11. Tablet identification
12. general product information
13. Laws/policies/procedures, Cost, Foreign products
14. Pharmaceutics (compounding, formulations)
15. Pharmacokinetics (ADME/levels)
16. Nutrition support
17. Adverse effects
18. Poisoning, toxicology
19. Pregnancy, Teratogenicity
20. Lactation/ infant risks

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reign products

Drugs.com ← المعلومات اللي فيه عن الادوية وشي عن الامراض
Medscape زي ال .

- **Develop a time line for response**

- Completely understanding the scope of the "true" question also aids in developing a realistic estimate of the time required to compose a response.

- **Categorize the question**

- A vital step in the systematic approach
- Allows for efficient use of the resources by providing the foundation of a logical progression process
- An all-inclusive resource with data to answer every drug information question does not exist References contain specific types of information
- Numerous topic specific resources are available (e.g, drug interactions, infectious disease, internal medicine)

Categorize the question

شو الفائدة من ال Categorization ؟

- Classification of a request aids in developing a more effective search strategy ① تعرف وين تفرق عن جواب السؤال
- Selecting the resource with the highest probability of containing the desired information can decrease the time requirement and increase the accuracy of the response ② بيفيد في توظيف البيانات.
- Otherwise, unnecessary time and energy may be expended on searching references unable to produce the needed facts

- **In the previous example above, the amoxicillin request pertains to a dose.**
- Therefore, this question would be classified as Dose.

- **The following are examples of references that provide this information:** American Hospital Formulary Service (AHFS), Facts and Comparisons, and USP Drug Information (USPDI) for the Health Care Professional.

- **Textbooks specific for drug interactions:** Drug Interaction Facts and Hansten and Horn's Drug Interactions Analysis and Management

- Therefore, if the inquiry concerned the potential of concomitant administration of warfarin (Coumadin®) and aspirin to increase the International Normalized Ratio (INR), the question would be classified as a **Drug Interaction** and a logical starting point would be these two references.

4. Develop Strategy and Conduct Research

1) Select and prioritize resources based on the probability of locating the desired information.

- Without prioritization, resources may be used based on ease of access or degree of comfort instead of probable efficiency

2) Conduct a systematic search

- Be familiar with the three types of information sources in the literature hierarchy
- Begin with the established knowledge located within the tertiary literature (e.g., textbooks) due to the condensed, easy-to-use format of the information presented.
- Progress through the secondary literature (e.g., MEDLINE, International Pharmaceutical Abstracts [IPA]) to the primary literature (e.g., controlled clinical trails, letters to the editor).

Example

- Continuing with the dose of amoxicillin prior to dental procedures for bacterial endocarditis prophylaxis, the question was classified as a Dose question. Therefore, references most likely to contain the dose of amoxicillin (e.g., American Hospital Formulary Service [AHFS], Facts and Comparisons, and USP Drug Information [USPDI] for the Health Care Professional) were consulted first. However, after reviewing these references a discrepancy in the recommended dose was identified in the references. Two of the references reported the amoxicillin dose as 2 grams orally one hour prior to the dental procedure and the other reference reported the dose as 3 grams one hour prior to the procedure and 1.5 grams 6 hours after the first dose.

- Due to this discrepancy, internal medicine and infections disease textbooks were consulted; these texts further supported the dose of amoxicillin as 3 grams one hour prior to the procedure and 1.5 grams 6 hours after the first dose.
- To insure that the most up-to-date information was obtained, a secondary literature search was conducted (e.g., MEDLINE, Iowa Drug Information Service [IDIS], and International Pharmaceutical Abstracts [IPA]) and an article with updated guidelines for bacterial endocarditis prophylaxis was located.

في كثير سلايدات بيقول الدكتور مش حتيجي ما علق عليها ولا شرحها :(

- The new guidelines recommend amoxicillin 2 grams orally one hour prior to the dental procedure for bacterial endocarditis prophylaxis; a second dose is not required.
- As mentioned previously, if the question is classified as a Drug Interaction, then a logical and efficient search would begin with a text specific for drug interactions (e.g., Hansten and Horn's Drug Interactions Analysis and Management, Drug Interaction Facts and Comparisons).

ese texts

- If a text specific for drug interaction is not available, other references likely to contain the desired information (e.g., Drug Facts and Comparisons, American Hospital Formulary Service, Micromedex) should be selected as opposed to references with a decreased probability of containing the information (e.g., Drug Topics Red Book, American Drug Index)

amoxicillin

بعد فاعلن من وين بدك تدور على المعلومات؟ (يعني مثلاً لو حلل عن استخدام الـ amoxicillin في الـ staphylococcus ؟ هيك صرت بدك تروح على Guidlines حتى مجرد indications ...

5. Data Evaluation, Analysis, Synthesis

دقة السؤال بتخليك تبحث على دقة الجواب

Confirm information with other references to assure consistency between various resources While authors, editors, and publishers attempt to assure the reliability of the information published, most resources include a disclaimer statement since errors do occur occasionally

6. Formulate and Provide Response

- Restate the question and any pertinent background information
- This allows the requestor to be informed of the question and focused on the impending response
- Provide the information and recommendation (if applicable)

- In addition, a brief review of the search strategy and references reviewed may be included in the response as a confirmation to the comprehensive search conducted
- Compose the response at the requestor's comprehension level

7. Follow Up and Follow Through

- Verify the appropriateness, correctness, and completeness of a response.
- Essential when judgement calls used.
- Essential when new data found or circumstances changed from original request.
- Document everything!

Ethical and Moral Responsibility

- How will they use your information?
- Are they asking for lethal dose of drug?
- Are they suicidal or homicidal?
- Are they seeking information for making illicit drugs?
- Are they trying to forge a prescription?
- Are they in serious need of an ER?

- Methods of documentation (examples)

1. Paper form
2. Logbook
3. Computer database

- Reasons for documentations (examples)

1. Justification of pharmacist's professional value to the institution
2. Future reference for repetitive drug information requests
3. Protective measure against legal liability

- Methods of follow-up

1. Mail survey
2. Phone call
3. Written communication

- Reasons for follow-up

1. Provide the requestor with additional information that supports or changes a prior recommendation
2. Obtain feedback concerning the quality of the service

Example

- a prescriber inquires about the relationship between elevated homocysteine levels and coronary heart disease (CHD). Furthermore, the caller requests information concerning prescribing folic acid to decrease homocysteine levels. After following the modified systematic approach, evidence that documented a relationship between elevated homocysteine levels and CHD was located. In addition, preliminary therapeutic trial information supported daily supplementation of folic acid to lower homocysteine levels. A few weeks later, additional information that further established the efficacy of folic acid in lowering homocysteine levels was published. Follow-up should be provided to the prescriber due to the recent information affirming the prior response.

Case Study 2–3

INITIAL QUESTION

Are there any drug interactions between labetalol, clonidine, amlodipine, lorazepam, and minoxidil?

POTENTIAL RESPONSE IN THE ABSENCE OF RELEVANT BACKGROUND INFORMATION

An extensive search of tertiary[1,9-12] and secondary literature sources did not reveal any significant drug–drug interactions between labetalol, clonidine, amlodipine, lorazepam, and minoxidil. However, concomitant therapy with a β-adrenergic antagonist, an α-adrenergic antagonist, a calcium channel antagonist, and a peripheral vasodilator may increase the potential for additive hypotension.

PERTINENT BACKGROUND INFORMATION

The requestor is a physician who is caring for a patient with severe hypertension. The physician plans to add minoxidil to the antihypertensive regimen because the patient's morning blood pressure is not optimally controlled. He would like to make sure that there are no drug interactions between minoxidil and the patient's other medications.

PERTINENT PATIENT FACTORS

S.L. is a 40-year-old man with severe hypertension and renal insufficiency.

Past Medical History

- HIV infection × 5 years
- Hepatitis C × 8 years
- Hypertension × 4 years
- Renal dysfunction

Social History

- 1 to 2 pints of vodka daily × 12 years
- 1 pack per day (PPD) of cigarettes × 25 years
- History of intravenous drug abuse

Current Medications

- Labetalol 400 mg orally daily (@9 AM)
- Clonidine transdermal patch 0.3 mg/day
- Amlodipine 10 mg orally daily (@9 AM)
- Lorazepam 1 mg orally as needed for anxiety
- Multiple vitamin orally daily
- Ø complementary/alternative or other nonprescription medications

Allergies/Intolerances

- Lisinopril (angioedema)

Laboratory Results

- Sodium 136 mmol/L, potassium 4.7 mmol/L, chloride 102 mmol/L, CO_2 24 mmo creatinine 2.9 mg/dL, glucose 98 mg/dL, BUN 14 mg/dL
- Viral DNA <100 copies/mL
- Cluster designation 4 (CD4) count 900 cells/mm^3

Blood Pressure Measurements

4/15		4/16		4/17	
@6 AM	172/116	@6 AM	168/110	@6 AM	178/114
@noon	121/81	@noon	116/86	@noon	119/84
@8 PM	158/100	@8 PM	150/104	@8 PM	166/100

PERTINENT DISEASE FACTORS

It is not known whether patients with HIV infection respond differently to antihypertensive medications.

PERTINENT MEDICATION FACTORS

There are no primary or tertiary literature reports describing drug interactions between minoxidil and any of S.L.'s current medications.[4,9-12] A review of the patient's current antihypertensive medications suggests that the dose of each agent is appropriate for achieving adequate blood pressure control in the face of significant renal compromise.[13] However, the duration of action of labetalol is 8 to 12 hours, and this agent is typically dosed twice daily. S.L. is receiving 400 mg of labetalol daily at 9 AM.

ANALYSIS AND SYNTHESIS

S.L.'s blood pressure appears to be highest in the morning, just before the daily doses of labetalol and amlodipine are administered. He is receiving 400 mg of labetalol daily at 9 AM. Because the duration of action of labetalol is 8 to 12 hours, and the usual maintenance dose is 200 to 400 mg twice daily, the increase in blood pressure observed in the morning could be due, at least in part, to inappropriate dosing of labetalol. This medication should generally be administered twice daily to achieve maximal benefit. Adjustment of the labetalol dose should precede the addition of other antihypertensive agents to this patient's medication regimen. Although long-term cigarette smoking can increase the cardiovascular risk associated with hypertension, there is no indication that smoking or alcohol ingestion are contributing to this patient's present problem.

RESPONSE AND RECOMMENDATIONS

There do not appear to be any significant drug interactions between any of S.L.'s current medications and minoxidil.[4,9,12] Additionally, after considering the pharmacokinetics, pharmacodynamics, adverse effect profiles, and pharmaceutical properties of the patient's medications, the potential for a clinically significant drug interaction appears low. However, a review of the patient's current antihypertensive regimen suggests that the dosing of labetalol is inappropriate. The duration of action of labetalol is 8 to 12 hours, and the usual maintenance dose is 200 to 400 mg twice daily. Because S.L. is receiving 400 mg of labetalol once daily at 9 AM, the increase in blood pressure observed in the morning could be due to inappropriate labetalol dosing. The physician was directed to optimize labetalol therapy before the addition of another antihypertensive agent. If the patient's blood pressure is not controlled with proper dosing of labetalol and minoxidil therapy is required, the physician should be advised that minoxidil is usually administered with a diuretic to prevent fluid retention.

CASE MESSAGE

This is another example emphasizing the importance of the proper context of the question. In this case, the pharmacist was able to recommend appropriate drug therapy management, even though the initial question posed by the physician was not related to the dosage and administration of labetalol.