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Medicine for Managers

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Medication Efficacy

We live in a wonderful pharmaceutical world with a panoply of extraordinary drugs to treat conditions that were completely untreatable only a generation ago. As a junior doctor fifty years ago there were a host of problems for which supportive care was all that we could offer. For example, it is amazing to remember when stomach ulcers were treated with antacids and milk drips. N ow wondrous ulcer healing drugs have transformed care.

In 2024-25, in England alone, the gross cost of medication was approaching ***22 billion pounds***, of which hospital prescribing was over eleven billion pounds.

The cost has been a veritable explosion! In 1950, for England and Wales, the cost of drugs was around ***forty-three million pounds***. The average price of commodities over that 75 years has risen by about forty-four times (so £100 in 1950 is equivalent to £4,407 in 2025), so the forty-three million pounds then would be about £1.89 billion now.

In other words, even allowing for inflation, the cost of medicines in England and Wales has increased by around ***11½ times***. That's science for you!

The standard measurement used by the pharmacologists to ensure that sufficient of the drug is retained in the body to be effective for an appropriate time is the ***half-life****.*

Since 1950, the pharmacological successes in healthcare have undergone what many believe is the golden age of advancement.

The treatments for existing disease have been refined and often replaced by new, effective, safe and targeted therapies. In the UK, life expectancy was around 66 in 1950 and is now about 82. By way of example, the numbers of patients dying in their fifties of ***heart disease*** has been estimated to have declined by about 75%.

This is the result of the introduction of drugs which have revolutionised the management of the risk factors for cardiac disability and death. The introduction of ***statins*** have transformed the management of raised cholesterol, a comprehensive range of

antihypertensive drugs have lowered raised blood pressure and have also influenced abnormalities of heart rhythm and heart failure.

A host of ***psychiatric medications*** have modernised and developed mental healthcare and the old mental 'institutions' have disappeared.

Drugs such as *chlorpromazine*, introduced in the 1950s, fundamentally changed the management of schizophrenia. Antidepressants and anxiolytics introduced between 1950 and now have made a major contribution to the huge cohort of depressed and anxious patients previously debilitated by their symptoms.

Thomas Sydenham (1624-89) said;

"We are overwhelmed with an infinite abundance of vaunted medicaments . . ."

A considerable number of drugs have been introduced for the treatment of innumerable ***cancers*** which were virtually untreatable in 1950.

Therapies targeted to specific forms of the disease and rapid advances in chemotherapy have been game changing for many types of the disease.

Transplantation of organs could not have proceeded so successfully without the development of the immunosuppressant drugs to prevent organ rejection. Indeed the first successful transplants were only carried out in the late 1950s. The first heart transplant was carried out by Donald Ross at the National Heart Hospital in 1968. Anti-rejection drugs were transformative for such surgery.

The huge advances in the control of ***infectious diseases*** should also not be minimised. The vaccines for such illnesses as polio, measles and tetanus are now routine in many areas of the world. Antibiotics for infectious bacterial diseases has progressed hugely from the early 1950s when really only penicillin and tetracycline were available. In the 1960s the first anti-viral drugs were introduced and have enabled diseases such as hepatitis and the HIV/AIDS outbreak to be managed and controlled.

Much of the success of all these drugs has been the result of the improvements in the drug delivery systems and the movement away from using just simple tablets to methods such as sustained and delayed-release capsules, which have not only improved compliance but achieved more steady state dosing.

Long-acting injectables have resulted in major improvements in some diseases and disorders where, previously, poor compliance defeated effective treatment.

Attention must be focused now on maximising the efficacy of the wondrous available drugs. In simple terms it matters with almost any drug when and how it is taken if its effects are to be optimised. Appropriate timing is often as important as the dose of the drug itself.

The standard measurement used by the pharmacologists to ensure that sufficient of the drug is retained in the body to be effective for

an appropriate time is the ***half-life***. The half-life is defined as the time required for the concentration or amount of the drug in the body to reduce by exactly 50%, as it is metabolised (broken down) and eliminated from the body. The half-life figure is used to determine dosing levels to ensure that drug concentrations remain sufficiently high to be effective.

For example, if a drug has a ***two-hour half life***, then 100 mg will fall to 50 mg after two hours, 25 mg in four hours and 12.5 mg in six hours.

Any drug is usually considered to have been eliminated after about five half-lives (because less than 3% of the drug remains in the body).

Dosing and timing of taking a drug is therefore important to ensure a sufficient concentration of the drug remains in the body. It is essential that drugs are taken by a patient ***as instructed*** by the prescriber.

The time of day of taking the drug is also very important. For example:

- Cholesterol lowering drugs are best taken at night because cholesterol production is highest at night
- Diuretic medicines are best taken in the morning because the frequent urination they generate would disturb sleep
- Antibiotics can be taken at any time of day. The important factor is to take them at the same time(s) each day to ensure consistency of dose.
- Antacids are advised to be taken away from other drugs because they can interfere with their absorption.
- Thyroxine is best taken on an empty stomach because food decreases its absorbtion.

Because medication therefore works well, not only at specific times of the day, but also in relation to food or activity, it is essential that the prescription makes clear the regime as well as the dose to obtain maximum efficacy and success.

We are blessed with so many wonderful medicines and, every day, modern pharmaceutical research generates new treatments for existing problems and therapy for diseases where there was previously no treatment. This feeling of plentiful medication is not new.

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Concern about chronicity of dosage was summed up by ***Napoleon Bonaparte (1769-1821)*** who said "Take a dose of medicine once and, in all probability, you will be obliged to take an additional hundred afterwards".

We must all, however, remember past experience and those drugs which failed to fulfil promise or which caused unforeseen harm. Perhaps the words of ***Samuel Stumpf (1918-98)*** should be borne in mind. "Some drugs are inappropriately called 'wonder drugs' inasmuch as one wonders what they will do next".

Balance in medication is important and perhaps we should also remember the Latin proverb "He who lives medically, lives miserably".

Keep well.

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