Clostridium difficile (C. Diff) Infection Treatment Pathway

IDENTITY
Citation
· Flores et al, Clostridium difficile (C. Diff) Infection Treatment Pathway, Penn Medicine Center for Evidence-based Practice (CEP) 04 2018, Available at: https://cds.ahrq.gov/cdsconnect/artifact/clostridium-difficile-c-diff-infection-cdi-treatment-pathway

Date Released
· 2018-10-31

GEM Cut History
GEM Cut Version: 1
· GEM Cut Author: Jeremy Michel
· GEM Cut Date 02/19/2019

DEVELOPER
Developer Name
· Penn Medicine Center for Evidence-based Practice (CEP)

Conflict Of Interest Policy
Conflict Of Interest Disclosure

PURPOSE
Objective

INTENDED AUDIENCE
Intended Users
· Intended for use by providers delivering care in an inpatient setting

Care Setting
· inpatient setting

METHOD OF DEVELOPMENT
Rating Scheme
Evidence Quality Rating Scheme
Recommendation Strength Rating Scheme
Qualifying Statement
Patient And Public Involvement

TARGET POPULATION
Eligibility
Adults patients in the acute care setting who have a positive CDI test and signs and symptoms of CDI or high clinical suspicion (e.g. temperature > 101.3F, high white blood count, >= three documented liquid stools in 24-hours)

Inclusion Criterion
· positive CDI test
· signs and symptoms of CDI
- high clinical suspicion (e.g. temperature > 101.3F, high white blood count, >= three documented liquid stools in 24-hours
- adult patient
- inpatient setting

**Exclusion Criterion**
- N/A

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**KNOWLEDGE COMPONENTS**

**DEFINITIONS**

**RECOMMENDATION:** D1: Pathway Inclusion

**Conditional:** Begin C. diff pathway if inpatient, positive C. diff test AND clinical signs/symptoms consistent with CDI {Rec_1:Cond_1}

**Notes:** Not progressing to CDS development as Project presumes CDI and another pathway is used for diagnosis.

**RECOMMENDATION:** D2: Pathway Inclusion

**Conditional:** Begin C. diff pathway if inpatient and high clinical suspicion (e.g. fever, high white blood cell count, >= 3 documented liquid stools in 24 hours) {Rec_23:Cond_23}

**Notes:** Not progressing to CDS development as Project presumes CDI and another pathway is used for diagnosis.

**RECOMMENDATION:** O1: Stop Antibiotics

**Conditional:** When starting the C. diff pathway if possible STOP precipitating antibiotic(s). Discontinue therapy with inciting antibiotic agent(s) as soon as possible, as this may influence the risk of CDI recurrence. {Rec_22:Cond_22}

**Decision Variable:** CDI
- **Value:** true
- **Action:** stop antibiotics (except those for CDI) IF possible.
  - **Value:** antibiotics
  - **Type:** prevent
  - **Benefit:** this may influence the risk of CDI recurrence
  - **Actor:** clinician
  - **Verb:** discontinue if possible
  - **Complement:** if possible
  - **Deontic:** should
  - **Risk/Harm:** antibiotics may be needed for another illness

**Logic:**
If
CDI is [true]
Then
stop antibiotics (except those for CDI) IF possible.

Notes: Intervention would require BPA and is therefore excluded from Penn Process. However, will be useful for CQL representation of topic as other sites may have different limitations.

RECOMMENDATION: O2: Stop Laxatives

| Conditional: When starting the C. diff pathway if possible STOP laxatives. |
| {Rec_21:Cond_21 } |
| **Decision Variable:** CDI |
| **Value:** true |
| **Action:** if possible STOP laxatives. |
| **Value:** laxatives |
| **Type:** prevent |
| **Benefit:** prevent continued diarrhea |
| **Actor:** clinician |
| **Complement:** is possible |
| **Deontic:** should |
| **Risk/Harm:** may be needed for non-diarrheal illness (hepatic encephalopathy) |
| **Logic:** |
| If |
| CDI is [true] |
| Then |
| if possible STOP laxatives. |

RECOMMENDATION: O3: Avoid anti-peristaltic agents

| Conditional: When starting the C. diff pathway avoid anti-peristaltic agents. {Rec_20:Cond_20 } |
| **Decision Variable:** CDI |
| **Value:** true |
| **Action:** avoid anti-peristaltic agents |
| **Value:** anti-peristaltic agents |
| **Type:** prevent |
| **Actor:** clinician |
| **Deontic:** should |
| **Logic:** |
| If |
| CDI is [true] |
| Then |
| avoid anti-peristaltic agents |
RECOMMENDATION: D3: Dx Recurrent CDI

**Conditional:** Diagnose as recurrent CDI if positive C. diff test with recurrent symptoms attributable to CDI within 8 weeks of successfully completing treatment for previous CDI that was associated with interval improvement. {Rec_19:Cond_19 }

**Decision Variable:** CDI

- **Value:** true

**Decision Variable:** CDI treatment completed within last 8 weeks prior to this CDI

- **Value:** true

**Action:** Diagnose as recurrent CDI

- **Value:** CDI, recurrent
- **Type:** conclude
- **Actor:** clinician

**Logic:**

If
CDI is [true]
AND
CDI treatment completed within last 8 weeks prior to this CDI is [true]
Then
Diagnose as recurrent CDI

RECOMMENDATION: D4: Dx Refractory CDI

**Conditional:** Diagnose as refractory CDI if lack of symptomatic improvement to appropriate prescribed treatment for CDI. {Rec_18:Cond_18 }

**Decision Variable:** CDI

- **Value:** true

**Decision Variable:** symptom improvement

- **Value:** false

**Action:** Diagnose as refractory CDI

- **Value:** CDI, refractory
- **Type:** conclude
- **Actor:** clinician

**Logic:**

If
CDI is [true]
AND
symptom improvement is [false]
Then
Diagnose as refractory CDI
**RECOMMENDATION:** C1: Manage of Refract. CDI

**Conditional:** If refractory CDI is suspected consider alternative causes for infection. {Rec_17:Cond_17 }

- **Decision Variable:** CDI, refractory
  - **Value:** suspected
- **Action:** consider alternative causes for infection
  - **Value:** source of infection
  - **Type:** test/inquire
  - **Actor:** clinician

**Logic:**

If
CDI, refractory is [suspected]
Then
consider alternative causes for infection

**Notes:** Not encodable.

**RECOMMENDATION:** R1: Manage of Refract. CDI

**Conditional:** If refractory CDI is suspected consult infectious disease. {Rec_16:Cond_16 }

- **Decision Variable:** CDI, refractory
  - **Value:** suspected
- **Action:** consult infectious disease
  - **Value:** infectious disease
  - **Type:** refer/consult
  - **Actor:** clinician

**Logic:**

If
CDI, refractory is [suspected]
Then
consult infectious disease

**RECOMMENDATION:** L1: Evaluation, first Episode

**Conditional:** If first (i.e. non-recurrent) CDI obtain OR ensure has obtained within the last 24 hours CBC and BMP. {Rec_15:Cond_15 }

- **Decision Variable:** CDI
  - **Value:** true
- **Decision Variable:** CBC (with differential) within past 24 hours
  - **Value:** true
- **Decision Variable:** BMP within past 24 hours
  - **Value:** true
- **Action:** CBC with differential
  - **Value:** CBC with differential
  - **Type:** test
**Actor:** clinician  
**Deontic:** must  
**Action:** BMP  
**Value:** BMP  
**Type:** test  
**Actor:** clinician  
**Deontic:** must  

**Logic:**

If  
CDI is [true]  
AND  
NOT  
(CBC (with differential) within past 24 hours is [true]  
OR BMP within past 24 hours is [true] )  
Then  
CBC with differential  
AND  
BMP

**Notes:** first or not first CDI not relevant to action  
**Notes:** Assumed CBC with diff'  
**Notes:** Should be split into two action steps: If no CBC just get CBC if no BMP just get BMP

**RECOMMENDATION:** D3: Dx CDI Severity Non-Severe  
**Conditional:** If recurrent CDI and first recurrence then treat with  
vancomycin 125 mg PO Q6H for 10 days (especially if  
previously treated with metronidazole) OR vancomycin  
tapered regimen (see pathway).  

{Rec_14:Cond_3}

**Decision Variable:** CDI  
**Value:** true  
**Decision Variable:** if previously treated with metronidazole  
**Value:** true  
**Decision Variable:** if previously treated with vancomycin  
**Value:** false  
**Decision Variable:** CDI, recurrent  
**Value:** true  
**Decision Variable:** CDI recurrence count  
**Value:** 1  
**Action:** treat with vancomycin 125 mg PO Q6H for 10 days  
**Logic:**

If  
CDI is [true]  
AND  
if previously treated with metronidazole is [true]
AND if previously treated with vancomycin is [false]
AND CDI, recurrent is [true]
AND CDI recurrence count is [1]
Then treat with vancomycin 125 mg PO Q6H for 10 days

**Conditional:** Diagnose patient presenting with non-recurrent CDI as "CDI, non-severe" if WBC less than 15,000 cells/mL AND Cr less than 1.5 mg/dl. \{Rec_14:Cond_14 \}

**Decision Variable:** WBC  
**Value:** greater than 15,000 cells/mL

**Decision Variable:** CDI  
**Value:** true

**Decision Variable:** Creatinine  
**Value:** less than 1.5 mg/dL

**Action:** Diagnose patient presenting with non-recurrent CDI as "CDI, non-severe"
  
  **Value:** cdi, non-severe

**Type:** conclude

**Logic:**

If  
CDI is [true]  
AND  
WBC is [greater than 15,000 cells/mL]  
AND  
Creatinine is [less than 1.5 mg/dL]
Then  
Diagnose patient presenting with non-recurrent CDI as "CDI, non-severe"

**RECOMMENDATION:** D4: Dx CDI Severity Severe

**Conditional:** Diagnose patient presenting with non-recurrent CDI as "CDI, severe" if WBC above or equal to 15,000 cells/mL or Cr above or equal to 1.5 mg/dl. \{Rec_13:Cond_13 \}

**Decision Variable:** CDI  
**Value:** true

**Decision Variable:** WBC  
**Value:** above or equal to 15,000 cells/mL

**Decision Variable:** Creatinine  
**Value:** above or equal to 1.5 mg/dL

**Action:** Diagnose patient presenting with non-recurrent CDI as "CDI, severe"
  
  **Value:** CDI, severe
Type: conclude  
Actor: clinician  

Logic:

If  
CDI is [true]  
AND  
WBC is [above or equal to 15,000 cells/mL]  
AND  
Creatinine is [above or equal to 1.5 mg/dL]  
Then  
Diagnose patient presenting with non-recurrent CDI as "CDI, severe"

RECOMMENDATION: D5: Dx CDI Severity Fulminant  
Conditional: Diagnose patient presenting with non-recurrent CDI as "CDI, fulminant" if sepsis with acute organ dysfunction OR septic shock OR abdominal signs/symptoms (vomiting, distention) concerning for ileus, toxic megacolon. {Rec_12:Cond_12}  

Decision Variable: sepsis with acute organ dysfunction  
Value: true  
Decision Variable: septic shock  
Value: true  
Decision Variable: abdominal signs/symptoms (vomiting, distention) concerning for ileus, toxic megacolon  
Value: true  
Action: Diagnose patient presenting with non-recurrent CDI as "CDI, fulminant"  
Value: CDI, fulminant  
Type: conclude  
Actor: clinician

RECOMMENDATION: O4: Non-Fulminant CDI, off ABX  
Conditional: If CDI and not on antibiotics, treat with vancomycin, 125 mg q6h for 10 days {Rec_11:Cond_11}  

Decision Variable: CDI  
Value: true  
Decision Variable: CDI severity  
Value: non-severe  
Value: severe  
Decision Variable: antibiotics (not used for CDI)  
Value: false  
Action: treat with vancomycin, 125 mg q6h for 10 days  
Value: vancomycin  
Type: prescribe  
Logic:
If
CDI is [true]
AND
CDI severity is [non-severe, severe]
AND
antibiotics (not used for CDI) is [false]
Then
treat with vancomycin, 125 mg q6h for 10 days

RECOMMENDATION: O5: Non-Fulminant CDI, on ABX

Conditional: If CDI and on antibiotics, treat with vancomycin, 125 mg q6h for 10 days minimum but consider extending the treatment course for 7 days beyond the current course of treatment.

Decision Variable: CDI
Value: true

Decision Variable: CDI severity
Value: non-severe
Value: severe

Decision Variable: antibiotics (not used for CDI)
Value: true

Action: treat with vancomycin, 125 mg q6h for 10 days
Value: vancomycin
Type: prescribe

Action: consider extending the treatment course for 7 days beyond the current course of treatment (of other antibiotics)
Value: vancomycin
Type: prescribe

Logic:

If
CDI is [true]
AND
CDI severity is [non-severe, severe]
AND
antibiotics (not used for CDI) is [true]
Then
treat with vancomycin, 125 mg q6h for 10 days
AND
consider extending the treatment course for 7 days beyond the current course of treatment (of other antibiotics)

RECOMMENDATION: O7: Fulminant CDI
Conditional: If diagnosed with fulminant CDI and no C. diff test has been ordered, order a C. diff test to confirm. {Rec_9:Cond_9 }

Decision Variable: CDI severity
Value: fulminant

Decision Variable: CDI
Value: true

Decision Variable: C. diff test
Value: false

Action: Order a C. diff test to confirm
Value: C. diff
type: test

Logic:

If
CDI severity is [fulminant]
AND
CDI is [true]
AND
C. diff test is [false]
Then
Order a C. diff test to confirm

RECOMMENDATION: O8: Fulminant CDI

Conditional: If diagnosed with fulminant CDI, abdominal x-ray or CT is recommended if abdominal signs/symptoms (vomiting, distention) concerning for ileus, toxic megacolon. {Rec_8:Cond_8 }

Decision Variable: CDI
Value: true

Decision Variable: CDI, fulminant
Value: true

Decision Variable: abdominal signs/symptoms (vomiting, distention) concerning for ileus, toxic megacolon.
Value: true

Action: abdominal x-ray
Value: abdominal x-ray
type: test

Action: abdominal CT
Value: abdominal CT
type: test

Logic:

If
CDI is [true]
AND
CDI, fulminant is [true]
AND abdominal signs/symptoms (vomiting, distention) concerning for ileus, toxic megacolon. is \[true\]
Then abdominal x-ray OR abdominal CT

RECOMMENDATION: R2: Fulminant CDI

**Conditional:** If diagnosed with fulminant CDI, surgical and infectious disease consults are recommended \{Rec_7:Cond_7\}

**Decision Variable:** CDI
- **Value:** true

**Decision Variable:** fulminant CDI
- **Value:** true

**Action:** consult surgery
- **Value:** surgery
- **Type:** refer/consult

**Action:** consult infectious disease
- **Value:** infectious disease
- **Type:** refer/consult

RECOMMENDATION: O9: Fulminant CDI

**Conditional:** If diagnosed with fulminant CDI, and NO significant abdominal findings treat with vancomycin 500 mg PO/NG Q6h x 14 days AND metronidazole 500 mg IV Q8H x 14 days. \{Rec_6:Cond_6\}

**Decision Variable:** CDI
- **Value:** true

**Decision Variable:** CDI, fulminant
- **Value:** true

**Decision Variable:** significant abdominal findings
- **Value:** false

**Action:** prescribe vancomycin 500 mg PO/NG Q6h x 14 days
- **Value:** vancomycin
- **Type:** prescribe

**Action:** prescribe metronidazole 500 mg IV Q8H x 14 days.
- **Value:** metronidazole
- **Type:** prescribe

**Logic:**

If CDI is \[true\] AND CDI, fulminant is \[true\] AND
significant abdominal findings is [false]
Then
prescribe vancomycin 500 mg PO/NG Q6h x14 days
AND
prescribe metronidazole 500 mg IV Q8H x 14 days.

RECOMMENDATION: O10: Fulminant CDI

Conditional: If diagnosed with fulminant CDI, and significant abdominal findings treat with vancomycin 500 mg PO/NG Q6h x14 days
vancomycin retention enema 500 mg in 100 mL sterile water q6h x14 days AND metronidazole 500 mg IV Q8H x 14 days.

{Rec_5:Cond_5 }

Decision Variable: CDI
Value: true
Decision Variable: CDI, fulminant
Value: true
Decision Variable: significant abdominal findings
Value: true
Action: vancomycin 500 mg PO/NG Q6h x14 days
  Value: vancomycin
  Type: prescribe
Action: vancomycin retention enema 500 mg in 100 mL sterile water q6h x14 days
  Value: vancomycin retention enema
  Type: prescribe
Action: metronidazole 500 mg IV Q8H x 14 days
  Value: metronidazole
  Type: prescribe

Logic:

If
CDI is [true]
AND
CDI, fulminant is [true]
AND
significant abdominal findings is [true]
Then
vancomycin 500 mg PO/NG Q6h x14 days
AND
vancomycin retention enema 500 mg in 100 mL sterile water q6h x14 days
AND
metronidazole 500 mg IV Q8H x 14 days

RECOMMENDATION: M1: Monitoring
Conditional: If following CDI pathway and no improvement within 5 days consider alternative diagnosis and consult infectious disease.

{Rec_4:Cond_4 }

Notes: Out of scope for project

RECOMMENDATION: O11: First recurrence

Conditional: If recurrent CDI and first recurrence and treated with vancomycin consider vancomycin tapered regimen (see pathway). {Rec_3:Cond_24 }

Decision Variable: CDI
Value: true

Decision Variable: treated with vancomycin
Value: true

Decision Variable: CDI, recurrent
Value: true

Decision Variable: CDI recurrence count
Value: 1

Action: consider vancomycin tapered regimen (see pathway).
Value: vancomycin tapered regimen (see pathway).
Type: prescribe

Logic:

If
CDI is [true]
AND
treated with vancomycin is [true]
AND
CDI, recurrent is [true]
AND
CDI recurrence count is [1]
Then
consider vancomycin tapered regimen (see pathway).

Conditional: If recurrent CDI and first recurrence then treat with vancomycin 125 mg PO Q6H for 10 days (especially if previously treated with metronidazole) {Rec_3:Cond_25 }

Decision Variable: CDI
Value: true

Decision Variable: CDI, recurrent
Value: true

Decision Variable: CDI recurrence count
Value: true

Decision Variable: treated with metronidazole
Value: true

Decision Variable: treated with vancomycin
Value: false

Action: prescribe vancomycin 125 mg PO Q6H for 10 days
Value: vancomycin
Type: prescribe

Logic:

If
CDI is [true]
AND
CDI, recurrent is [true]
AND
CDI recurrence count is [true]
AND
treated with metronidazole is [true]
AND
treated with vancomycin is [false]
Then
prescribe vancomycin 125 mg PO Q6H for 10 days

RECOMMENDATION: O12: Multiple recurrence

Conditional: If recurrent CDI and not first recurrence then treat with vancomycin taper (see pathway), consider infectious disease consult for fecal microbiota transplantation.

{Rec_2:Cond_2}

Decision Variable: CDI
Value: true

Decision Variable: CDI, recurrent
Value: true

Decision Variable: CDI, recurrent count
Value: 2+

Action: treat with vancomycin taper (see pathway)
Value: vancomycin
Type: prescribe

Action: consider infectious disease consult for fecal microbiota transplantation
Value: infectious disease for fecal microbiota transplantation
Type: refer/consult

Logic:

If
CDI is [true]
AND
CDI, recurrent is [true]
AND
CDI, recurrent count is [2+]
Then
treat with vancomycin taper (see pathway)
AND
consider infectious disease consult for fecal microbiota transplantation

ALGORITHM:

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