by Diane S. " They are ordered either in volume (ml) per hour or in strength as micrograms (mcg)." [5]

Intramuscular injections are used to deliver the drug through the muscle. For example medicines like antibiotics (diazepam) and vaccines (hepatitis B) are

given in small amounts. The reason it works really fast is because “ muscles have more blood vessels than subcutaneous tissues.”[5] Subcutaneous tissues are fat based under the skin. When the Subcutaneous injections are given the drug has to pass through the capillary wall and into bloodstream therefore the less the capillaries the slower the rate.

The reason of using this route not commonly because nurses and doctors have to be very careful what dosage they are giving to the patient according to their age and their health circumstances. There was a case in independent news that ‘ Wayne Jowett, 18, was recovering from leukaemia when Dr Freda Mulhem ordered an injection into his spine instead of a vein.’[6] This reflects that this route is very sensitive so extra care has to be taken as it directly circulates in the blood and cannot be removed once it is given. Training is required for the health care professionals in order to give the medication correctly because it is a complex procedure. The injection needs to be highly sterile so that bacteria or virus cannot reach places like the central nervous system and damage the entire system.

In summation the benefit and limitation of the five routes of drug administration depend on several factors that already have been outlined. They hinge upon how quickly it goes to the site of target whether it can be absorbed quickly especially in case of patches, absorbed by the bloodstream. The insertion of drug gives any negative effects on any other parts of the body. All routes of drug administration have one purpose to deliver the drug to the target part of the body.



**REFERENCES:**

[1] Palliative Care Perspectives, James L. Hallenbeck, M. D. Copyright © 2003 by Oxford University Press, Inc.

[2] [http://www.medscape.com/viewarticle/504375\\_6](http://www.medscape.com/viewarticle/504375_6) 2: 24am 22 march2009.

[3] Encyclopedia of pharmaceutical technology by James Swarbrick, James C. Boylan. 2nd edition, ISBN 0-8247-2822-X pg863.

[4] Injectable Drug Administration Guide by R. Shulman ISBN 0632-05027-6 Blackwell Science.

[5] Drug Therapy in nursing, Chapter 3, pg 34 and 35. 3RD Edition, Diane S. Aschenbrenner

[6] The Independent, Sep 24, 2003.

[7] [http://www.experiencefestival.com/a/Taking\\_Medicine/id/229443](http://www.experiencefestival.com/a/Taking_Medicine/id/229443) Date 23 -3-2009 time 11: 59.

[8] <http://www.drugdeliverytech.com/cgi-bin/articles.cgi?idArticle=128>.