

International Infection Control Council

Global consensus conference on infection prevention and control practice for *Clostridium difficile* associated disease (CDAD)

BACKGROUND

The International Infection Control Council is comprised of three infection prevention and control organizations headquartered in the United States, Canada and the United Kingdom: The Association for Professionals in Infection Control and Epidemiology, Inc. (APIC), the Community and Hospital Infection Control Association – Canada (CHICA-Canada), and The Infection Control Nurses Association (ICNA now known as the Infection Prevention Society).

The International Infection Control Council was established in 1997. The concept for its inception was to add to the expert resources available to members of the three organizations through collaborative development of projects of mutual interest. The first project was a consensus conference on infection control issues and antimicrobial resistance. It was held in Toronto in 1999.

The recommendations from that consensus conference can be found on the associations' websites. In addition to the planning of this conference, the Council undertook the development and publication of three toolkits: The Infection Control Toolkit for Pandemics and Disasters (2004), The Infection Control Toolkit for Emergencies and Disasters (revised 2007) and the Toolkit for Best Infection Control Practices for Patients with Extended Spectrum beta Lactamase Enterobacteriaceae (ESBL).

The purpose of the current consensus conference was to bring experts from the three countries together to discuss issues surrounding *Clostridium difficile* associated disease. There were three plenary sessions that framed the issues for each country (US, Canada and UK). Then each invited expert was assigned to two of four workshops: Surveillance and Epidemiology; Environment and Equipment; Treatment Measures/Antimicrobials; and Control Measures.

EXECUTIVE SUMMARY OF CONFERENCE

With the increase in *C. difficile* disease in the 21st century, the International Infection Control Council recognized the need to address various infection prevention and control questions. This conference brought together experts from the United States, Canada and the United Kingdom to discuss these questions and propose consensus recommendations. Areas for further research were also outlined. The discussions focused on four areas: Surveillance and Epidemiology; Environment and Equipment; Treatment; and Control Measures. Questions were posed by facilitators and scribes outlined the recommendations.

All groups determined that practices should be consistent regardless of healthcare setting. Key points made include the following:

1. Surveillance is important for healthcare facilities. However there is little value in nominal reporting to public health.
2. Consistent case definitions and rate denominators will assist in making comparisons.
3. Use of contact precautions is important to control spread of disease. Hand hygiene using soap and water or alcohol based hand rub is a critical part of the precautions.
4. Environmental cleaning must occur using a sporicidal agent.
5. A major equipment issue is the use and management of bedpans.
6. Antibiotic stewardship is as important as any other control measure.



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Global consensus conference on infection prevention and control practice for *Clostridium difficile* associated disease (CDAD)

SYNTHESIS OF QUESTIONS AND CONSENSUS

Surveillance and Epidemiology

ASSUMPTIONS:

- Surveillance is a tool for quality improvement and better patient outcomes.
- Objectives and criteria of surveillance should be clearly defined.
- It is part of a quality management system and is a valuable component to control CDAD.
- Surveillance is necessary to track trends and pose questions for control.
- Surveillance requires skills, knowledge and definitions to collect and analyze information.

1. Is there an implication for the public?

There should be increased public awareness regarding adverse effects of inappropriate and appropriate use of antibiotics.

There is limited information about *C. difficile* spread into the community or community-associated CDAD. Using sentinel sites would provide a baseline to use for later comparison. Objectives for surveillance are different depending on the sector. There is no evidence to support community surveillance but institutional surveillance of healthcare-facility-associated cases of CDAD is necessary. There may be a role for sentinel sites performing community surveillance (tracking disease burden, trends, and changing epidemiology).

Institutions should capture cases of CDAD at point of entry which will assist with a better understanding of the risk of CDAD in the community.

2. What should be the role of Public Health? Are there implications regarding disclosure?

- The purpose of public reporting is education, for instance:
 - Public messaging about the adverse effects of antibiotic use.
 - Raising public awareness of infection control, hygiene, etc.
 - Disclosure of new diseases or increasing incidence of a known disease.
- Information must be easy to understand with consistency in methodology of data.
- Non-disclosure may lead to more problems as there will be the perception that something is being hidden.

3. Should *C. difficile* be reportable? What is rationale? If yes, should it be reportable by name or by rate only?

The value of mandatory reporting to Public Health is unclear. Mandatory reporting may be beneficial in a framework for improvement. There is no evidence that nominal reporting (i.e., names and pertinent demographic data) is of any benefit in the control of CDAD.

Methods of reporting may vary however laboratory reporting of positive CDAD results or aggregate data per health care institution seem appropriate.

International Infection Control Council

Global consensus conference on infection prevention and control practice for *Clostridium difficile* associated disease (CDAD)

4. Should rates be provided to the general public? Who should have access to the surveillance reports?

The following groups should have this information:

- Institutions
- Local public health
- State/regional/provincial health authority
- Regional infection control networks (where they exist)
- Public

Disseminating surveillance reports

- When surveillance information is provided to people, they need to know what to do with it and how to use it appropriately.
- Define the purpose for dissemination of surveillance reports such as opportunities for benchmarking and to improve patient care.
- Disseminate surveillance reports widely within the institution to raise the awareness of deficiencies in infection prevention and control and drive appropriate antibiotic usage.

5. Can surveillance data be used to show other benefits?

Surveillance can determine if interventions have had their expected impact. Surveillance data can be used to investigate associations with other things that might impact healthcare-associated infection rates (e.g., length of stay, ratios of bathrooms/patient).

6. What are the criteria for a case definition of CDAD?

1. Positive toxin assay A or B/culture of toxigenic strain AND diarrhoea (loose bowel movement that conforms to shape of the container) or symptoms of ileus or toxic megacolon
2. Pseudomembranous colitis or histopathology consistent with *C. difficile*

Laboratory

Do not test formed stools or asymptomatic patients. It is preferable to perform toxin testing prior to initiation of antibiotic treatment for CDAD. Test stool for the presence of Toxin A and B. This may be achieved by screening stool for GD (glutamate dehydrogenase) antigen and then testing those stools that are GD (+) using an assay that detects both Toxin A and B. If toxin tests (e.g. two or more) are negative and there is a suspicion of CDAD, re-test using an alternative test such as culture (any *C. difficile* isolates detected need to be confirmed as toxigenic) or the CPE assay.

Laboratory must be adequately resourced for testing and typing that is required (e.g., culturing).

All facilities should have *C. difficile* testing available 7 days per week, especially in outbreak situations. Laboratory results have an impact on treatment and resource allocations, therefore earlier diagnosis is imperative.

International Infection Control Council

Global consensus conference on infection prevention and control practice for *Clostridium difficile* associated disease (CDAD)

7. What denominators should be used?

Be consistent; use the same denominator over time. Patient-days is a better indication of patient risk, particularly in facilities with long-term stays. [Exclude psychiatry and neonatology]. Patient-days facilitate inter-institution comparisons. However, describing rates per patient-admissions may be more intelligible to the general public.

Rates:

Determine institution-wide rates, unit rates, and service/program-specific rates. Clearly define hospital setting and population at risk. Use onset after 48 hours of admission for defining nosocomial *C. difficile*. Post-discharge, consider CDAD to be nosocomial if discharged and readmitted within 4-8 weeks. If symptoms recur within 8 weeks, this is considered to be a relapse.

8. What role does patient screening or HCW screening play in reducing CDAD?

- No evidence to support the effectiveness of toxin assay testing on formed stool or culture of asymptomatic individuals.
- Consider focusing screening on all patients with diarrhoea who are on antibiotics.
- There is no value in routine screening of healthcare workers.

9. Is benchmarking an effective management strategy?

Benchmarking is used for comparability, can provide feedback that leads to actions and improved outcomes however:

- There are no established benchmarks for *C. difficile*
- Aggregate data have limitations in the identification of cases due to relapse or detecting multiple transfers of the same case
- Risk stratification is difficult

Best rate is lowest rate possible and ideally the goal should be zero.

10. What constitutes an outbreak? What are the criteria for transmissibility?

- Cases are those that occur 48 hours after admission
- Increase in number of cases that are related in space and time above baseline
- Any cluster of cases should spark an investigation
- Be aware of the possibility of inter-institution transmission
- In any institution that has not had CDAD cases, presence of any number of new cases could be an outbreak

11. Should surveillance information include capturing information on severity of illness?

This is resource intensive and not required for routine surveillance. However, it may be possible for short-term or targeted surveillance.

12. Should there be different surveillance practices for different settings?

There should be no difference in methods.

International Infection Control Council

Global consensus conference on infection prevention and control practice for *Clostridium difficile* associated disease (CDAD)

13. Should previously known cases be identified (electronically flagged) in an institution?

If a setting treats all patients with diarrhoea as presumptive CDAD, the flag is not of value. In other settings, a flag will initiate action. If a previously identified case is readmitted with diarrhoea, Contact Precautions can be initiated immediately and can be a tool to assist in earlier treatment.

Control Measures including Hand Hygiene and Barriers

ASSUMPTIONS:

- Action taken for all patients at the onset of diarrhoea and after a risk assessment for CDAD is completed. (See risk assessment below.)
- Ingestion of spores is the most common mode of transmission – contaminated hands (patient and staff) are assumed to be main vector.
- Patients who have had a colectomy following CDAD – should be managed as if they are infectious, although the period of infectivity is unknown.
- A common definition of diarrhoea is established for the institution.
- Standard Precautions/Routine Practices will be used for all patient care.
- Contact Precautions refers to specific measures taken to prevent transmission by both direct and indirect routes. Contact Precautions are part of the guidelines for transmission-based precautions from the Centers for Disease Control and Prevention and Public Health Agency of Canada.

Risk assessment for CDAD:

- Rule out other causes
- Clinical symptoms and history
- Prior antimicrobial exposure

1. When and what kind of control measures are needed?

Use Contact Precautions:

- NO roommates (unless roommate has CDAD)
- NO room transfers (unless medically necessary)
- NO shared toilets
- Clear signage (at door, effective to stop people at entry requiring them to apply personal protective equipment)

Interim measures if no private room

- Contact precautions even if not in single room.
- Dedicated commode to patient with CDAD.
- Rooms with more than one bed should have clear demarcation of individual bed space.
- Delineation of bed space can be accomplished with marks on the floor, e.g., with tape, and curtains drawn as a temporary measure.

Patient mobility

- Important to continue mobilization unless patient has faecal incontinence; restrict only if incontinent.



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Global consensus conference on infection prevention and control practice for *Clostridium difficile* associated disease (CDAD)

- Unrestricted activity is permissible as long as hand hygiene is performed and information provided for patient regarding dedicated toilet use.
- Isolation gowns and gloves are not required to be worn by the patient when outside their room.
- Clothes worn by the patient should be clean and should not be physically soiled.

Hydrotherapy is permitted as long as patient is continent and proper disinfection processes for pool or tub are followed.

Personal Care Items:

- are to be dedicated to the patient
- discard or reprocess after the patient is discharged
- do not share items such as lotion containers

Education/Information sheet: to be provided for patients, family/visitors, staff.

Personal Protective Equipment:

- Gloves and gowns are required upon entering room or bed space (donning and removal as per Contact Precautions).
- Requirements for personal protective equipment should be listed on the signage at point of entry to the room or bed space.

Healthcare workers and other staff should remain off work when experiencing diarrhoea (unless there is a known underlying non-infectious cause).

2. When should the use of these measures be initiated and when should they be discontinued?

IMPLEMENTATION

At onset of diarrhoea or after notification of *C. difficile* lab result – ‘whichever comes first’

- If challenged for single rooms, consider a matrix for prioritizing patients who require Contact Precautions
- Conduct daily ward rounds to identify people with diarrhoea (syndromic surveillance) particularly during outbreak situations

DISCONTINUATION

A. Presumptive/suspect patient with diarrhoea

- Two stools, at least one day apart, that are negative for *C. difficile* toxin
- Other laboratory investigation (e.g. culture or CPE assay) may be required if clinical symptoms highly suggestive of CDAD despite two stools that are negative for *C. difficile* toxin antigen.

B. Confirmed CDAD positive patient

- Discontinue isolation precautions when clinical staff deem the diarrhoea has resolved according to established criteria, in consultation with Infection Prevention and Control

International Infection Control Council

Global consensus conference on infection prevention and control practice for *Clostridium difficile* associated disease (CDAD)

- A reasonable approach is to discontinue precautions when patient is symptom free (i.e., no diarrhoea) for 48-72 hours (regardless of whether patient is on or off of CDAD therapy).
- Terminal room cleaning must occur prior to admitting other patients to share the same room.

Test results

- Early diagnosis is important, therefore rapid test methods are recommended.
- Ensure positive CDAD results are urgently reported as “critical results” to ward/unit and Infection Prevention and Control.
- It is not necessary to have a negative laboratory result to discontinue precautions for patient with confirmed CDAD as spores will continue to be excreted on a sporadic basis even when diarrhoea resolves and patient is not ill (i.e., do NOT perform any “laboratory test of cure”). Transmission is not likely with a patient with formed stool.

3. Who starts Contact Precautions?

- Caregiver/Ward to implement Contact Precautions (recommend that Infection Prevention and Control follow-up to ensure patient is on isolation)
- Nurses empowered to implement Contact Precautions

4. What is the most effective method of hand hygiene and under what circumstances?

- Observe meticulous hand hygiene with soap and water or alcohol based hand rub (ABHR).
 - Soap and water for full 15-30 seconds is **theoretically** more effective in removing spores from *C. difficile* contaminated hands than ABHR.
 - When a hand wash sink is immediately available for staff then hands should be washed with soap and water after glove removal.
 - Gloves are to be used per Contact Precautions. When gloves are worn ABHR may be used after glove removal when a sink for soap and water hand washing is not readily accessible.
 - ABHR has been used to successfully control outbreaks.

Optimally, hand hygiene should not be carried out in a patient sink as this will re-contaminate healthcare worker's hands.

Education should be provided to the patient on the need and procedure to be used for hand hygiene e.g. prior to eating, when leaving room. Hand wipes should be available for patients who cannot get to hand sink.

Maintenance of skin integrity is an integral part of hand hygiene.

5. Should there be different practices for different settings?

Regardless of setting, all health care providers should follow the same principles: implementation may vary.

- These include: long term care, residential, nursing home, ambulatory care, dialysis, home care, and clinics.

International Infection Control Council

Global consensus conference on infection prevention and control practice for *Clostridium difficile* associated disease (CDAD)

Home setting

- Provide information sheet for patient/family which includes information on toileting and room cleaning/disinfection
- Perform hand hygiene before and after contact with patient

Community physicians/Primary Care – require guidance on how to manage patients

Schools: People with symptoms of diarrhoea suspicious of an infectious process should not attend schools or day care facilities.

6. What is the most effective method to determine compliance?

Indicators of compliance include:

- Time to implementation of Contact Precautions for suspect and confirmed cases
- Practice of appropriate precautions
- Compliance with criteria for the discontinuation of precautions
- Hand hygiene practice
- Laboratory turnaround time for results
- Measure staff awareness of protocols (CDAD protocol) and what the CDAD rates are for their institution
- Environment cleaning protocols

7. Are animals an issue?

- Animals do not provide an important route of transmission
- Maintain Routine Practices/Standard Precautions
- All visiting animals should be healthy
- Visiting animals should not enter rooms where patients require Contact Precautions
- For further information refer to current documents on pet therapy

8. If control measures are identified as non-effective (i.e., transmission continues to occur), what are the next steps?

Any or all of the following may be helpful:

- Report outbreak to Public Health if legislation mandates
- Communicate to other settings that there may be a potential problem
- Notify institution and allied services of outbreak situation
- Cohort patients and staff; create ward/area for patients with CDAD
- Review practices: e.g., compliance with Contact Precautions; ensure that equipment is actually being dedicated; supplies within the room are being discarded after precautions are discontinued. Consider an objective observer to assess practices.
- Dedicate personnel to clean and disinfect equipment.
- Re-clean areas previously occupied by patients with CDAD. Refer to infection prevention and control team for advice.
- In clusters or in outbreaks use disinfection throughout the ward or area on the advice of the infection prevention and control team.

International Infection Control Council

Global consensus conference on infection prevention and control practice for *Clostridium difficile* associated disease (CDAD)

- Audit environmental cleaning.
- Identify additional cases – including discharges and transfers.
- Staff education (including housekeeping staff).
- Patients confined to room except for critical tests.
- Ask for help from experts – and secure necessary resources (financial, human resources, Infection Prevention and Control professionals).
- Review antimicrobial prescribing.
- Visitors - follow existing policies. Provide education on *C. difficile* transmission/precautions and to avoid visiting if at risk for CDAD.
- Public messaging – develop message with public affairs office if required; provide message on telephone lines if necessary.
- Close wards to new admissions (institutional decision) – this is a last resort. (Reasons to close ward for *C. difficile* - reduces those at risk; unethical to admit to ward where transmission is occurring.)

Environment and Equipment

ASSUMPTIONS:

- It is cost effective to invest and ensure that good standards are present in healthcare
- Adequate resources are available to deliver appropriate cleaning
- There is training and education of staff and reassessment of knowledge and competence of cleaning staff
- There are performance standards and feedback of performance
- Cleaning departments have enough staff and enough time to clean

1. Based on Standard Precautions or Routine Practices, do you need to do anything differently for environmental cleaning (non-critical) when the patient has *C. difficile*? What, how and at what frequency?

- Twice daily for high contact/frequently touched areas and once daily for the rest as a minimum standard.
 - High contact areas include commode, toilet, mattress, sink handles, door knobs, and bedrails.
- Need to remove superfluous or uncleanable equipment or furniture from the environment.
- During an outbreak consider increasing the frequency of cleaning and monitoring.

Extra cleaning for *C. difficile*

- Once the patient is discharged or precautions are discontinued, clean the patient environment with a sporicidal agent. Note that precautions should continue until cleaning is complete.
- Clean room or area from high level to floor removing disposables, clean all equipment as per policy, change curtains.
- If the patient's space is in a multi bed area, clean the defined patient space. Clean toilet or commode.
- Use same cleaning method for terminal cleaning for single cases or outbreak of CDAD.

International Infection Control Council

Global consensus conference on infection prevention and control practice for *Clostridium difficile* associated disease (CDAD)

- In outbreaks consider alternative methods of terminal cleaning e.g., hydrogen peroxide fogging or other disinfectant with sporicidal activity against *C. difficile*.

2. Based on Standard Precautions or Routine Practices, do you need to do anything differently for equipment cleaning (semi-critical, critical) when the patient has *C. difficile*? What, how and at what frequency?

- Nothing different for critical or semi critical items for CDAD: follow current guidelines
- Non critical items: ensure that practices follow the existing protocols and that there is an assigned responsibility for cleaning
- Need formalized check list for cleaning

Non Critical Equipment Cleaning issues

- If patient moves to another area may need to replace with clean equipment or clean equipment before move to reduce load, e.g., beds.
- Use disposable toilet brushes and dispose of brush at patient discharge/transfer.
- Throw out all disposables, e.g., toilet paper, hand towels, books, magazines which are shared at terminal cleaning.
- Place vinyl covers on shared books which then are wipeable with a sporicidal disinfectant.
- Any shared item that is visibly soiled and cannot be cleaned must be discarded.

Bedpan Issues

- There should be access to bedpan washer or macerator for disposal.
- Bedpans – dispose of faeces in bedpan washer or macerator.
- Do not use sprayers in patient's bathroom for cleaning; do not manually clean bedpans in patient's bathroom.
- Avoid sluicing of bedpans and other such containers in order to reduce aerosols.
- Consider condition of bedpans particularly if chipped or scratched. These are more difficult to clean.

Options to consider:

- Do not transport used bedpan from one place to another without cover. Consider use solidifying gel to enhance containment of faeces.
- Consider single patient use bedpans if there is space for storage.
- Sanitize bedpan between patients (including holder of macerated bedpan).
- Allocate a bedpan to an individual patient.

3. Based on Standard Precautions or Routine Practices, do you need to do anything differently for personal care equipment (e.g. shavers, clippers, chiropodist supplies) cleaning when the patient has *C. difficile*? What, how and at what frequency?

- Dedicate personal care equipment
- If it cannot be cleaned then discard or use disposable

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Global consensus conference on infection prevention and control practice for *Clostridium difficile* associated disease (CDAD)

4. If disinfectants are necessary, which can be used and how should they be used?

- Dirt and detritus must be removed in order for effective disinfection to occur.
- A disinfectant agent with sporicidal activity should be used.
- If and when moving a patient with CDAD, ensure that any previous bed space and toilet occupied by the patient with CDAD be terminally cleaned.

Other cleaning issues:

- Physical cleaning, e.g., micro fibres, may be effective in removing spores
- Any agent may damage the environment. Products should be reviewed prior to implementation.

5. Would temporary barriers or covers be effective in certain circumstances (e.g., sheets over wheelchair, sheet over porter bed, plastic covering over charts)? If so, when and what would be effective?

- Barriers may be used to both confine and contain or to reduce bioburden on an item.
- There is no evidence to support the use of temporary covers in the patient's room.
- Minimal patient care items should be stored in the patient's room. Items such as linen should be stored centrally.
- Patient chart and records should not go into patient's room.
- If an item which accompanies the patient is contaminated it should be covered for transport.
- Transportation of patient – patient should be dressed in a clean gown or pyjamas.
- The wheelchair/trolley should be decontaminated following transfer according to normal guidelines if the patient is continent.
- If the patient is incontinent then there should be a protective barrier between the patient and the piece of equipment or transporting vehicle.

6. What are the issues and resolutions for cleaning multi-bed settings?

Treat each patient with CDAD bed space as you would in a single room such as changing PPE and cleaning cloths between each bed space.

- When there is a single case of CDAD in a multi bed room, define affected area and clean.
- Shared equipment in the room – change gloves and gown/apron between patients and disinfect equipment between each patient.
- To reduce the bioburden from patients with incontinence, consider containment devices such as diapers, rectal tubes or faecal incontinence devices.

7. Should there be different practices for different settings?

- There are no differences in cleaning principles in various settings.
- In the Home Setting:
 - Information should be given to patients/family regarding CDAD, hand hygiene, cleaning of linen, cleaning of bathroom and equipment.
 - If possible, one toilet/bathroom should be dedicated for the patient with CDAD in the home.
- Facilities should handle the environment and equipment according to standard guidance. It is assumed that all staff will have training and education cleaning and hygiene.



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- In other residential settings such as group homes, prisons, and boarding schools: the same cleaning principles as in healthcare settings will apply and information should be supplied. Some of the advice should be adapted to reflect the challenges of these environments, e.g., carpets.
- 8. How do you measure the effectiveness of these environmental measures?**
- Housekeeping/environmental services should discuss the frequency of cleaning and monitoring with the Infection Prevention and Control Team.
 - Compliance with cleaning should be monitored and feedback provided.
 - Measure effectiveness through the use of tools such as adenosine triphosphate monitors and ultraviolet markers (investigational).
 - Compliance measurements should compliment other audit systems, checklists and accountability.
- 9. What are optimal institution designs for environmental /equipment cleaning and disinfection?**
- Single/private rooms with en suite bathroom/shower/toilet.
 - Call bells and other such devices should be designed to be smooth, sealed and cleanable.
 - Toilets should be designed for effective cleaning in and around the toilet. (e.g., wall mounted toilets).
 - There should be adequate storage space for commodes in bathrooms.
 - No exposed pipe work.
 - Sufficient numbers of commodes should be available.
 - Size of the dirty utility room should accommodate functions in the area in addition to having separate space for equipment cleaning and storage of clean equipment.
 - Encourage companies to develop equipment which is easily cleanable with clear guidelines for cleaning.
 - Hand washing sink for staff should be separate from patient's sink and clearly marked for staff use only.
 - Hands-free taps/faucet handles.
 - Air pressure issues and ventilation are currently unresolved.

Treatment Measures/Antibiotics

ASSUMPTIONS:

- Antibiotic stewardship requires a multidisciplinary team with a focus, structure, as well as administrative support.
 - Antibiotic stewardship is a patient safety initiative.
- 1. How effective are all other control measures without antibiotic stewardship?**
- Antibiotic stewardship is as important as other control measures and cannot be separated from them.
 - The components of *C. difficile* control are like the “legs of the stool”: Antibiotic stewardship, infection prevention and control, education and infrastructure.

International Infection Control Council

Global consensus conference on infection prevention and control practice for *Clostridium difficile* associated disease (CDAD)

- A multi-disciplinary approach to antibiotic stewardship is required, including pharmacy, physicians, technology support, laboratory, infection prevention and control, nursing.
- Designate ambassadors/champions for antibiotic stewardship (e.g., chief of surgery, infectious disease physicians).
- One approach will not work for all areas. There should be different antimicrobial management programs for acute care, complex continuing care, community care, long-term care.
- Antibiotic stewardship needs to be marketed to the public with a clear marketing strategy and messages.
- Education:
 - Need “back to basics” teaching in medical schools and teaching hospitals, regarding antibiotic resistance and prescribing practices.
 - Important to obtain appropriate specimens based on clinical suspicion of disease and use culture and susceptibility results to guide diagnosis and treatment of infections.
 - Guidelines should be developed for community physicians when prescribing antibiotics for community-acquired infections. In private practice, practitioners work alone, and should be supported and educated about antibiotic stewardship on an ongoing basis.
 - Education should focus on initiation of antibiotics, appropriateness of antibiotic spectrum, and ending or changing antibiotics as soon as possible.

2. What are the key components of an antibiotic stewardship program relevant to *C. difficile* disease?

- Develop a multi-disciplinary program that includes:
 - Bring awareness of antibiotic stewardship to a higher level of administration to obtain funding, resources.
 - Education of physicians to change old prescribing practices.
 - Include other health disciplines such as nursing, pharmacy, laboratory
 - Include mechanisms for enforcement and compliance.
 - Use susceptibility data to drive antibiotic choices and demonstrate efficacy.
 - Include an effective marketing program.
- Consider “Antibiotic Stewards” who are clinical experts in infection (e.g., clinical pharmacists, Microbiologists, Infectious Disease physicians and others)
 - Stewards require a high level of support and training
 - Take ownership and make decisions regarding antibiotic use in facilities
 - Restrict choices
 - Perform antibiotic rounds
 - Community prescribers need to participate in the stewardship programme
- Funding to be made available to support those who have antibiotic stewardship systems and programs in place.
- Need to develop a paradigm shift in the physician community to use antibiotics only when necessary and no longer than necessary.
- A standardized approach to treatment for community physicians regarding community acquired infections.

International Infection Control Council

Global consensus conference on infection prevention and control practice for *Clostridium difficile* associated disease (CDAD)

- Need rapid diagnostic testing available to all clinicians: For example, with community-acquired pneumonia (CAP) a rapid viral diagnostic test available to community practitioners will drive appropriate antibiotic use.
- Use laboratory controls to support antibiotic stewardship – identify antibiotic susceptibility tests to be used, place “canned comments” on laboratory reports to assist with antibiotic choice, and provide summary data on antibiotic resistance. There should be linkages to pharmacy and formulary.
- Link antibiotic awareness with patient safety campaigns.

3. Have the antibiotics that trigger CDAD changed?

- All antibiotics have the potential to cause CDAD.
- Certain antibiotics with a propensity for disrupting normal bowel flora have a greater risk of causing CDAD, e.g., fluoroquinolones, cephalosporins, clindamycin.
- Develop a formulary that reduces the risk of *C. difficile*.

4. Do alternative treatments alter infection prevention and control management?

- Alternative treatments should not be available through the formulary:
 - There are no data to support the effectiveness/benefits of probiotics such as *Saccharomyces* or *Lactobacillus* for prevention or treatment.
 - There might be a potential risk to using some probiotics and radical treatments.
 - There is no quality control of these “over the counter” natural products and therefore they cannot be compared.
- Other treatments that may put patients at risk for CDAD:
 - There should be guidelines for the threshold for use and discontinuation of laxatives.
 - Gastric acid suppression might be a risk for *C. difficile*.

Fecal transplant therapy has been used for patients with multiple recurrences of CDAD but there is insufficient published data in controlled studies to provide a consensus recommendation.

5. Are there infection prevention and control issues with recalcitrant or relapsed patients?

- The offending antimicrobial should be stopped whenever possible!
- Relapses:
 - Goal is to stop diarrhoea quickly without relapsing
 - Starting treatment as soon as possible leads to quicker resolution of diarrhoea and less shedding of *C. difficile*
 - Anyone being readmitted with diarrhoea who had CDAD within past 2 months should be considered to have CDAD, be tested and be started on precautions and considered for treatment
 - Infection prevention and control management does not change for relapsed patients
- Have a high level of suspicion for *C. difficile* infection if there has been an outbreak or high numbers of CDAD
- If the suspicion of CDAD is high enough to begin treatment, then precautions should be started as well

International Infection Control Council

Global consensus conference on infection prevention and control practice for *Clostridium difficile* associated disease (CDAD)

Emerging issues and research directions

The following are areas identified in each of the workshops that require additional research.

- Evaluate the potential benefits and risks of the use of loperamide and opiates in the control of diarrhoea in patients.
- Vaccine development for CDAD prevention.
- AB toxin blocker as a treatment for relapse.
- To evaluate cleaning processes (manual and automated) for reusable bedpans.
- The benefit of disposable bedpans.
- Further studies into the transmission of *C. difficile* spores via equipment to patients.
- Value of tracing previous locations of patients with CDAD in institution and then terminally cleaning the area.
- Need further study of risks of transmission within the environment in long term care facilities.
- Adenosine triphosphate (ATP) monitoring as a measure of cleaning effectiveness against *C. difficile* requires validation.
- Evaluate the impact of ventilation and air pressure gradients on control of CDAD.
- Develop safe and environmentally friendly cleaning products that can be used routinely (a universal cleaner and disinfectant) and are effective against *C. difficile*.
- What is the infectious potential of patients who have had interventions such as a colectomy?
- What is the rate of transmission of CDAD in LTC?
- What is the risk of transmission by asymptomatic carriers?
- When is the best time to discontinue Contact Precautions? (48 hours? 72 hours?)
- Create validated audit tools for compliance with control measures.
- Need more epidemiologic studies on CDAD in the elderly.
- Evaluate feasibility of Surveillance Systems for CA-CDAD.
- Further research to determine time frame definitions for healthcare - associated CDAD.
- Need more data on the benefits of single rooms with own toilets for the prevention and control of *C. difficile*.
- Do hyper - spreaders exist and if so who are they?
- Studies to relate CDAD rates to nurse/patient ratios.
- Determine if there are benefits using the process of root cause analysis.
- Develop a mechanism to combine CDAD surveillance with antibiotic consumption from pharmacy data.

International Infection Control Council

Global consensus conference on infection prevention and control practice for *Clostridium difficile* associated disease (CDAD)

Invited Experts

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