(Let Me Google that for You) and Other Approaches to Drug Information when Data are Scarce

Bassem Hamandi, RPh PhD

Presenter Disclosure

- Presenter's Name: Bassem Hamandi

- I have no current or past relationships with commercial entities

Learning Objectives

1. Briefly **summarize** the role of the drug information pharmacist, including examples of routinely encountered questions
2. **Describe** and **outline** the systematic approach to clinical questions when data are limited or absent
3. **List** and **discuss** notable resources utilized, including relevant clinical pearls and anecdotal experiences
4. **Apply** this systematic approach using a specific case-study example, explaining thought process and rationale during each step

Role of Drug Information Pharmacist

- Pharmacy & Therapeutics
- Maintaining a formulary/ managing drug shortages

- Support population-based medication practices
- Review clinical decision support tools

- Health outcome/comparative effectiveness analyses
- Review investigational drug submissions

Institutional Governance Support

- Provide drug information to staff
- Selection/purchase of pharmacy and institution-wide DI resources

- Maintaining DI/medication-use related intranet resources
- Prevent medication errors and adverse drug events

- DI education and training
- Research/QI projects

Staff/Patient-care Support

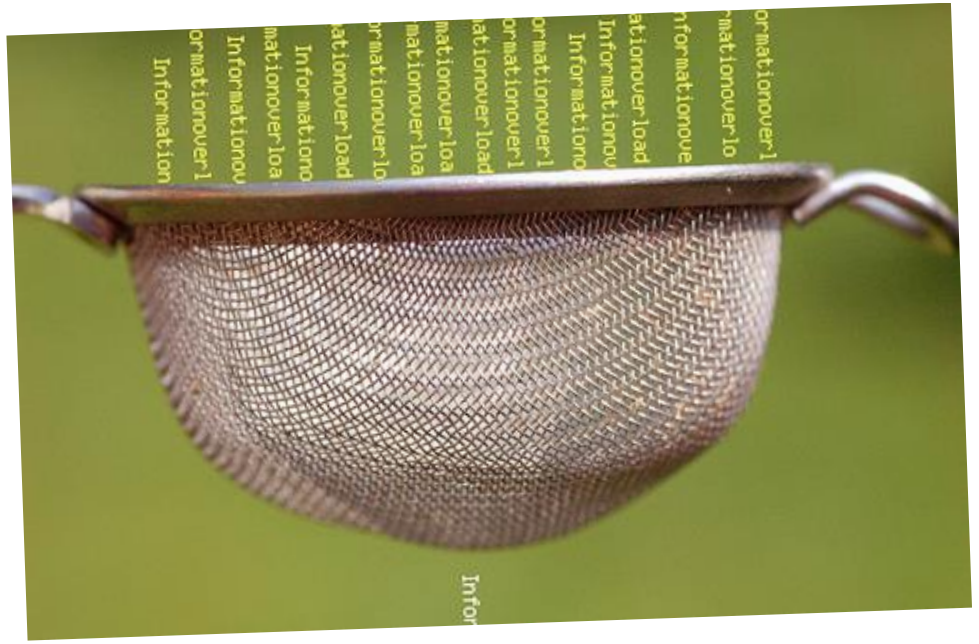
Mixed bag of questions

- What are therapeutic alternatives to hydralazine (drug shortage) for hypertensive urgency/ emergency or perioperative hypertension ?
- **Can you provide a summary of available literature on tocilizumab and AMR?**
- Are there any concerns in administering the shingles vaccine in a patient currently waiting for kidney transplant?
- Does a patient with an ileostomy need to take calcitriol with food?
- **Can we store Botox in pre-filled syringes and for how long?**
- Patient has Hepatitis C Virus and requires sofosbuvir for treatment. However, patient has failed the swallowing test. Can sofosbuvir be crushed?
- Should feeds be held and for how long when administering levothyroxine via enteral route?
- What is the stability of octreotide acetate injection if the refrigerator it was stored in went over 8°C and possibly below 2°C?
- What is the best diluent for Tazocin 0.75g, and is there any extended stability data following dilution?


Case Study
Voicemail message left on phone:
Can you let me know whether sofosbuvir can be crushed?

Poll 1: Do you agree that…

- I have a systematic approach to searching for drug information
    a) Agree
    b) Unsure
    c) Disagree



From
Instinctual
Haphazard
Incomplete
Reactive

To
Methodical
Comprehensive
Accurate
Proactive

Systematic approach to clinical questions

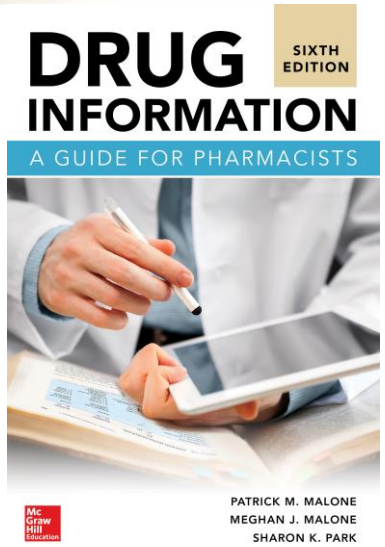
1. What is the actual question?
2. What do I need to know before I can appropriately answer the question?
3. How do I go about doing this efficiently and comprehensively?

Step 1
- Classification of the request

Step 2
- Obtaining background information

Step 3
- Systematic search

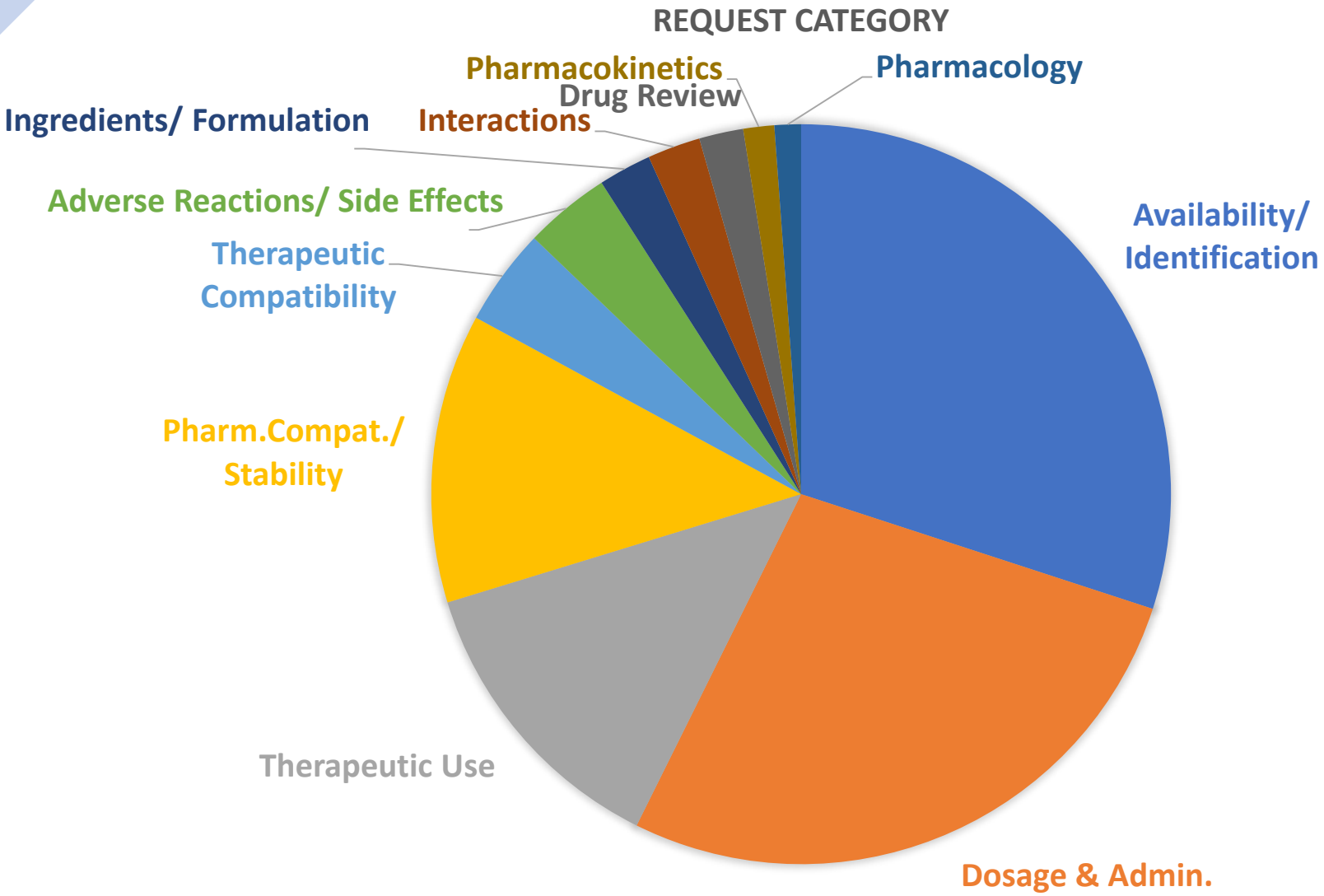
Step 4
- Response



Classify the request

Poll 2: Which category is the most requested?

a) Drug Availability/Identification
b) Dosage/Administration
c) Compatibility/Stability
d) ADR/Side Effects


REQUEST CATEGORY
Pharmacokinetics
Pharmacology
Drug Review
Ingredients/ Formulation
Interactions
Adverse Reactions/ Side Effects
Availability/ Identification
Therapeutic Compatibility
Pharm.Compat./ Stability
Therapeutic Use
Dosage & Admin.

Drug Information Categories

- Drug Availability/Identification
- Dosage/Administration
- Compatibility/Stability
- Ingredients/Formulation
- ADR/Side Effects

- Interaction
- Pharmacokinetics
- Pharmacology
- Therapeutic Compatibility
- Therapeutic Use
- Toxicity/Overdose

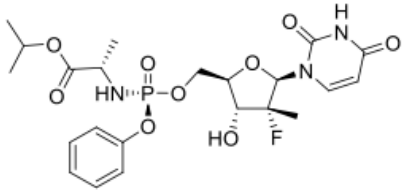
Case Study: First Look

- Sovaldi Canadian Product Monograph via HC DPD

PART II: SCIENTIFIC INFORMATION

13 PHARMACEUTICAL INFORMATION

Drug Substance

Proper name:	**sofosbuvir**
Chemical name:	(*S*)-Isopropyl 2-((*S*)-(((2*R*,3*R*,4*R*,5*R*)-5-(2,4-dioxo-3,4-dihydropyrimidin-1(2*H*)-yl)-4-fluoro-3-hydroxy-4-methyltetrahydrofuran-2-yl)methoxy)(phenoxy)phosphorylamino) propanoate
Molecular formula:	$C_{22}H_{29}FN_3O_9P$
Molecular mass:	529.45
Structural formula:	
Physicochemical properties:	Sofosbuvir is a white to off-white crystalline solid and is slightly soluble in water.

4.2 Recommended Dose and Dosage Adjustment

The recommended dose of SOVALDI is one 400 mg tablet, taken orally, once daily with or without food (see **10 CLINICAL PHARMACOLOGY**, **10.3 Pharmacokinetics**).

12 SPECIAL HANDLING INSTRUCTIONS

There are no special handling instructions.

Table 3. Dosage Forms, Strengths, Composition and Packaging

Route of Administration	Dosage Form / Strength/Composition	Non-medicinal Ingredients
Oral	Tablet 400 mg sofosbuvir	Colloidal silicon dioxide, croscarmellose sodium, magnesium stearate, mannitol, and microcrystalline cellulose. The tablets are film-coated with a coating material containing the following inactive ingredients: polyethylene glycol/macrogol, polyvinyl alcohol, talc, titanium dioxide, and yellow iron oxide.

- Why is the requestor asking for this information?

Step 1
- Classification of the request

Step 2
- Obtaining background information

Step 3
- Systematic search

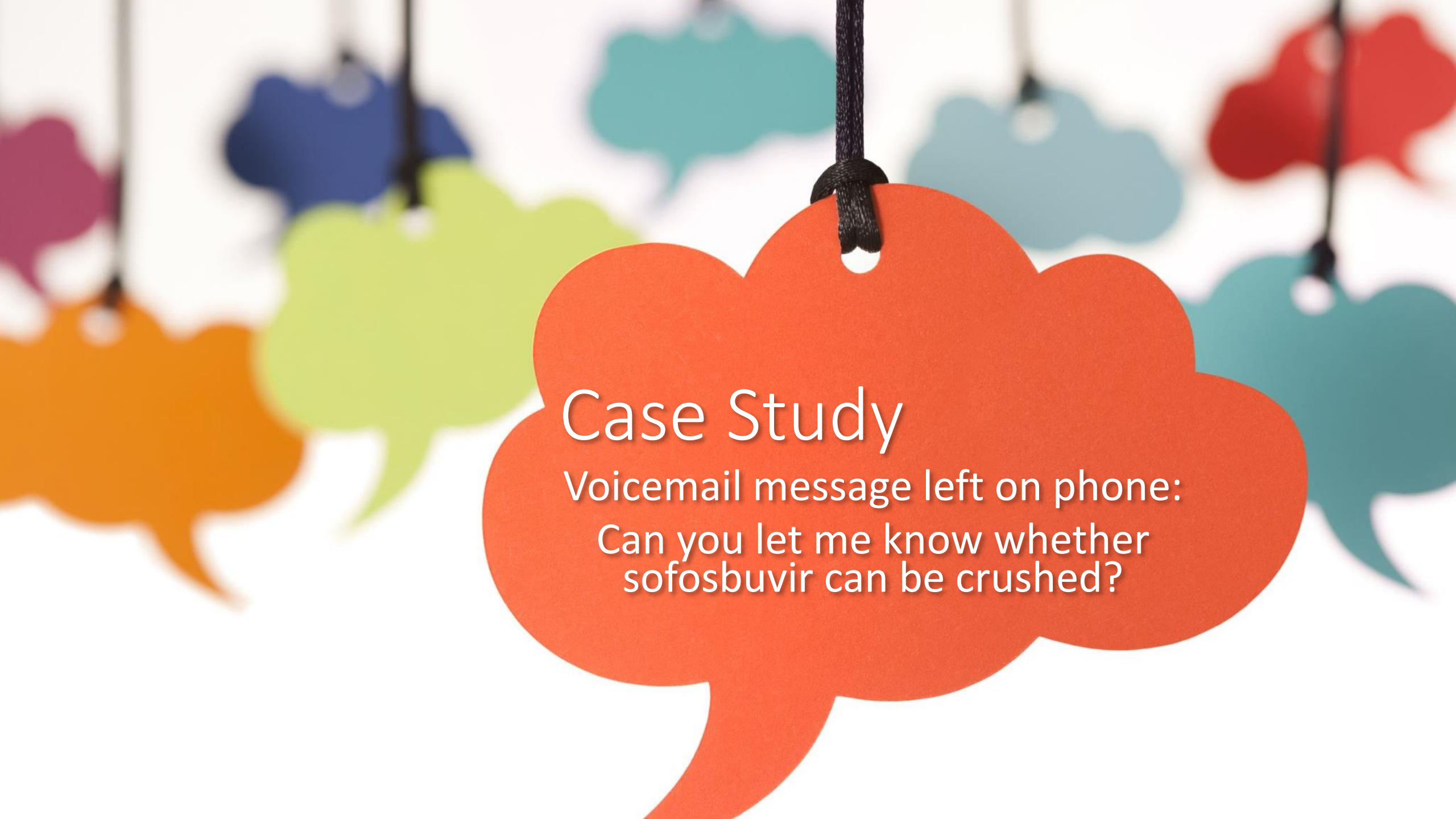
Step 4
- Response

Professional Affiliation

- Pharmacist (RPh)
- Physician (MD)
- Registered Nurse (RN)
- Respiratory Therapist (RT)
- Physiotherapist (PT)
- Occupational Therapist (OT)
- Patient

Background Information to Consider

- Patient-specific or academic
- Demographics of patient
- Allergies/intolerances
- Medical conditions
- Medication history
- Characterize nature of the reaction
- Contraindications
- Urgency
- Resources requestor has already consulted


Case Study
Voicemail message left on phone:
Can you let me know whether sofosbuvir can be crushed?

Case Study: Background Information

- Mr. T:
  - 55 y/o male
- HPI:
  - Recently developed dysphagia; dx: posterior pharyngeal ulceration
  - Percutaneous Endoscopic Gastrojejunostomy (PEG) tube inserted over w/e
- PMH:
  - GERD
  - Chronic Hepatitis C infection – currently well controlled on treatment
  - HCV viral load undetectable at week 6 (12-week course)
- Medications:
  - Famotidine 40 mg PO twice daily
  - Epclusa (sofosbuvir 400 mg/velpatasvir 100 mg) PO once daily

Poll 3: Which reference would be the most helpful for this case?

a) Epclusa product monograph
b) Google
c) Lexi-comp
d) ISMP

1. DO NOT SEARCH IN A HAPHAZARD WAY

2. DO NOT FOCUS ONLY ON ISOLATED DETAILS

3. DO NOT LIMIT YOUR SEARCH

Step 1

- Classification of the request

Step 2

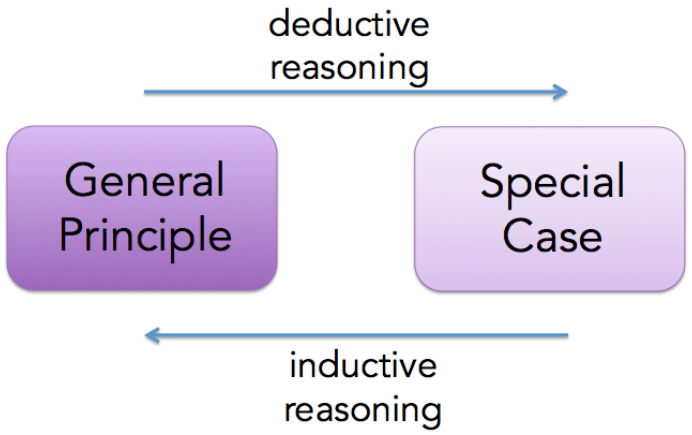
- Obtaining background information

Step 3

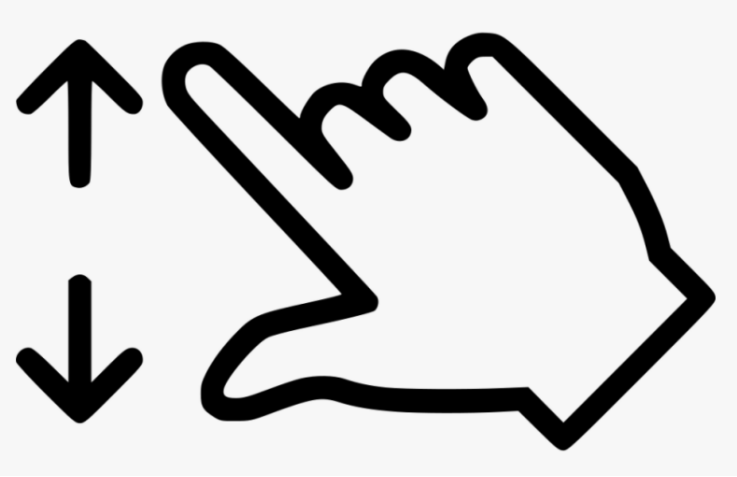
- Systematic search

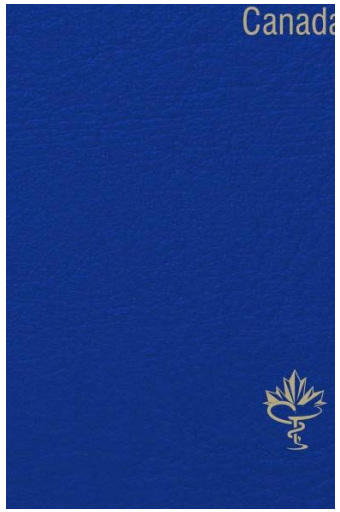
Step 4

- Response



Zoom-in Game

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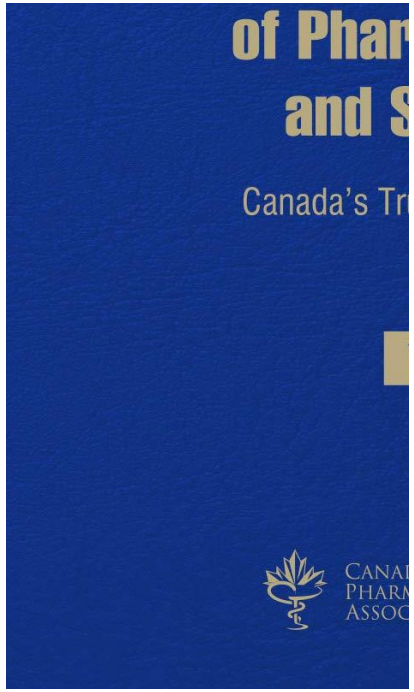
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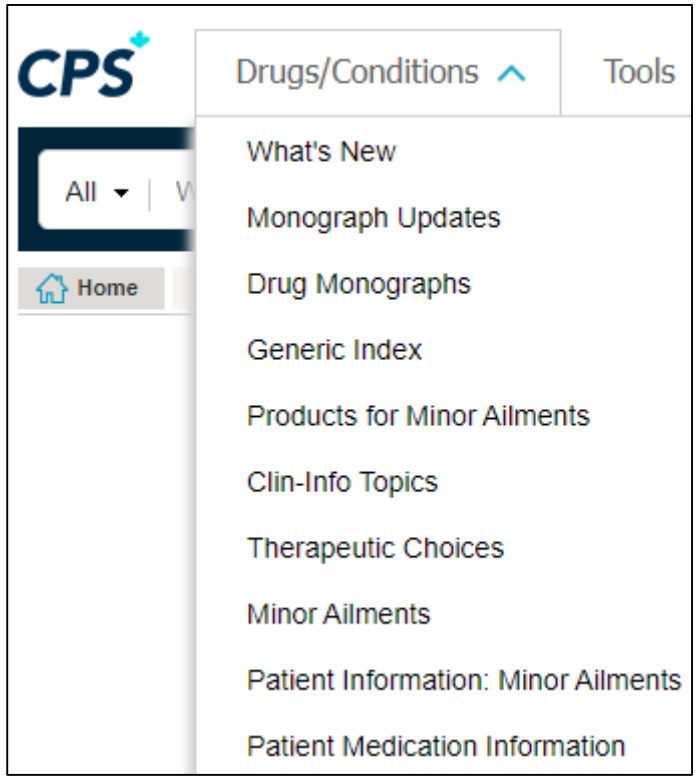
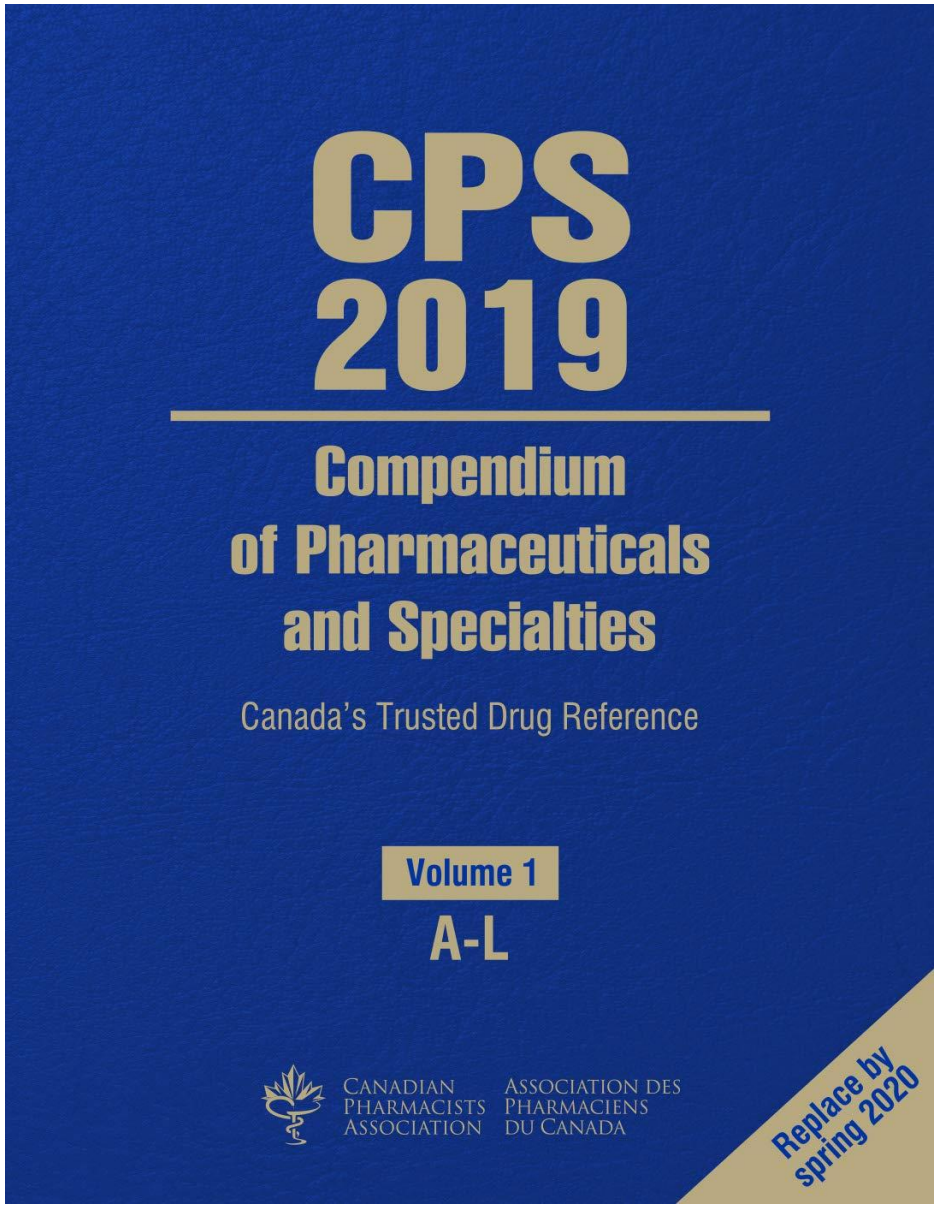
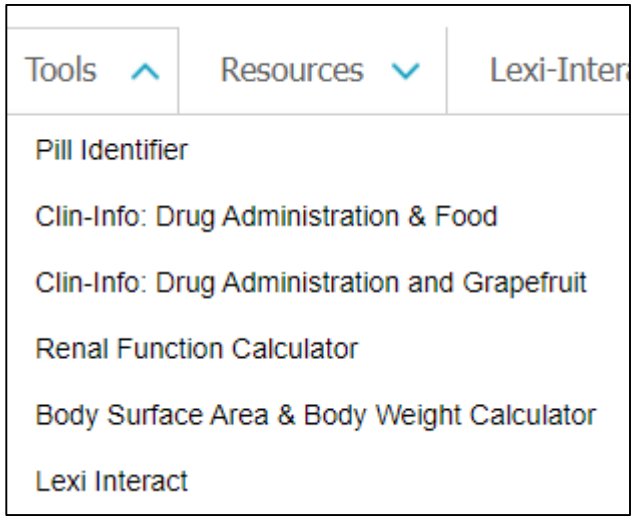
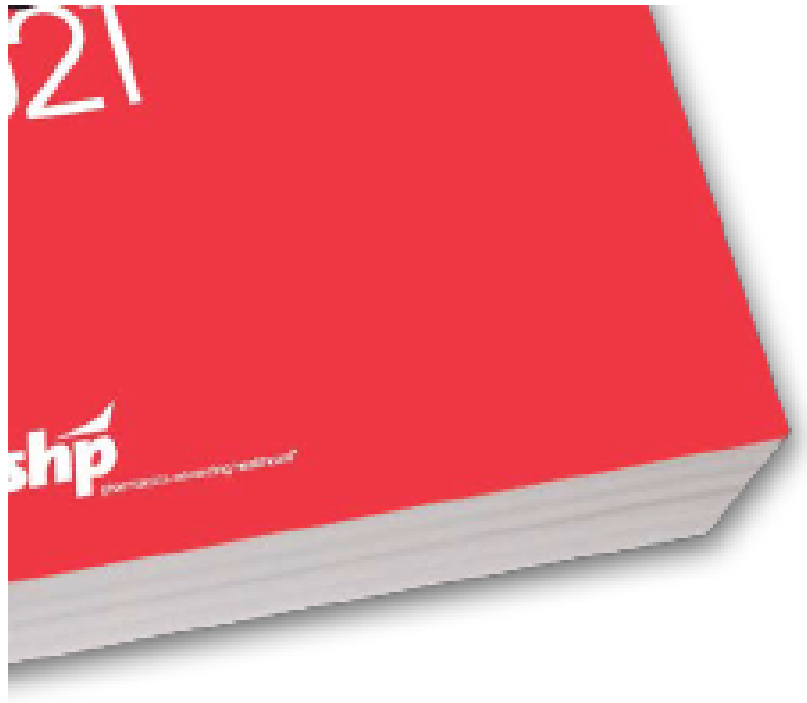
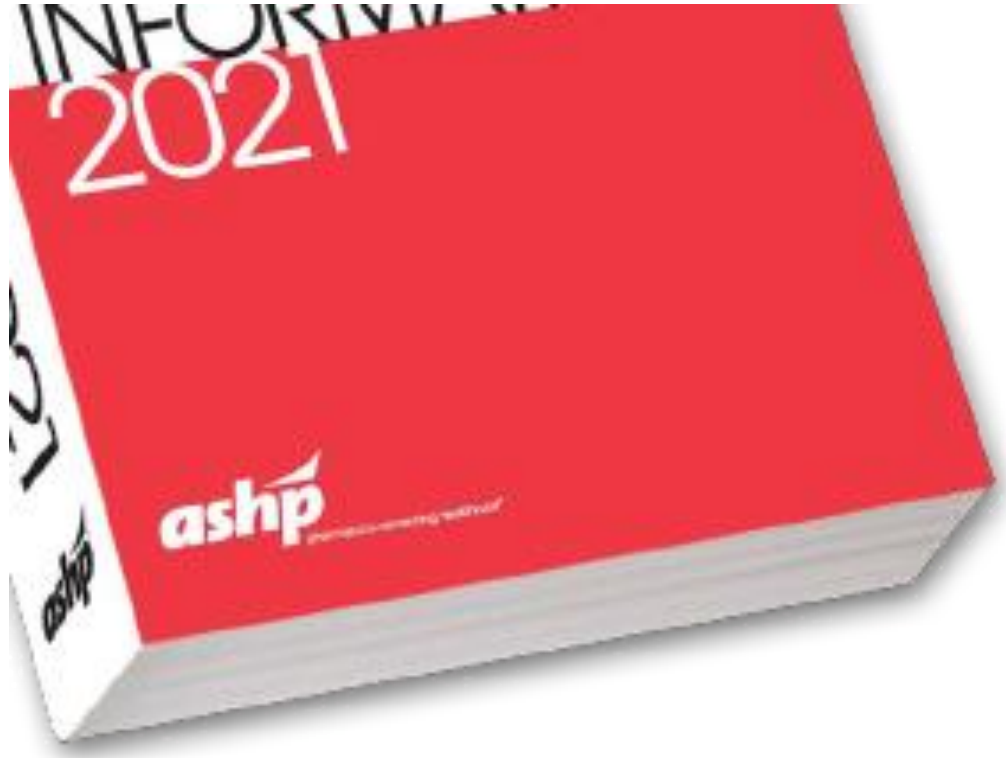

CPS
Drugs/Conditions
Tools
All
Home
What's New
Monograph Updates
Drug Monographs
Generic Index
Products for Minor Ailments
Clin-Info Topics
Therapeutic Choices
Minor Ailments
Patient Information: Minor Ailments
Patient Medication Information


CPS
2019
Compendium
of Pharmaceuticals
and Specialties
Canada's Trusted Drug Reference
Volume 1
A-L
Canadian Pharmacists Association
Association des Pharmaciens du Canada
Replace by spring 2020


Tools
Resources
Lexi-Inter
Pill Identifier
Clin-Info: Drug Administration & Food
Clin-Info: Drug Administration and Grapefruit
Renal Function Calculator
Body Surface Area & Body Weight Calculator
Lexi Interact


Resources
Lexi-Interact
CPS Notifications
Health Canada Advisories
Health Canada Reporting & Request Forms
Glossary of Medical Abbreviations
Glossary of Microorganism Abbreviations
Poison Control Centres
Manufacturer Directory
Health Organizations Directory
Public Drug Programs

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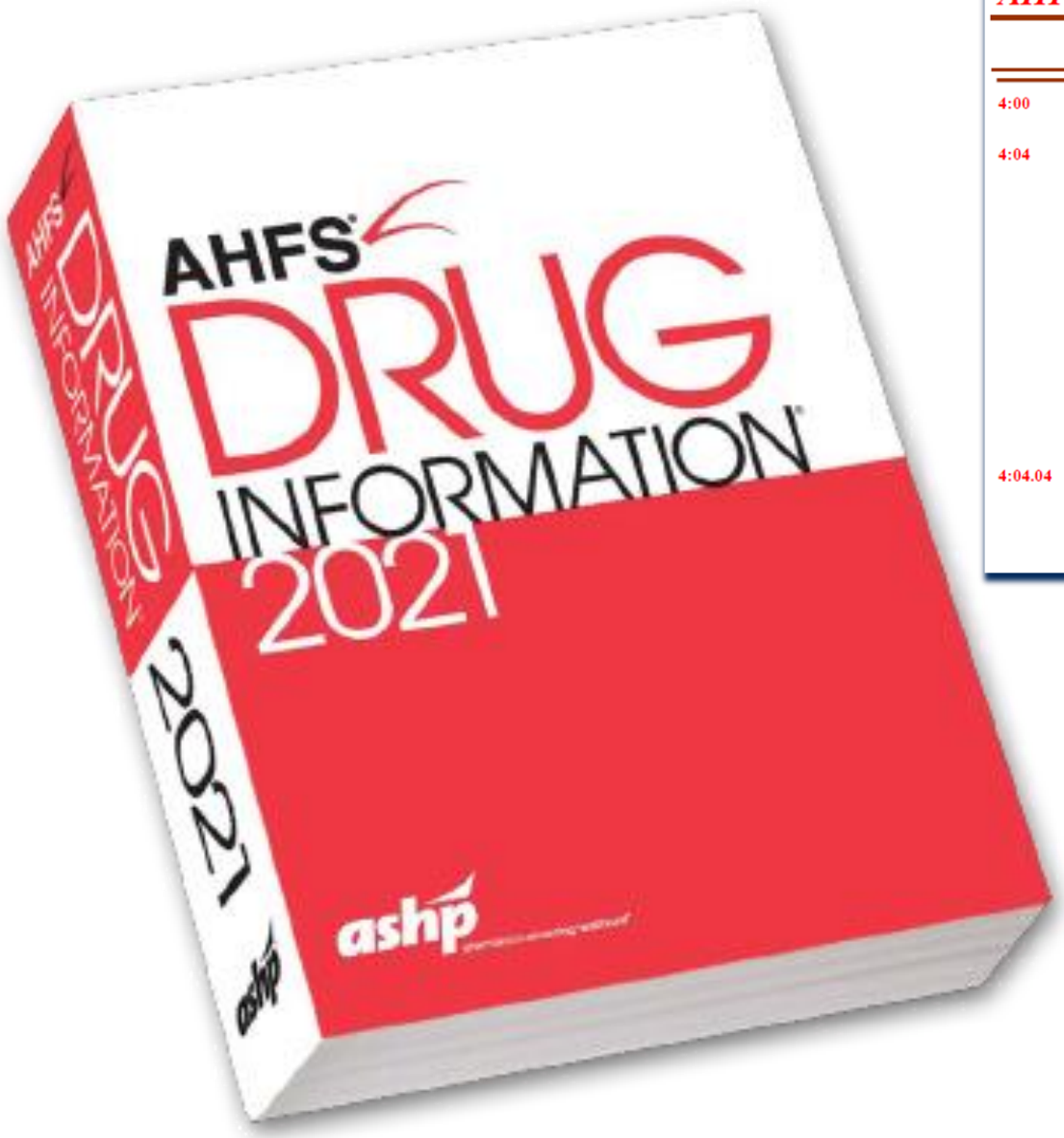


AHFS Pharmacologic-Therapeutic Classification System

AHFS DRUG INFORMATION

4:00	**Antihistamine Drugs**	
	Antihistamines General Statement (382920)	
4:04	**First Generation Antihistamines**	
	Brompheniramine (382545)	
	Carbinoxamine (382883)	
	Chlorpheniramine (382543)	
	Clemastine (382542)	
	Cyproheptadine (382541)	
	diphenhydrAMINE (382539)	
	Doxylamine (382537)	
	Promethazine (382752)	
	Pyrilamine (379200)	
	Tripelennamine (382534)	
	Triprolidine (382533)	
	dimenhyDRINATE (382140)	
	hydrOXYzine (382866)	
	Meclizine (382548)	
4:04.04	**Ethanolamine Derivatives**	
	Carbinoxamine (382883)	
	Clemastine (382542)	
	diphenhydrAMINE (382539)	
	Doxylamine (382537)	
	hydrOXYzine (382866)	
	Ketotifen (399018)	
	Nizatidine (394030)	
	Olopatadine (399006)	
	raNITIdine (384046)	
8:00	**Anti-infective Agents**	
8:08	**Anthelmintics**	
	Albendazole (397043)	
	Bithionol (379021	
	Diethylcarbamaz	
	Ivermectin (3040	
	Mebendazole (38	
	Moxidectin (3791	
	Praziquantel (384	
	Pyrantel (382820	
	Triclabendazole (	
8:12	**Antibacterials**	
8:12.02	**Aminoglycosides**	
	Amikacin (38266	
	Aminoglycosides	

AHFS Class: 8:14.08 — Azoles
VA Class: AM700

Voriconazole *(AHFS DI)*

Voriconazole
CAS Number: 137234-62-9
Chemical Name: (α*R*,β*S*)-α-(2,4,-difluorophenyl)-5-fluoro-β-methyl-α-(1*H*
Molecular Formula: $C_{16}H_{14}F_3N_5O$
Investigational Number: UT-15

Introduction

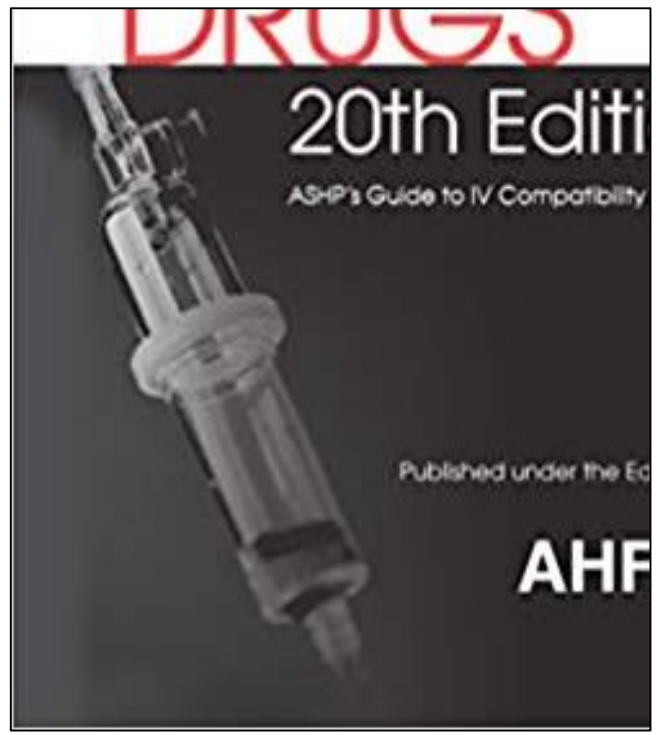
Voriconazole, a triazole antifungal agent, is a synthetic derivative of fluconazole.

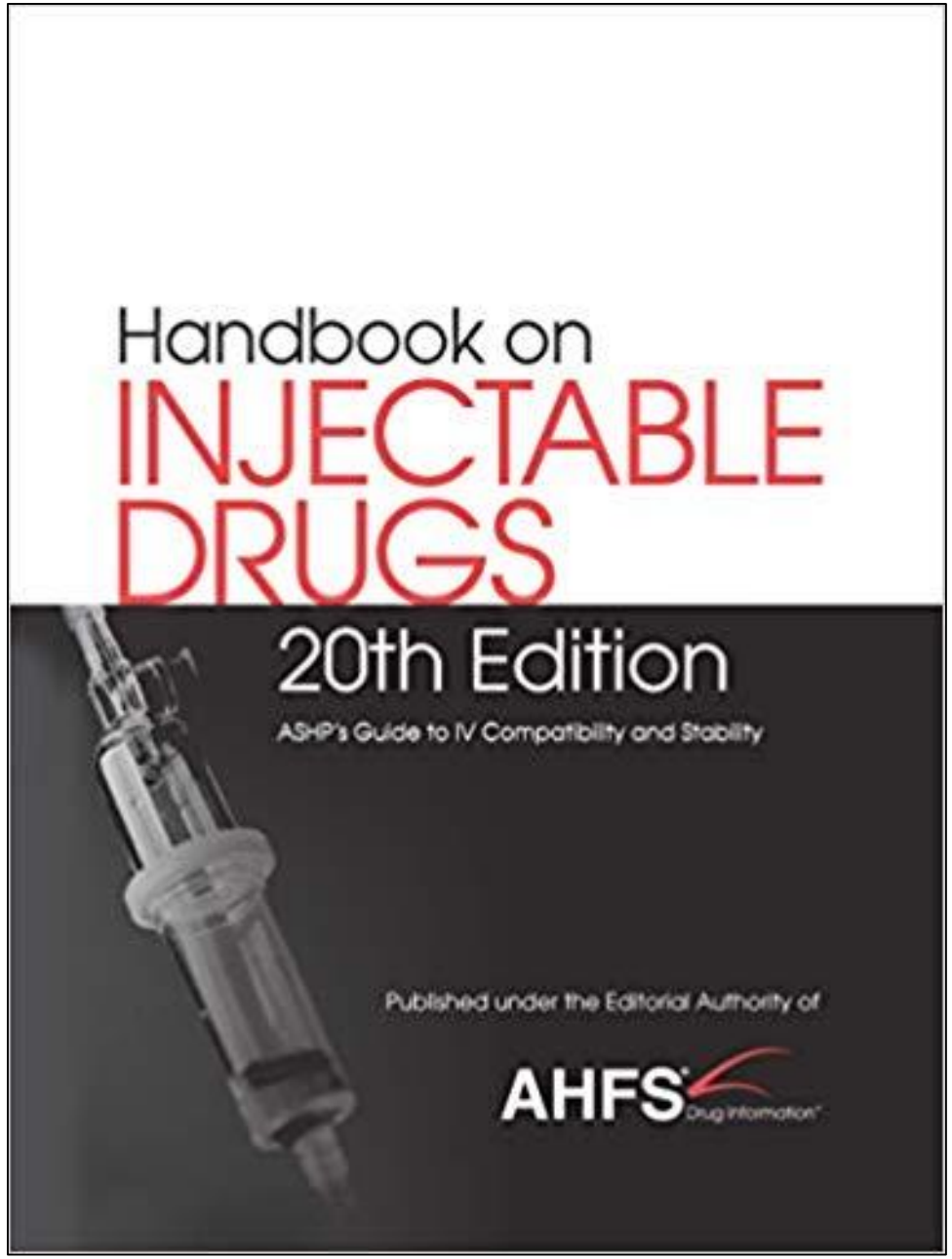
Uses

■ Aspergillosis

Voriconazole is used for the treatment of invasive aspergillosis.[1, 423, 436, 440, 441,
invasive aspergillosis, including treatment of invasive aspergillosis in patients int
majority of isolates were *Aspergillus fumigatus*.[1,


ASHP's G


DRUGS
20th Editi
ASHP's Guide to IV Compatibility
Published under the Ed
AHF



Sodium Content--

Omeprazole 40 mg provides sodium 2.6 mg.[115]

Trade Name(s)--

Losec, Mopral, Omeprazen

Administration--

Omeprazole is administered by intravenous infusion and intravenous injection. The drug must

After dilution of the omeprazole infusion to 100 mL with sodium chloride 0.9% or dextrose 5

a 20- to 30-minute intravenous infusion.[38 115]

After dilution with the accompanying special diluent, omeprazole injection is administered in

maximum rate of 4 mL/min.[38 115]

Stability--

Intact vials of omeprazole infusion and injection should be stored at room temperature not exc

Discoloration of the reconstituted solution may occur if reconstituted incorrectly. Dilution of ome

0.9% results in a solution that is stable for 12 hours[38 115] ; diluted in dextrose 5% omeprazole is

solutions must not be used for dilution of omeprazole infusion. Omeprazole injection reconstituted

is stable for four hours. Do not use the reconstituted solution if particles are present.[38 115]

Reconstituted omeprazole has been reported to develop an unacceptable discoloration indicat

room temperature exposed to light.[2507]

Compatibility Information--

Solution Compatibility--

Omeprazole

Test Soln Name	Test Soln Mfr	Base Drug Mfr	Base Drug Conc/L	Remarks	R
Dextrose 5%	BA	PH	400 mg	Physically compatible. 10% loss occurs in 2.5 days at 22°C in light	[38]
Sodium chloride 0.9%	BA	PH	400 mg	Physically compatible. 10% loss occurs in 8 days at 22°C in light	[38]

Y-Site Injection Compatibility (1:1 Mixture)--

Omeprazole

Test Drug	Test Drug Mfr	Test Drug Conc	Base Drug Mfr	Base Drug Conc	Remarks
Lorazepam	WY	0.33 mg/mL[3]	AST	4 mg/mL	Yellow discoloratio forms
Midazolam HCl	RC	5 mg/mL	AST	4 mg/mL	Brown color then precipitate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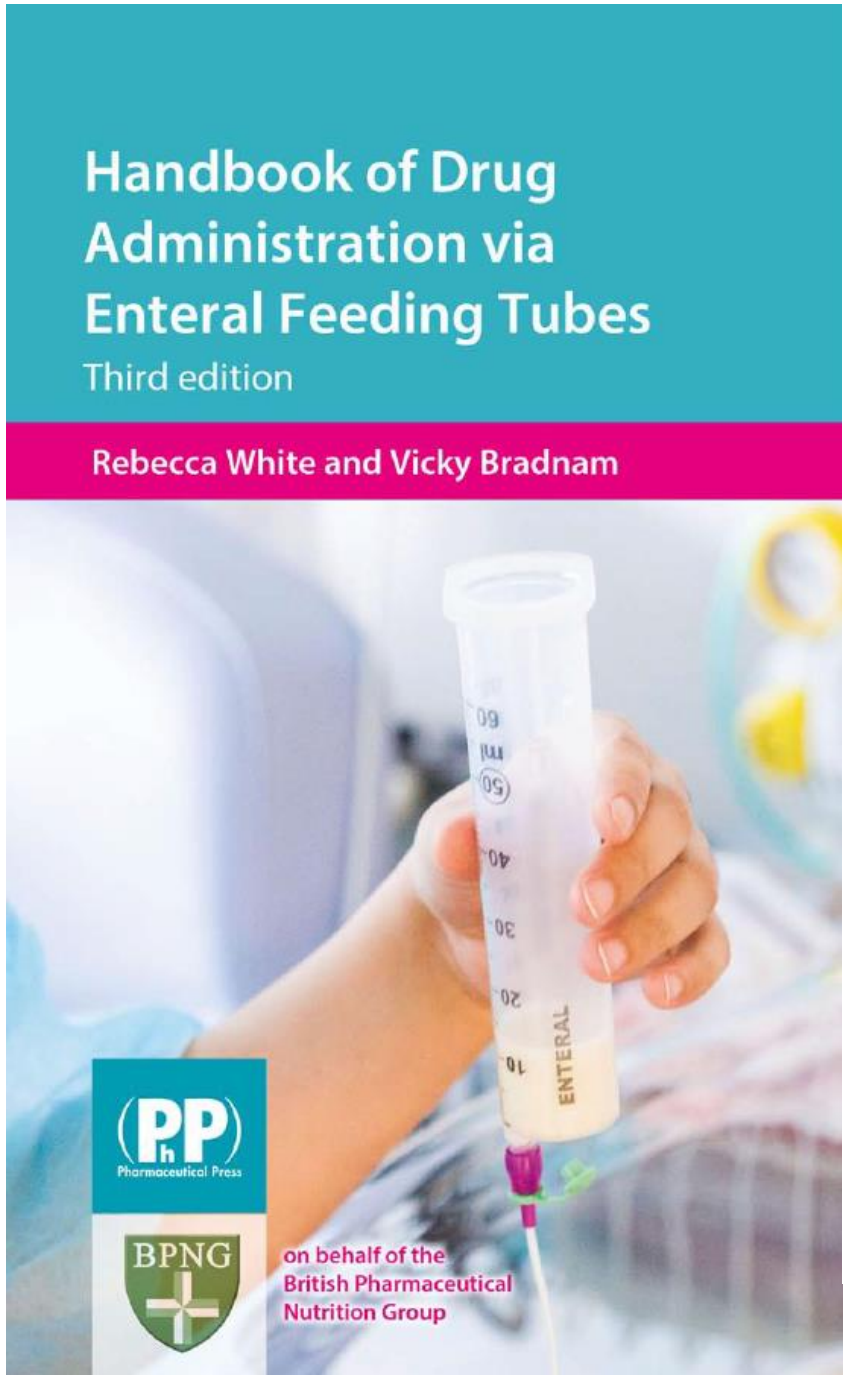

Pyridoxine hydrochloride

Formulations available[1]

Brand name (Manufacturer)	Formulation and strength	Product information/Administration information
Pyridoxine (BR, CP, Hillcross)	Tablets 10 mg, 20 mg, 50 mg	CP brand tablets disintegrate within 5 minutes when placed in 10 mL of water but give a very coarse dispersion that is difficult to draw up. When crushed, the powder mixes with water but settles quickly, with risk of leaving some of the dose in the container if it is not rinsed thoroughly.[2]

Site of absorption (oral administration)

Specific site of absorption is not documented. Pyridoxine is readily absorbed from the GI tract.[3]

Alternative routes available

Pabrinex injection contains 50 mg pyridoxine (see Thiamine monograph).

Interactions

No specific interaction.

Health and safety

Standard precautions apply.

Suggestions/recommendations

- Nutritionally complete enteral feeds will contain some pyridoxine. Additional doses should only be used when additional supplementation is required.
- The tablets can be crushed and mixed with water immediately prior to administration.
- A prolonged break in feeding is not required.

Intragastric administration

1. Stop the enteral feed.
2. Flush the enteral feeding tube with the recommended volume of water.
3. Place the tablet in a mortar and crush to a fine powder using the pestle.
4. Add a few millilitres of water and mix to form a paste.
5. Add up to 15 mL of water and mix thoroughly ensuring that there are no large particles of tablet.
6. Draw this into an appropriate syringe.
7. Flush the medication dose down the feeding tube.
8. Add another 15 mL of water to the mortar and stir to ensure that any remaining drug is rinsed from the container. Draw this water into the syringe and also flush this via the feeding tube (this will rinse the mortar and syringe and ensure that the total dose is administered).
9. Finally, flush the enteral feeding tube with the recommended volume of water.
10. Re-start the feed, unless a prolonged break is required.

Which Tertiary References?

- **Availability/Drug Monographs:** PM, CPS, CPMA, AHFS DI, Natural Medicines, Martindale
- **Compatibility/Stability/Administration**: Trissel, King Guide, Extended Stability for Parenteral Drugs, Gahart's Intravenous Medications, Handbook of Drug Administration via Enteral Feeding Tubes, USP/NF
- **ADR:** Meyler's Side Effects of Drugs, Side Effects of Drugs Annual, Adverse Drug Reactions, Canada Vigilance adverse reaction online database
- **Drug Interactions:** Lexi-interact, Stockley's Drug Interactions, Handbook of Adverse Drug Interactions
- **Electronic Sources**: Up-to-Date, Dynamed, Micromedex, Lexi-Comp, BMJ Best Practice
- **Textbooks:** Pharmacotherapy, Applied Therapeutics

Which Tertiary References?

- **Availability/Drug Monographs:** PM, CPS, CPMA, AHFS DI, Natural Medicines, Martindale
- **Compatibility/Stability/Administration**: Trissel, King Guide, Extended Stability for Parenteral Drugs, Gahart's Intravenous Medications, Handbook of Drug Administration via Enteral Feeding Tubes
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- **Electronic Sources**: Up-to-Date, Dynamed, Micromedex, Lexi-Comp, BMJ Best Practice
- **Textbooks:** Pharmacotherapy, Applied Therapeutics

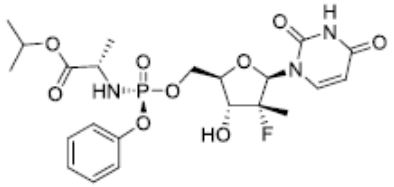
Secondary Sources - Databases

Database	Indexed terms	Citation-tracking	Free	Discipline(s)	Coverage	Notes
PubMed/ MEDLINE	✓ MeSH	✗	✓	Biomedical	1966-present (for most journals) 1809-present (for some journals)	Indexing in MEDLINE can take months. PubMed includes the latest non-indexed articles for keyword search.
EMBASE	✓ Emtree	✗	✗	Biomedical, pharmacology	1947-present	Lots of overlap with MEDLINE. More European and non-English journals.
Google Scholar	✗	✓	✓	Inter-disciplinary	Uncertain	Search engine of the whole internet, not curated by humans, searches full text of articles.
Web of Science	✗	✓	✗	Inter-disciplinary	1900-present (Science) 1956-present (Social Science) 1975-present (Arts & Humanities)	Selective coverage of journals based on the scientific quality and impact.
International Pharmaceutical Abstracts (OVID)	✗	✓	✗	Pharmaceutical science	1970-present (for some journals)	Comprehensive information is included for drug therapy, toxicity, and pharmacy practice.

Case Study: Second Look

- Epclusa Canadian Product Monograph via HC DPD

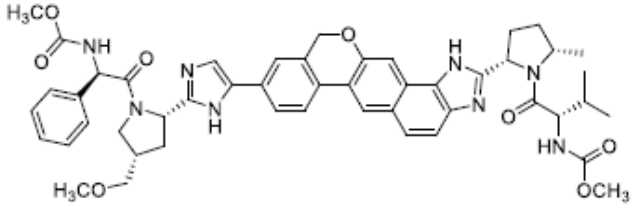
Structural formula:



Physicochemical properties:

Appearance	Sofosbuvir is a white to off-white crystalline solid.
Solubility	Sofosbuvir is slightly soluble in water.

Structural formula:



Physicochemical properties:

Appearance	Velpatasvir is a white to tan or yellow solid.
Solubility	Velpatasvir is practically insoluble (< 0.1 mg/mL) above pH 5, slightly soluble (3.6 mg/mL) at pH 2.0, and soluble (> 36 mg/mL) at pH 1.2.

4.2 Recommended Dose and Dosage Adjustment

EPCLUSA is a single tablet regimen. No dosage adjustments are possible for EPCLUSA.

The recommended dose of EPCLUSA is one tablet of 400 mg/100 mg sofosbuvir/velpatasvir, taken orally, once daily with or without food (see **10 CLINICAL PHARMACOLOGY, 10.3 Pharmacokinetics, *Effects of Food***).

12 SPECIAL HANDLING INSTRUCTIONS

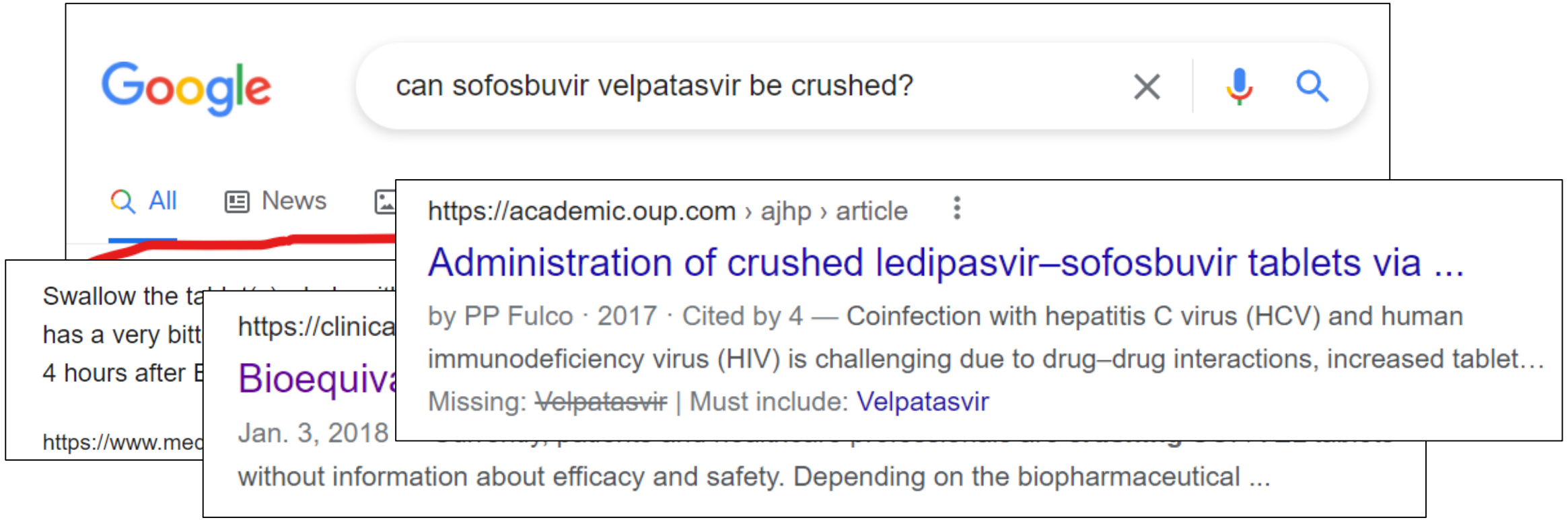
There are no special handling instructions.

6 DOSAGE FORMS, STRENGTHS, COMPOSITION AND PACKAGING

Table 2. Dosage Forms, Strengths, Composition and Packaging

Route of Administration	Dosage Form / Strength/Composition	Non-medicinal Ingredients
Oral	Tablet 400 mg sofosbuvir/ 100 mg velpatasvir	Copovidone, croscarmellose sodium, magnesium stearate and microcrystalline cellulose. The tablets are film-coated with a coating material containing the following inactive ingredients: iron oxide red, polyethylene glycol, polyvinyl alcohol, talc and titanium dioxide

Case Study: Let Me Google that for You



Case Study: Tertiary References

- RxTx

Drug Name	Administration	Comments
sofosbuvir	• With or Without Food	

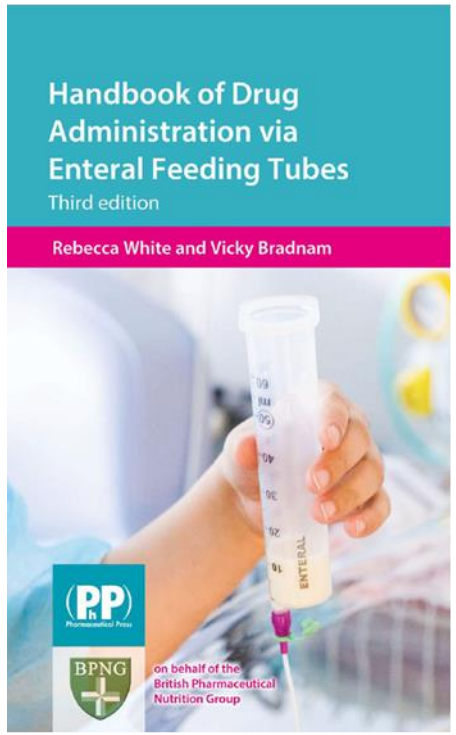
- Check institutional and ISMP “Do not crush” lists
  - not listed

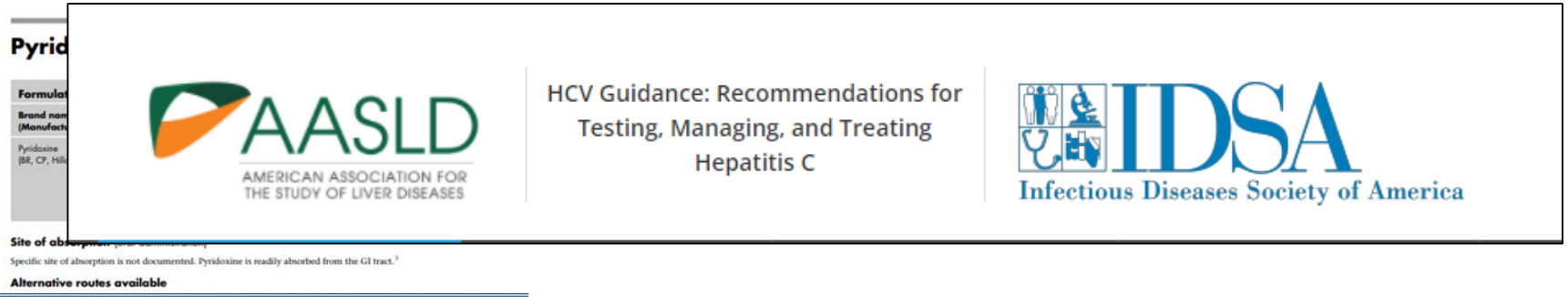
Lexicomp®

IBM Micromedex®

AHFS DI

Case Study: Topic-specific References

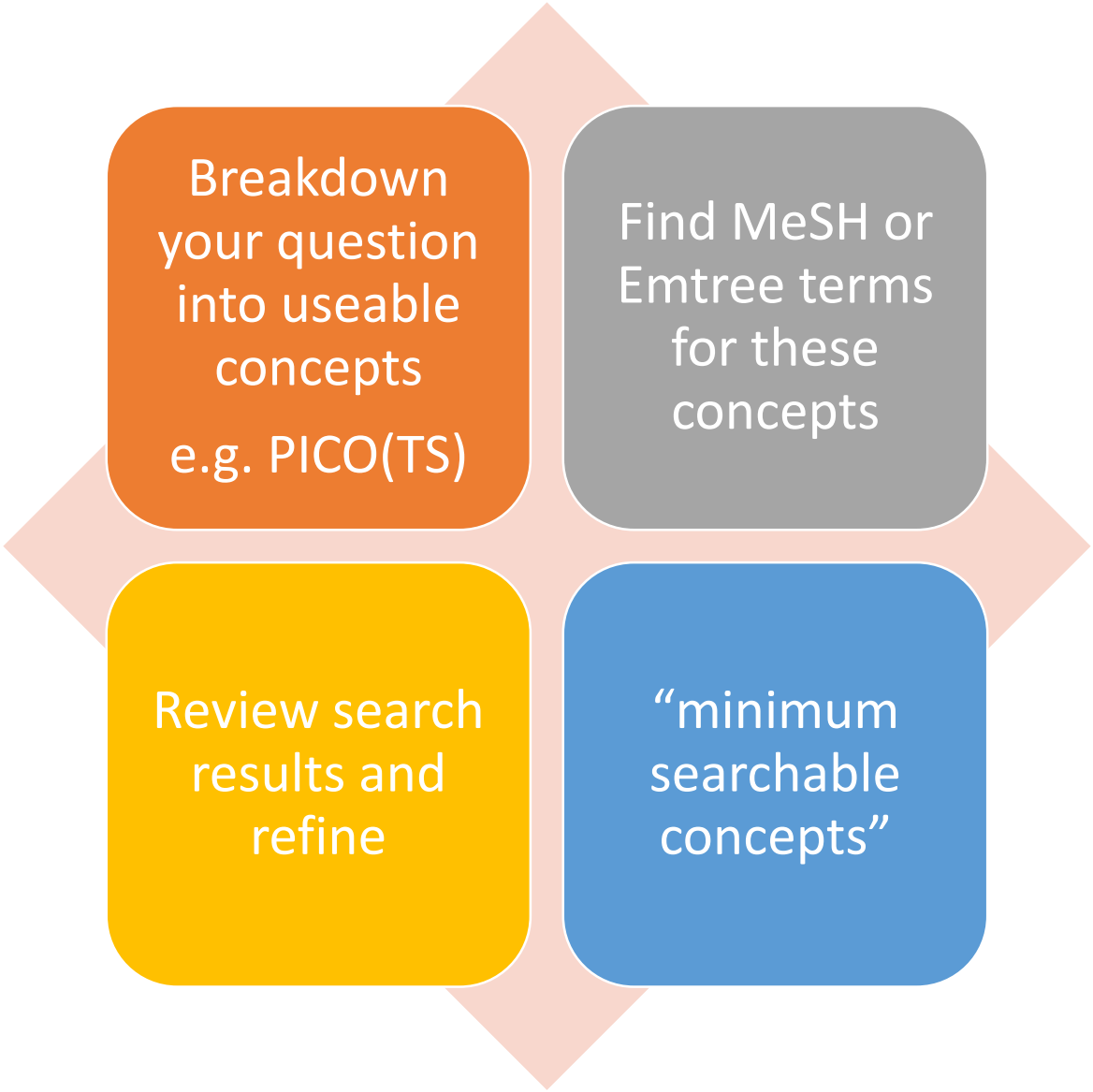




Manufacturer states that Epclusa® tablets are not enteric-coated and are not sustained-release. Tablets can be disintegrated in water, juice, or milk with minor stirring and pressure with a spoon. A disintegrated or crushed tablet may have an unpleasant taste and there are no studies evaluating the pharmacokinetics of these methods of administration. (Personal communication, Gilead Sciences Canada)

GILEAD

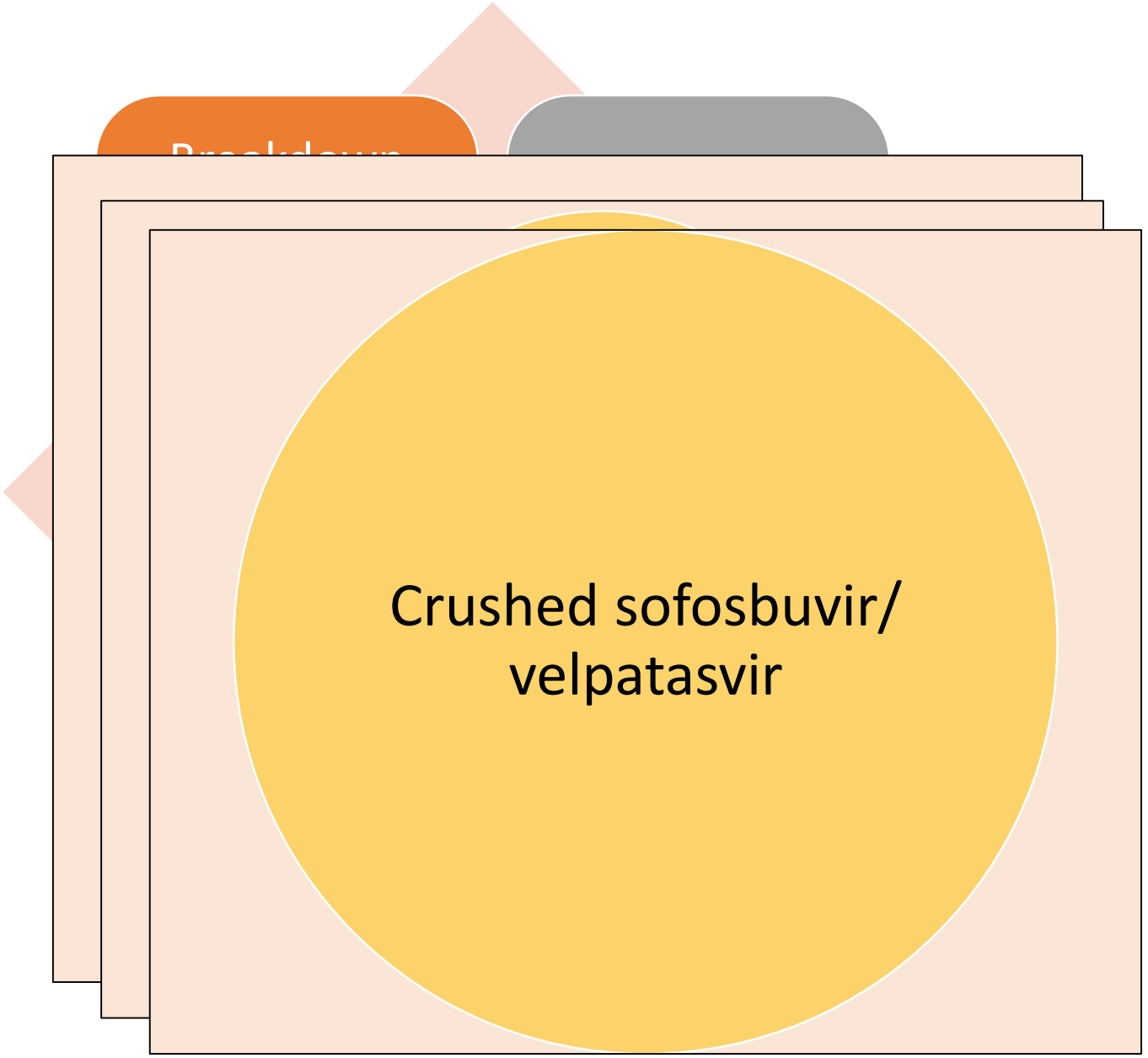
Secondary Sources – Search Method



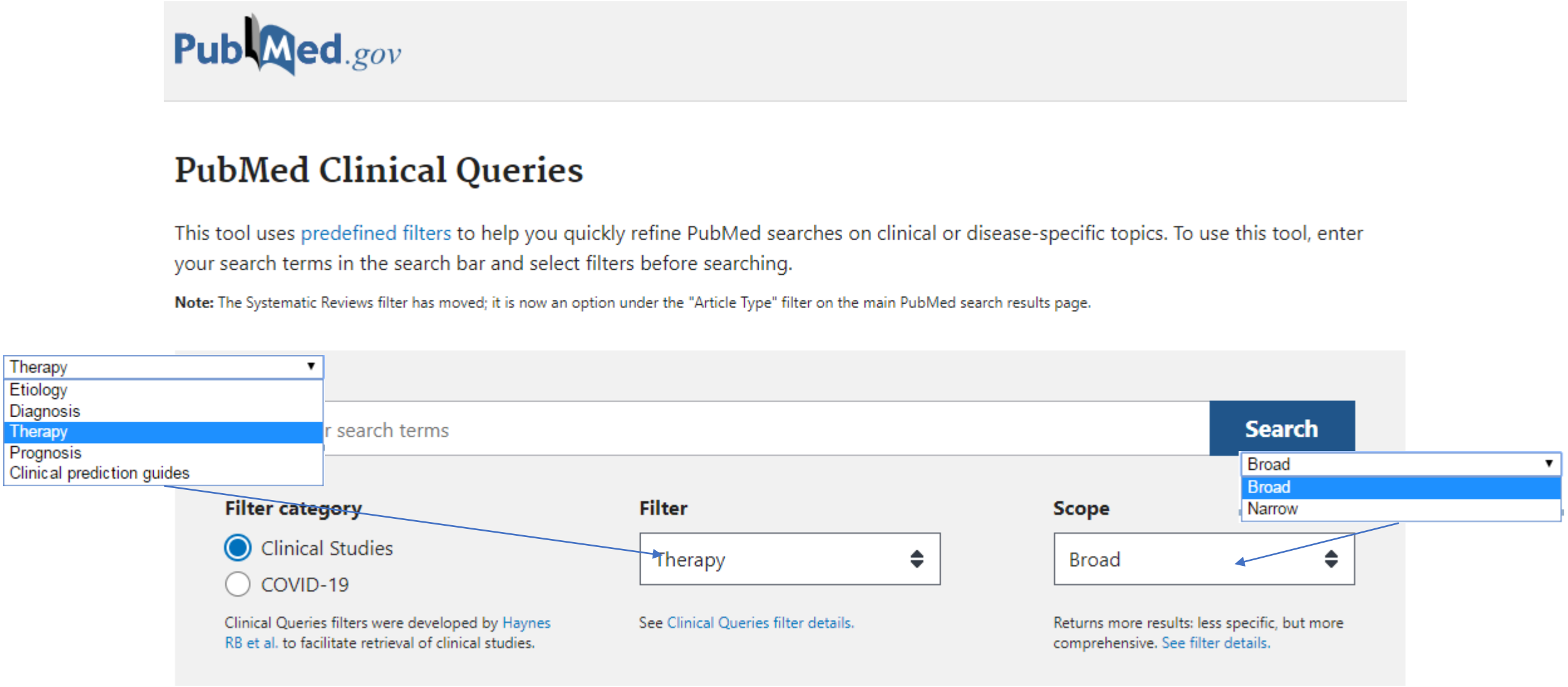
Poll 4: What would be the “minimum searchable concepts”?

a) sofosbuvir/velpatasvir, Adults, HCV, SVR, Adverse Reactions
b) sofosbuvir/velpatasvir crushed, HCV, SVR, Adverse Reactions
c) sofosbuvir/velpatasvir crushed, SVR, Adverse Reactions
d) sofosbuvir/velpatasvir crushed, SVR

Secondary Sources – Search Method



PubMed - Clinical Queries



- Accessed via PubMed homepage

Ovid - Keyword Searching Tips

Truncation

- * or $ or :
- Therap* will search:
  - Therap**y,** Therap**eutics,** Therap**ies**, Therap**ist**, etc.
- Therap*3 will search:
  - Therap**y**, Therap**ies**, Therap**ist**, but NOT Therap**eutics** or Therap**ists**

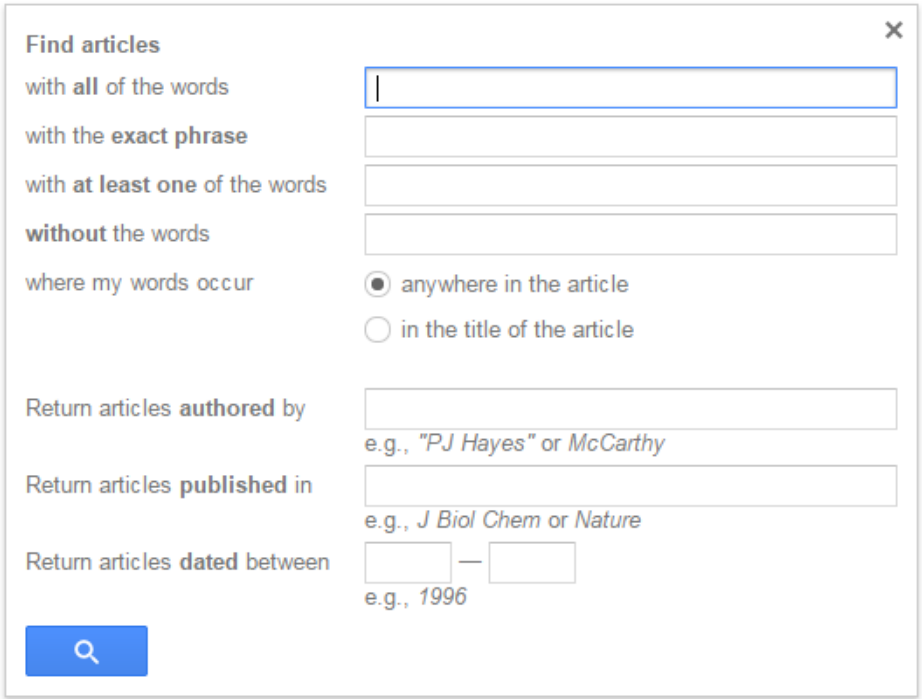
Wildcards

- ? stands in for 0 or 1 characters
  - Colo?r will search Color and Colour
- # stands in for 1 character
  - Wom#n will search Woman and Women

Adjacency

- Searches for terms within a specified distance of another term.
- Hypertension adj3 pregnan* will search
  - Hypertension in pregnancy
  - Hypertension in a pregnant (woman)
  - Etc.

Google Scholar



Google Scholar

Treatment of chronic hepatitis C virus infection with **crushed** ledipasvir/**sofosbuvir** administered via a percutaneous endoscopic gastrostomy tube

L Jindracek, J Stark - Journal of pharmacy practice, 2018 - journals.sagepub.com

Introduction: Ledipasvir/**sofosbuvir** (Harvoni®) is a fixed-dose tablet indicated for the treatment of chronic hepatitis C virus (HCV) infection. There are currently no data available on the safety and efficacy of **crushed** ledipasvir/**sofosbuvir** tablets. Case Summary: This ...

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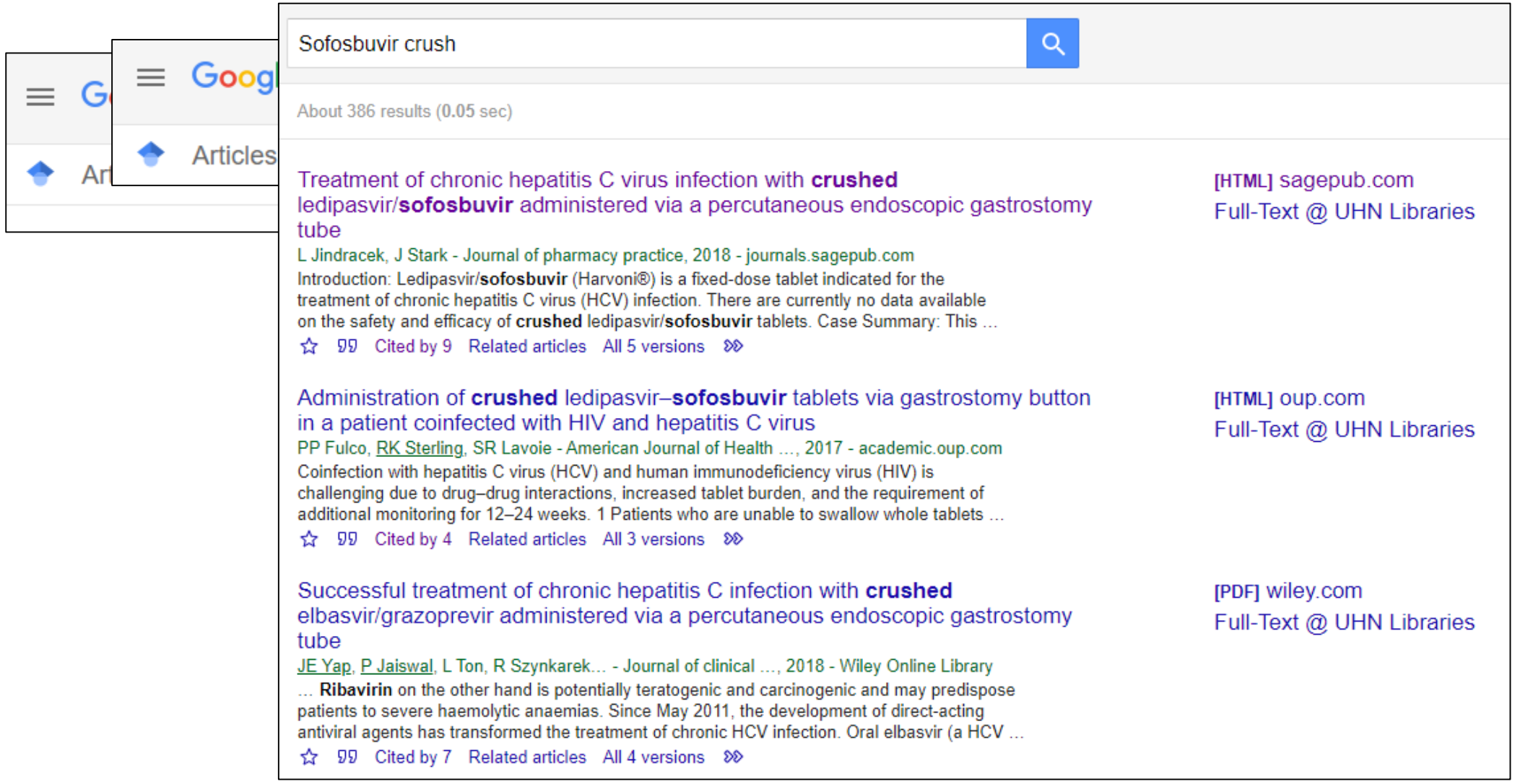
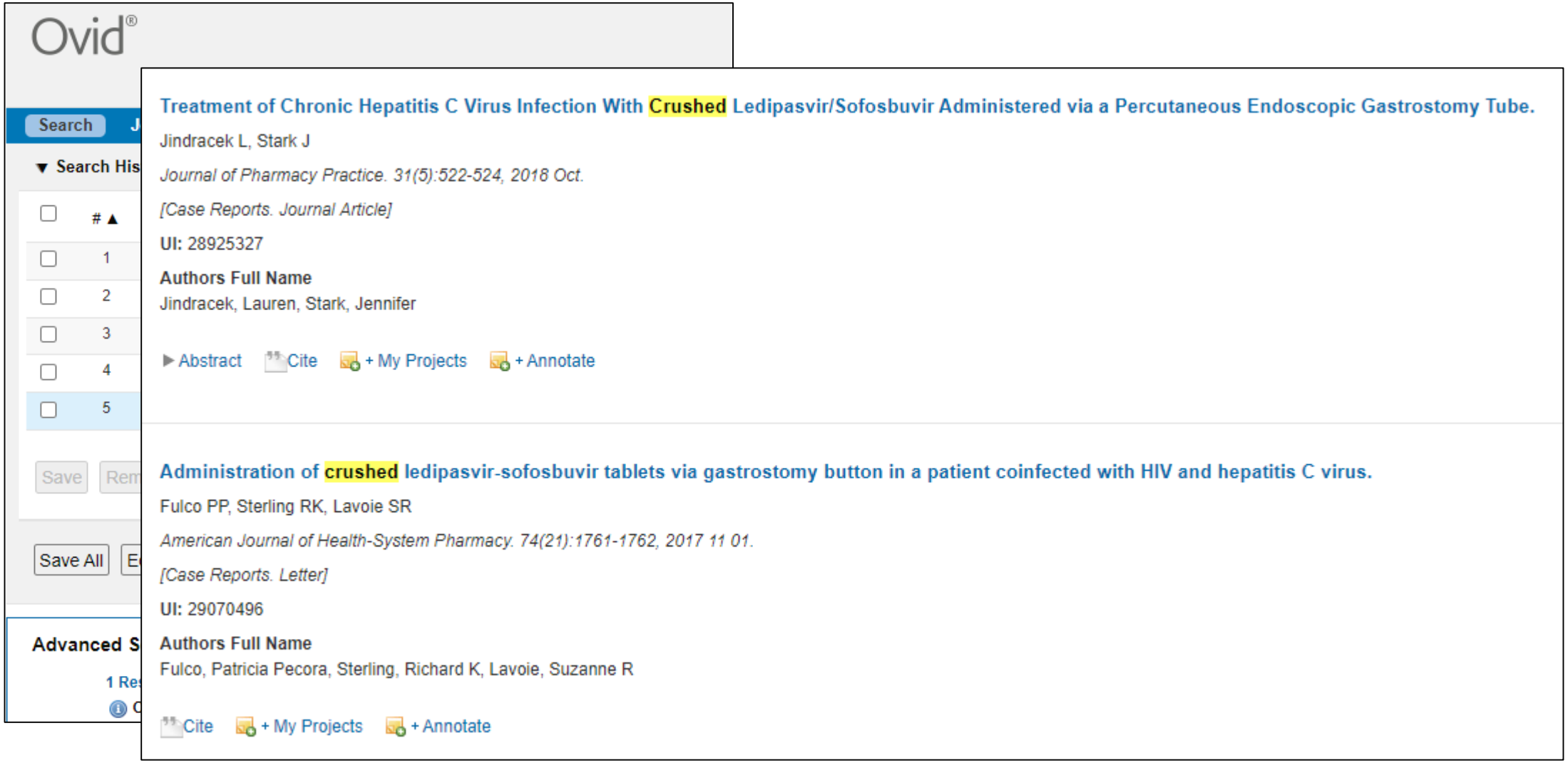
Case Study: Google Scholar



Case Study: PubMed/Medline



Case Study: Primary Reference

- Harvoni: sofosbuvir/ledipasvir
    - Published, documented case of crushed Harvoni administered through PEG
    - 24-week therapy
    - HCV viral load undetectable at weeks 7, 11, 17, and at end of therapy
    - No adverse reactions reported (no reports of common S/E: headache, fatigue)
    - Authors state crushed sofosbuvir/ledipasvir is viable, efficacious and safe option
    - Ledipasvir, similar to velpatasvir
        - Inhibit viral NS5A enzyme
- Considering pharmacokinetics:
    - Sofosbuvir – rapidly absorbed, displays linear kinetics
    - Ledipasvir – displays similar PK as velpatasvir (pH-dependent solubility)
- Reasonable to extrapolate to sofosbuvir/velpatasvir ?

Poll 5: Reasonable to extrapolate data to sofosbuvir/velpatasvir ?

a) Agree
b) Unsure
c) Disagree

Google Scholar

Sofosbuvir Velpatasvir crushed

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Effectiveness of **crushed sofosbuvir–velpatasvir** in a patient with dysphagia

A Mogul, E Teixeira, L McAuliffe... - American Journal of ..., 2020 - academic.oup.com

(AASLD) and Infectious Diseases Society of America (IDSA) endorse treating all patients diagnosed with hepatitis C virus (HCV) infection. 1 Despite this recommendation, patients often do not receive treatment due to perceived or relative contraindications to therapy. One ...

☆ Cite Cited by 3 Related articles All 5 versions »

[HTML] Therapeutic Drug Monitoring-Guided **Crushed Sofosbuvir-Velpatasvir** Treatment: A Case Study

S Lalanne, C Jézéquel, C Tron... - Therapeutic drug ..., 2020 - journals.lww.com

In this study, the authors report the case of a patient diagnosed with hepatitis C virus who was treated with **sofosbuvir–velpatasvir** (400/100 mg). As the patient was unable to swallow whole tablets, therapeutic drug monitoring was performed to evaluate the effect of **crushing** ...

☆ Cite Cited by 2 Related articles All 7 versions »

Successful Treatment with **Crushed Sofosbuvir/Velpatasvir** of a Patient with Decompensated Cirrhosis C and Thrombocytopenia

A Murayama, K Tajiri, C Kanegane... - Case Reports in ..., 2021 - karger.com

A 36-year-old woman with decompensated liver cirrhosis type C was referred to our hospital to receive antiviral treatment for hepatitis C virus (HCV). She had been diagnosed with intractable epilepsy and cerebral palsy at birth and was managed by central venous nutrition ...

☆ Cite All 6 versions »

5PSQ-032 Successful treatment of chronic hepatitis C infection with **crushed sofosbuvir/velpatasvir**

AP Villaescusa, IG Esteve, ML Vargas, MJF Gallart - 2020 - ejhp.bmj.com

Background and importance **Sofosbuvir/velpatasvir** (SOF/VEL) is an oral regimen approved for patients with hepatitis C virus (HCV). To date, no pharmacokinetic data exist on the impact on efficacy and safety of this regimen when it is **crushed** and mixed with liquids or ...

☆ Cite »

Step 1

- Classification of the request

Step 2

- Obtaining background information

Step 3

- Systematic search

Step 4

- Response

Approach to Response

Organize data

Combine information

Evaluate the quality of the information

Critically analyze and evaluate

Analysis and synthesis

Draw conclusions

Case Study: Assessment

- Administration of crushed sofosbuvir/ velpatasvir via enteral tube
  - Benefit
    - Treatment of HCV will continue
      - Stopping/interrupting treatment may result in treatment failure, increase in viral load, resistance
  - Risk
    - Does not disperse adequately; occlusion
      - Test in Pharmacy; flush PEG tube before and after all medications
    - Adverse effects due to rapid absorption
      - Most common: headache, fatigue
    - Velpatasvir pH-dependent absorption
      - Monitor more frequently
- Switching to sofosbuvir/ledipasvir (more evidence)?
  - Patient's HCV is well controlled under Epclusa (on 6th week); Risk of resistance, treatment failure
- Recommendation: Suggested to administer crushed sofosbuvir/velpatasvir via enteral tube

Summary

- DI Pharmacists support both institutional governance and patient-care
- An efficient search involves a step-wise approach, including topic-specific references
- Once collected, data must be critically appraised and evaluated
- Response is synthesized by integrating data from diverse resources using clinical experience, logic and deductive reasoning
- Disclose most relevant information, present all reasonable alternatives, and follow-up

Notable Resources

i) Compatibilities/Stability:

• Injectables (King Guide to Parenteral Admixtures; Trissel's Tables, Handbook on Injectable Drugs)

• Oral/Ophthalmic/Topical Preparations (Trissel's, Stability of Compounded Formulations; The Children's Hospital of Philadelphia Extemporaneous Formulations; Extemporaneous Formulations for Pediatric, Geriatric, and Special Needs Patients [Jew, Soo-Hoo, Erush]; Pediatric Drug Formulations [Nahata, Pai and Hipple]; CSHP, Extemporaneous Oral Liquid Dosage Preparations); Remington: The Science and Practice of Pharmacy, Merck Index, A Practical Guide to Contemporary Pharmacy Practice, USP/NF

ii) Availability/Drug Monographs:

• Canadian Products (CPS; Compendium of Products for Minor Ailments (CPMA))

• American Products (Drug Facts & Comparisons; American Hospital Formulary Service [AHFS]; Physician's Desk Reference [PDR]

• Other Countries (Martindale, The complete drug reference)

• Herbal Products (Natural Medicines Comprehensive Database; The Review of Natural Products)

• Investigational Drugs (OPA DIRC - CID Drug List; Martindale the Complete Drug Reference)

iii) Medical Dictionaries:

• Dorland's Illustrated Medical Dictionary

• Dictionary of Medical Syndromes

• Medical Abbreviations: 32,000 conveniences at the expense of communications and safety

Notable Resources

iv) Therapeutics (How to Treat Diseases)

- The Merck Manual (concise)
- Harrision's Principles of Internal Medicine (more detailed)
- Cecil’s Textbook of Medicine (more detailed)
- DiPiro’s Pharmacotherapy (good for basics relating drugs to treatment management; limited scope of disease states covered)
- Koda-Kimble’s Applied Therapeutics (contains numerous therapeutic pearls; limited scope of disease states covered)
- The Washington Manual (concise, “cook-book” to prescribing)
- Compendium of Therapeutic Choices (Canadian - comparisons of drugs; previously Therapeutic Choices)
- The Clinical Handbook of Psychotropic Drugs

v) Patient Counseling

- Professional’s Guide to Patient Drug Facts

vi) Drug Interactions

- Hansten & Horns, Drug Interactions analysis and management (2014)
- Drug Interaction Facts (Volume 1, 2, herbal supplements and food)
- Handbook of Adverse Drug Interactions (Medical Letter)
- Stockley’s Drug Interactions

Notable Resources

vii) Adverse Drug Effects

- Textbook of Adverse Drug Reactions (easy to use; basics)
- Meyler's Side Effects of Drugs (more complex; detailed)
- Adverse Drug Reactions by Lee (easy to use; basics)

viii) Drugs in Pregnancy & Breast Feeding

- Briggs/Freeman/Yaffe's - Drugs in Pregnancy and Lactation (plus updates)
- Medication Safety and Pregnancy by Koren (from MotheRisk, HSC)
- Exposure to Psychotropic Medications and Other Substances during Pregnancy and Lactation, A Handbook for Health Care Providers (CAMH & MotheRisk)

Questions/Comments?