



## Frequently Asked Questions

*Click on header in table of contents below to quickly navigate.*

### Table of Contents

What is the Antimicrobial CDSS?.....	2
What are the Goals of the Antimicrobial CDSS? .....	2
Why Should I use the Antimicrobial CDSS? .....	2
Improve patient outcomes .....	2
Order restricted antimicrobials .....	2
Increased efficiency .....	2
How do I Access the Antimicrobial CDSS?.....	3
Accessing within CPRS.....	3
Accessing from web or mobile device (Orders must be placed in CDSS in CPRS).....	3
Installing and updating app (Orders must be placed in CDSS in CPRS).....	3
What if I Can't Find the Infectious Disease I am Looking For? .....	3
Navigate using the decision tree (all versions) .....	4
Navigate using the Index .....	4
Search for the term (web and mobile versions).....	4
What if a Desired Antimicrobial is not Provided in the Recommendations?.....	5
What are the Limitations of CDSS Quick Orders in CPRS? .....	5
Where Can I Find Drug Information Within the Antimicrobial CDSS?.....	6
Further Questions and Feedback .....	7
Figures.....	8
References.....	16

## What is the Antimicrobial CDSS?

A tool within the Computerized Patient Record System (CPRS) that offers antimicrobial prescribing advice at the point of order entry. The system is structured as an order menu decision tree that contains quick orders pre-programmed with appropriate antimicrobial regimens for specific infectious diseases and syndromes.

The Antimicrobial CDSS is also available online and as a mobile app, known as Antimicrobial CDSS Online. The content of this version mirrors CPRS's version but does not contain antimicrobial quick orders and is for reference only.

## What are the Goals of the Antimicrobial CDSS?

Improve patient outcomes, reduce rates of microbial resistance, prevent adverse patient outcomes, optimize costs and improve providers' lives. In addition to these goals, the program fulfills antimicrobial stewardship quality standards implemented by the Joint Commission.

## Why Should I use the Antimicrobial CDSS?

### Improve patient outcomes

In a 2013 study, Minneapolis Veterans Affairs Medical Center (MVAMC) antimicrobial courses ordered through the Antimicrobial CDSS within CPRS were significantly more likely to be appropriate from start to completion, (44%) compared to non-CDSS courses (33%,  $P = 0.013$ )<sup>1</sup>. This is consistent with other studies that have shown significant improvement in appropriate use of antimicrobials when CDSS programs are utilized<sup>2</sup>.

### Order restricted antimicrobials (Minneapolis VAHCS only)

The Minneapolis VAHCS has a restricted antimicrobial formulary. A restricted formulary reduces the cost of health care and is an integral part of antimicrobial stewardship<sup>3</sup>. The Antimicrobial CDSS within CPRS provides a method of formulary restriction that doesn't require a call back from pharmacy or a prior authorization for the antimicrobial to be approved. Restricted antimicrobials ordered outside the Antimicrobial CDSS within CPRS require ID approval.

### Increased efficiency

Along with being able to order restricted antimicrobials without a prior authorization, the Antimicrobial CDSS within CPRS provides quick orders pre-programmed with appropriate antimicrobial regimens for specific infectious diseases. Using the system saves time and increases the efficiency of the ordering provider.

## How do I Access the Antimicrobial CDSS?

The Antimicrobial CDSS has been designed to offer antimicrobial prescribing advice quickly and efficiently. Since inpatient, outpatient and emergency department medications are ordered differently, the Antimicrobial CDSS has separate CPRS versions for ordering in these locations.

The Antimicrobial CDSS Online version mirrors CPRS content with minor differences and is for reference only as it contains no antimicrobial quick orders. At the Minneapolis VAHCS, restricted antimicrobials must be ordered through the Antimicrobial CDSS in CPRS.

### Accessing within CPRS

To access the Antimicrobial CDSS in CPRS, open CPRS and click on the “Orders” tab at the bottom left-hand side of the CPRS window.

**\*Note:** The below directions are specific for the Minneapolis Veterans Affairs Health Care System (VAHCS) only. Access at other VAHCSs will vary.

#### For inpatients:

On the left-hand side of the “Orders” tab, click on the “Medicine Inpt Orders...” option ([Figure 1](#)) In the right-hand column of the window that pops up, under the “INFECTIONS” header, select “#341 Antimicrobials (CDSS)...”. The main menu of the Inpatient Antimicrobial CDSS will now be open.

#### For outpatients:

On the left-hand side of the “Orders” tab, click on the “Medicine Outpt Orders...” option ([Figure 1](#)). In the right-hand column of the window that pops up, select “#55 Antimicrobial (CDSS)... “. The main menu of the Outpatient Antimicrobial CDSS will now be open.

#### For emergency department patients:

On the left-hand side of the “Orders” tab, click on the “Emergency Department Orders...” option ([Figure 1](#)). In the right-hand column of the window that pops up, select “#62 ED Antimicrobial CDSS... “. The main menu of the Outpatient Antimicrobial CDSS will now be open.

### Accessing from web or mobile device (Orders must be placed in CDSS in CPRS)

To access the Antimicrobial CDSS from the web, on any device or network, open this link: [Antimicrobial CDSS Online](#) <OR> use the link that is available in the main menu of the Antimicrobial CDSS in CPRS <OR> use the link in the “Tools” menu of CPRS under “More” option.

### Installing and updating app (Orders must be placed in CDSS in CPRS)

Use the link above to navigate to the Antimicrobial CDSS Online. You will be able to install or update the app on your device using the directions below based on type of device.

PC and Android Devices:

Once the App is ready to install or update on your PC or Android device, a button with the text "Install/Update App" will appear at the bottom of the Antimicrobial CDSS Online home screen or at the top right of the window when version is selected ([Figure 2](#)). Press the button to and follow the prompts to complete the installation or update.

If the "Install/Update App" button is not visible, wait a few minutes for the button to appear. If the button does not appear, you already have the current version of the app installed on your device.

#### Apple Devices:

Select the "Share" button, located at the top or bottom of the browser (appears as a square with an arrow pointing up). Once the App is ready to install or update, the "Add to Home Screen" option will appear ([Figure 3](#)). Select this option and follow the prompts to complete the installation or update.

If the "Add to Home Screen" option is not visible, wait a few minutes for the option to appear. If the option does not appear, you already have the current version of the app installed on your device.

### What if I Can't Find the Infectious Disease I am Looking For?

Although the Antimicrobial CDSS contains recommendations for the majority of infectious diseases, it does not include them all. If you cannot find the infectious disease in the decision tree, within the index or using the search function (Antimicrobial CDSS Online version only), search for a broader term or synonym (e.g. instead of "chicken pox" search for "varicella"). If you still cannot find the infectious disease you are looking for, contact the Antimicrobial Stewardship Team (Muthu Narayan, DO or Eric Geurkink, PharmD) for help.

### Navigate using the decision tree (all versions)

The main menu of the Antimicrobial CDSS contains links to categories of infectious diseases based on syndrome/organ system (e.g. cardiovascular, genitourinary, etc.), organisms (e.g. gram-positive bacteria, gram-negative bacteria, viruses, etc.) and other special cases ([Figure 4](#)). To navigate to specific infectious disease, select the category the infectious disease is associated with. Within the category menu, select the specific infectious disease sub-menu for recommendations, quick orders and pertinent resources (e.g., section-specific consults, important drug properties, CDSS system help resources, etc.) ([Figure 5](#)).

### Navigate using the Index

The index is in the main menu at the top of the left-hand column under the header "Index of Antimicrobial CDSS content" and is also located at the top next to the home button in the online version. The index contains an alphabetized list of Antimicrobial CDSS content. Find the infectious disease, organism or other topic you are looking for by scrolling down the list. When you locate the term you are looking for, click on it to be linked to the menu containing specific recommendations, quick orders and pertinent resources ([Figure 6](#)).

### Search for the term (web and mobile versions)

The search field is located at the top left of the online version. In the search field, type the term (i.e. pertussis) you are looking for. A list of all recommendations that contain the search term will be displayed, sorted by number of matches ([Figure 7](#)).

## What if a Desired Antimicrobial is not Provided in the Recommendations?

The Antimicrobial CDSS has been developed locally with input from a broad, representative group of clinicians. All antimicrobial recommendations within the Antimicrobial CDSS are reviewed by a clinical pharmacist and an Infectious Diseases Specialist. Recommendations are based on local susceptibility patterns, clinical evidence, local preferences, and national guidelines. In rare cases, the recommended antimicrobials and listed alternatives may not be preferred for the patient you are treating (e.g. isolate resistance, allergy, etc.). In these cases, a broader set of alternative antimicrobials may be ordered through the Antimicrobial CDSS in CPRS. Like other antimicrobial orders in the CDSS, antimicrobials ordered through the Alternative Antimicrobials menu do not require a prior authorization or ID approval.

To access the Alternative Antimicrobials menu, within the CPRS version of the CDSS, navigate to the menu containing antimicrobial recommendations for the infectious disease you are treating. At the very top of the menu, select option #2 “Select here for help, legend, consults, alternative antimicrobials and more”. In the next menu, select option #8 “Alternative Antimicrobials to CDSS Recommendations.” Select the reason an alternative antimicrobial is required, then the Alternative Antimicrobials menu will pop up ([Figure 8](#)).

The Alternative Antimicrobial menu contains antimicrobial regimens that have been deemed appropriate for use as alternatives to recommended antimicrobials by the Antimicrobial P&T Subcommittee. If the list does not contain the preferred antimicrobial, contact or consult Infectious Diseases or submit a prior authorization request.

The regimens provided in the Alternative Antimicrobial menu are not tailored for a specific infectious disease. The dose, frequency, and duration must be changed based on the infectious disease you are treating as well as for patient specific factors. The usage of alternative antimicrobials is monitored by the Antimicrobial CDSS team for appropriateness and to identify infectious diseases for addition to the system.

## What are the Limitations of CDSS Quick Orders in CPRS?

Quick orders are preprogrammed with the typically recommended antimicrobial dose, frequency, and solution for the specific infectious disease. For outpatient prescriptions, when a range is recommended by CDSS, the prescription order will default to the lowest dose and days’ supply. For inpatient orders, durations are listed in the recommendations but are not included in the quick order. If desired, the provider must select a duration when completing an inpatient quick order.

Quick orders are not tailored to specific patient factors such as renal insufficiency, comorbidities, contraindications, weight, allergies, etc. The provider must assess every patient closely for these factors and modify recommended antimicrobials if needed. Drug information is available within the Antimicrobial CDSS for reference by the provider (see below “Where Can I Find Drug Information Within the Antimicrobial CDSS?”)

## Where Can I Find Drug Information Within the Antimicrobial CDSS?

To assist the provider in deciding on therapy, dosing, etc., drug information is provided within specific antimicrobial recommendations and a link to more in-depth information is provided through the General Information menu in the CPRS version of CDSS ([Figure 9](#)). Alternatives to preferred antimicrobials are often provided in recommendations. A broader selection of alternative antimicrobials is provided in the Alternative Antimicrobial menu of the Antimicrobial CDSS in CPRS (see above “What if a Preferred Antimicrobial is not Provided in the Recommendations?”).

## Further Questions and Feedback

You can contact the Antimicrobial CDSS team by phone, Skype or email.

**Team email:** [VISN23AntimicrobialCDSS@va.gov](mailto:VISN23AntimicrobialCDSS@va.gov)

**Program Manager:**

Erik Stensgard, PharmD

Phone: (612)-271-4121

**Clinical Pharmacist:**

Bobbie Masoud, PharmD, BCPS

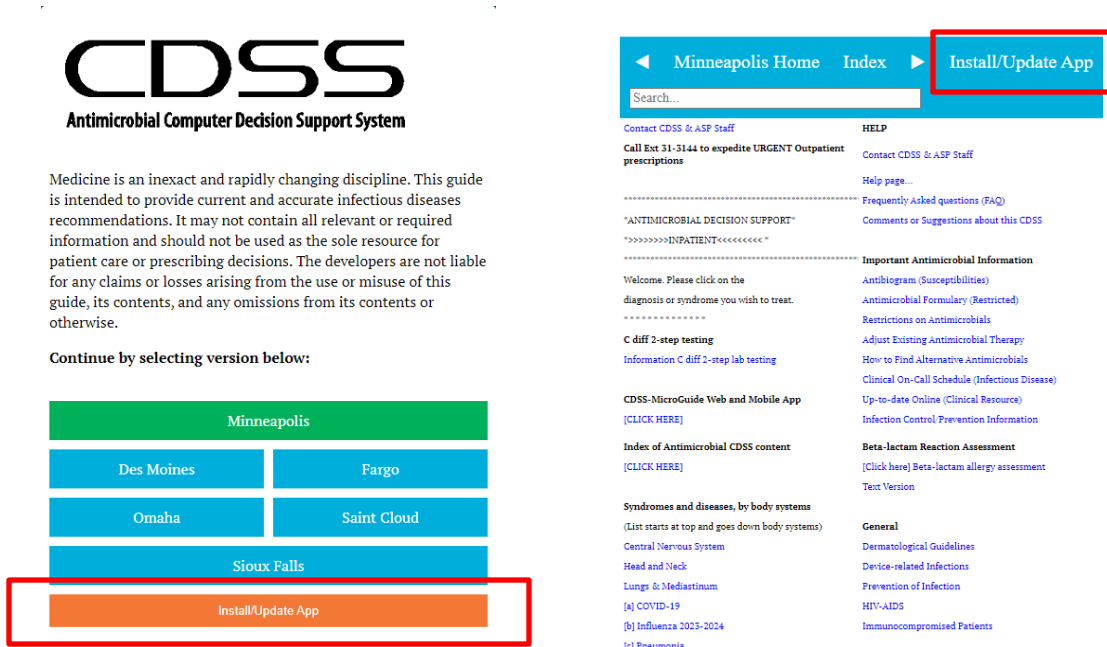
Phone: (612) 719-6778

# Figures

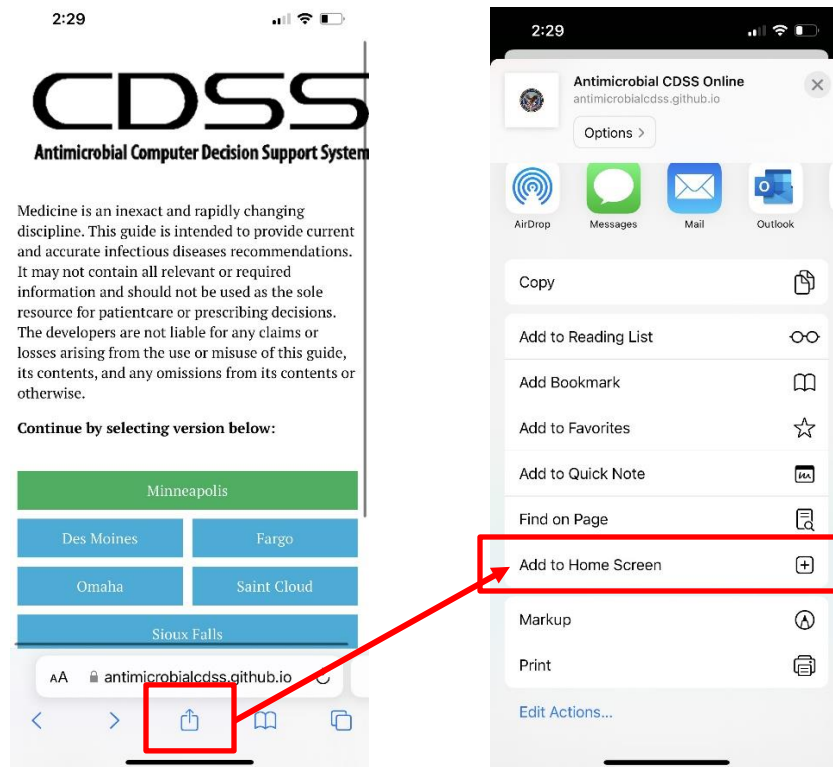
The figure illustrates the navigation path within the CPRS interface to access the Antimicrobial CDSS. The main menu on the left contains several options, with 'Medicine Inpt Orders...' highlighted in red. A red arrow points from this option to the 'Medicine Inpt Orders' window. In this window, the 'INFECTIONS' category is highlighted in red, containing 'Antimicrobials (CDSS)'. Another red arrow points from this option to the 'Medicine Outpt Orders...' window. In this window, '54 Antimicrobials (CDSS)...' is highlighted in red. A final red arrow points from this option to the 'Emergency Department Orders...' window, where '62 ED Antimicrobial CDSS' is highlighted in red.

**Figure 1.** Accessing the Antimicrobial CDSS in CPRS within Minneapolis VAHCS





**Figure 2.** Installing or updating the app on PC and Android devices from the home page or when version is selected.



**Figure 3.** Installing or updating the app on Apple devices

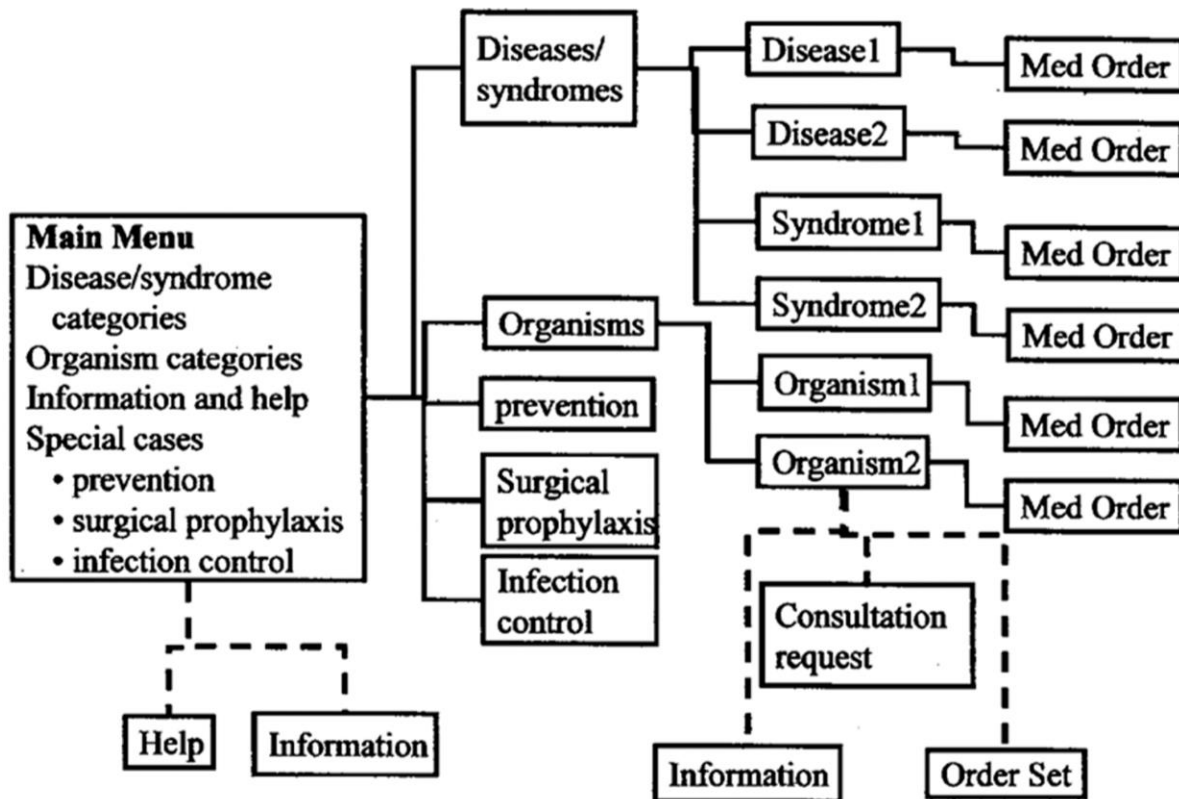
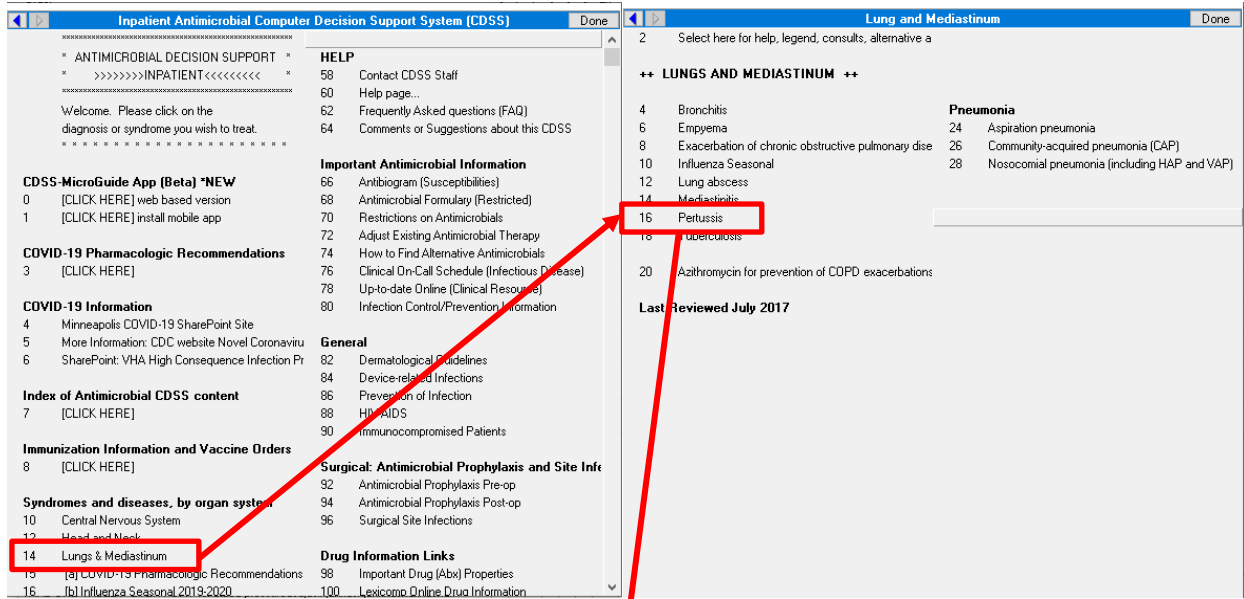
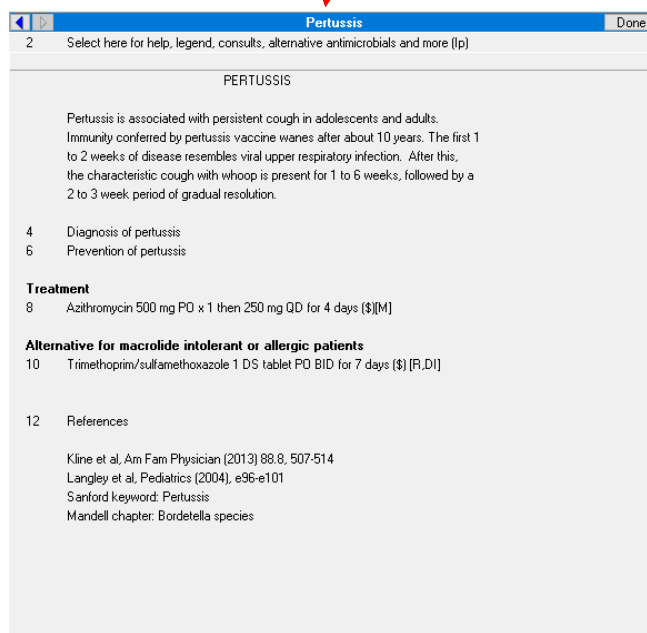


Figure 4. Structure of the Antimicrobial CDSS



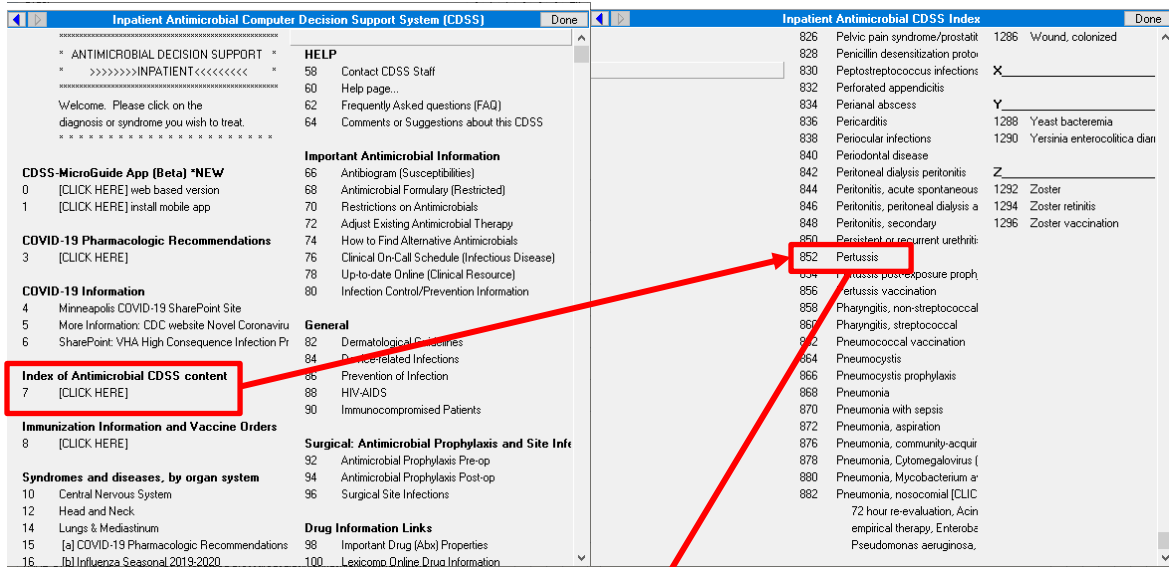
CDSS main menu

Category menu



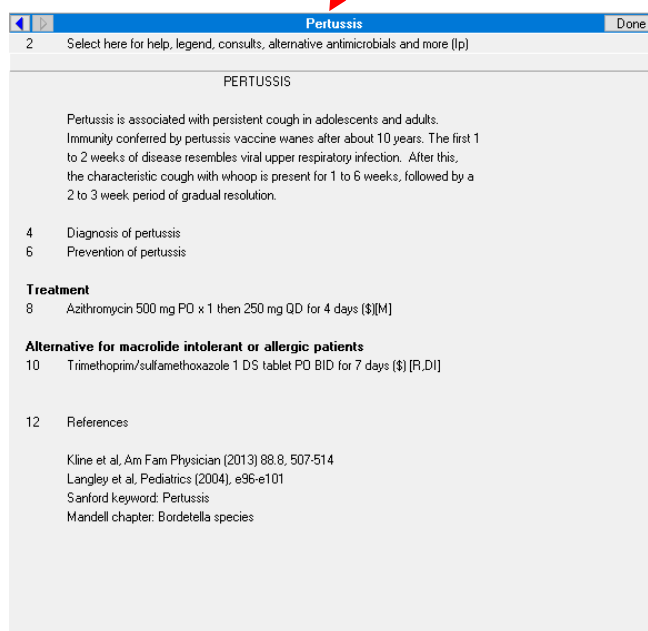
Disease specific menu with recommendations

Figure 5. Navigating using the decision tree



CDSS main menu

Index menu



Disease specific menu with recommendations

Figure 6. Navigating using the index

Minneapolis Home Index

Search field, type in search term here.

pneumocystis

Matches: 11

- Pneumocystis prophylaxis
- Prophylactic antimicrobials for Pneumocystis
- Other Pathogens section
- Infection Prevention section
- Prevention of Infection section
- Transplantation
- Cell-mediated immunity (CMI) defects
- Fungi section
- HIV infection, general
- Immunocompromised Patients section
- Parasites

diagnosis or syndrome you wish to treat.

\*\*\*\*\*

**C diff 2-step testing**

[Information C diff 2-step lab testing](#)

HELP

Search results

Contact CDSS & ASP Staff

Help page...

\*\*\*\*\* [Frequently Asked questions \(FAQ\)](#)

\*\*\*\*\* [Comments or Suggestions about this CDSS](#)

\*\*\*\*\* **Important Antimicrobial Information**

- [Antibiogram \(Susceptibilities\)](#)
- [Antimicrobial Formulary \(Restricted\)](#)
- [Restrictions on Antimicrobials](#)
- [Adjust Existing Antimicrobial Therapy](#)
- [How to Find Alternative Antimicrobials](#)

Figure 7. Using Search Function in Web and Mobile App Versions of CDSS

**PERTUSSIS**

Pertussis is associated with persistent cough in adolescents and adults. Immunity conferred by pertussis vaccine wanes after about 10 years. The first 1 to 2 weeks of disease resembles viral upper respiratory infection. After this, the characteristic cough with whoop is present for 1 to 6 weeks, followed by a 2 to 3 week period of gradual resolution.

4 Diagnosis of pertussis  
6 Prevention of pertussis

**Treatment**

8 Azithromycin 500 mg PO x 1 then 250 mg QD for 4 days (\$)(M)

**Alternative for macrolide intolerant or allergic patients**

10 Trimethopim/sulfamethoxazole 1 DS tablet PO BID for 7 days (\$) (R,DI)

12 References

Kline et al, Am Fam Physician (2013) 88,8, 507-514  
Langley et al, Pediatrics (2004), e96-e101  
Sanford keyword: Pertussis  
Mandell chapter: Bordetella species

**GENERAL INFORMATION**

2 Help and Additional Information Menu  
3 Infectious Diseases Consult  
4 Consult Menu - place consults to specialty service  
6 Antibigram  
8 **Alternative Antimicrobials to CDSS Recommendations - select here**  
10 Contact Information  
12 Antimicrobial Information

**LEGEND**

14 Important Drug Properties  
[DI] = Important interactions between antimicrobial and other drugs  
[H] = Hepatic excretion of antimicrobial  
[M] = Minimal risk posed by antimicrobial  
[O] = Other important antimicrobial property  
[R] = Renal excretion of antimicrobial

16 Antimicrobial Cost Information  
(\$) = <10 dollars per day  
(\$\$) = 10-50 dollars per day  
(\$\$\$) = 50-100 dollars per day  
(\$\$\$\$) = 101-400 dollars per day  
(\$\$\$\$\$) = >400 dollars per day

Disease specific menu with recommendations

General Information Menu

**Alternative Drug Needed?**

NEED AN ALTERNATIVE ANTIMICROBIAL?

If you cannot use the recommended antimicrobials or you believe another one would be better for your patient, you can order another drug. Please indicate the reason you need an alternative drug below.

[1] Patient allergic to recommended drug(s)  
[2] Decreased renal clearance  
[3] Liver secretory or metabolic impairment  
[4] Drug interaction  
[5] Patient has multiple infections requiring antimicrobials  
[6] Adjust therapy based on antimicrobial susceptibility  
[7] Other adverse drug affect  
[8] Other reason

Note: Alternative antimicrobial selections will be reviewed and we may contact prescribers to learn more about situations that need alternatives, improve the CDSS, and in some cases offer suggestions.

**Clarification/Comments:**

08 Please Click Here to send comments to the CDSS team  
10 Information about drug allergies...  
14 Need additional help? Consult Infectious Diseases (7-340)

**List of antimicrobials**

ALTERNATIVE ANTIMICROBIA

02	Acyclovir IV	90	Ganciclovir IV
04	Acyclovir PO	96	Gentamicin IV
10	Amikacin IV	102	Itraconazole PO
12	Amoxicillin PO	103	Levofloxacin IV
14	Amoxicillin-clavulanate PO	104	Levofloxacin PO
15	Amoxicillin/clavulanate ER PO	106	Meropenem IV
16	Amphotericin B IV	108	Metronidazole IV
18	Ampicillin IV	110	Metronidazole PO
20	Ampicillin-sulbactam IV	112	Metronidazole Vaginal
22	Atovaquone PO	114	Minocycline PO
24	Azithromycin IV	116	Moxifloxacin Ophthalmic
26	Azithromycin PO	118	Nafcillin IV
28	Aztreonam IV	120	Neomycin PO
30	Benzathine Penicillin IM	122	Nitrofurantoin PO
34	Cefazolin IV		Oseltamivir (see Influenza Menu)
35	Cefixime PO	126	Penicillin PO
36	Cefepime IV	128	Penicillin IV
37	CEFDOTETAN IV	130	Piperacillin/Tazobactam IV
38	Cefoxitin IV	132	Pyrimethamine PO
39	Cefpodoxime PO	136	Rifampin IV
40	Ceftazidime IV	138	Rifampin PO
42	Ceftriaxone IM	146	Sulfacetamide OPTH
44	Ceftriaxone IV	148	Sulfadiazine PO
46	Cefuroxime PO	149	Terbinafine PO
48	Cephalexin PO	150	Terconazole 0.4% Vaginal

Reason for alternative antimicrobial menu

Alternative Antimicrobials menu

Figure 8. Navigating to the Alternative Antimicrobials menu

**Pertussis**

2 Select here for help, legend, consults, alternative antimicrobials and more (lp)

**PERTUSSIS**

Pertussis is associated with persistent cough in adolescents and adults. Immunity conferred by pertussis vaccine wanes after about 10 years. The first 1 to 2 weeks of disease resembles viral upper respiratory infection. After this, the characteristic cough with whoop is present for 1 to 6 weeks, followed by a 2 to 3 week period of gradual resolution.

4 Diagnosis of pertussis  
6 Prevention of pertussis

**Treatment**

8 Azithromycin 500 mg PO x 1 then 250 mg QD for 4 days (\$[M])

**Alternative for macrolide intolerant or allergic patients**

10 Trimethoprim/sulfamethoxazole 1 DS tablet PO BID for 7 days (\$) [R,D,I]

12 References

**Antimicrobial information. Coding is defined within the Legend located in the General Information menu (see below).**

**Disease specific menu with recommendations**

**GENERAL INFORMATION**

2 Help and Additional Information Menu  
3 Infectious Diseases Consult  
4 Consult Menu - place consults to specialty service  
6 Antibiogram  
8 Alternative Antimicrobials to CDSS Recommendations - select here  
10 Contact Information  
12 Antimicrobial Information

**LEGEND**

14 Important Drug Properties  
[D] = Important interactions between antimicrobial and other drugs  
[H] = Hepatic excretion of antimicrobial  
[M] = Minimal risk posed by antimicrobial  
[O] = Other important antimicrobial property  
[R] = Renal excretion of antimicrobial

16 Antimicrobial Cost Information  
(\$) = <10 dollars per day  
(\$\$) = 10-50 dollars per day  
(\$\$\$) = 51-100 dollars per day  
(\$\$\$\$) = 101-400 dollars per day  
(\$\$\$\$\$) = > 400 dollars per day

**IMPORTANT DRUG PROPERTIES PAGE ++**

Select below for drug info from online database

4 Acyclovir PO  
6 Acyclovir IV  
8 Albendazole PO  
10 Anaradine PO  
12 Amikacin IV  
14 Amoxicillin PO  
16 Amoxicillin-clavulanate PO  
18 Amphoterin B IV  
20 Ampicillin IV  
22 Ampicillin-sulbactam IV  
24 Atovaquone PO  
26 Azithromycin PO  
28 Azithromycin IV  
30 Aztreonam IV  
32 Benzathine penicillin IM  
34 Caspofungin IV  
36 Cefazolin IV  
38 Cefepime IV  
40 Cefixime PO  
42 Cefotaxim IV  
44 Cefotaxim IV  
46 Cefpodoxime PO  
48 Ceftriaxone IV  
50 Ceftriaxone IM  
52 Ceftriaxone IV  
54 Cefuroxime PO  
56 Cephalexin PO  
58 Chloramphenicol IV  
60 Ciprofloxacin PO  
62 Ciprofloxacin IV  
64 Clarithromycin PO  
66 Clindamycin PO  
68 Clindamycin IV  
70 Clindamycin Vaginal  
72 Clofazimine Topical

**Select antimicrobial to navigate to Sanford Guide website for additional drug information**

**\*Note: Sanford Guide links to specific antimicrobial information is only available in the Minneapolis VAHCS Antimicrobial CDSS**

**General Information Menu**  
**Figure 9. Drug information resources**

**Important Drug Properties Menu**

## References

1. Filice et al. *Use of a Computer Decision Support System and Antimicrobial Therapy Appropriateness, infection control and hospital epidemiology*. 2013, 34.6
2. Rawson et al. *A systematic review of clinical decision support systems for antimicrobial management*. *Clinical Microbiology and Infection*. 2017; 1e9
3. Dellit et al. *Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America Guidelines for Developing an Institutional Program to Enhance Antimicrobial Stewardship*. *Clinical Infectious Diseases* 2007; 44:159–77