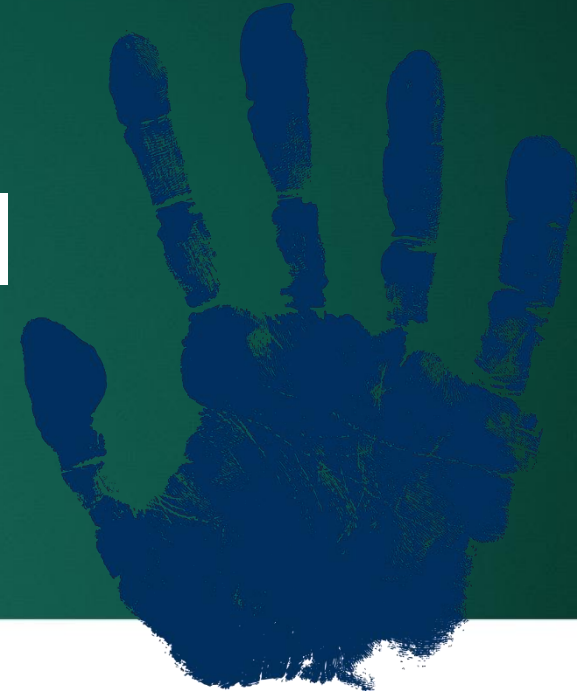




Intravenous to Oral Switch for Antimicrobial Therapy



Prepared by
**Antimicrobial Resistance & Infection Control Team (AMRIC) Acute
Services Team**
V1.0 February 2025



Target audience for presentation

- Anyone involved in the use of antimicrobials
- **Prescribes** –Medical and surgical consultants, NCHDs, interns, nurse prescribers
- **Dispenses** –Pharmacists, pharmacy technicians
- **Administers** –Nurses
- **Quality & Patient Safety Staff**

Contents of this AMRIC presentation are not for local amendment however please follow with your own slide deck to include local audit results, plans for quality improvement etc.



In the 2024 the national hospital point prevalence survey on antimicrobial prescribing

- 68% of antibiotics prescribed on the day were administered intravenously
- The proportion of all IV therapies suitable for oral switch as per local guidelines was 16.6% (558).

558

IV prescriptions
administered suitable for
oral switch





✓ Decreased risk of bloodstream and catheter-related infections



✓ Reduced total cost of therapy



✓ Reduced length of stay



✓ Improved patient mobility



✓ Reduced use of single use plastics used to administer IV antimicrobials



✓ Reduced nursing time administering IV antimicrobials



**We're taking
climate action**



Antimicrobial Resistance &
Infection Control Programme

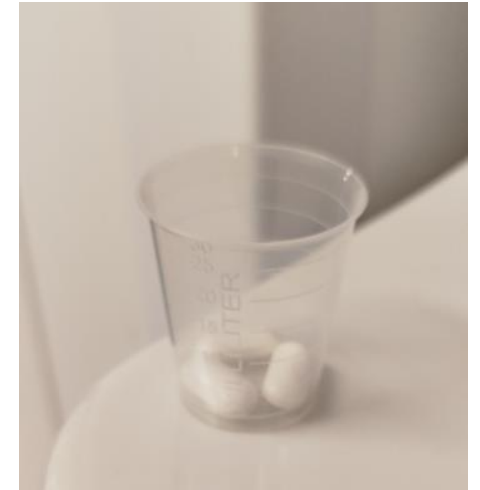


**Metronidazole has 100%
oral bioavailability**

← One day of IV
metronidazole and the
plastic waste associated

One day of oral →
metronidazole and the
plastic waste associated

Reduce Plastic Waste

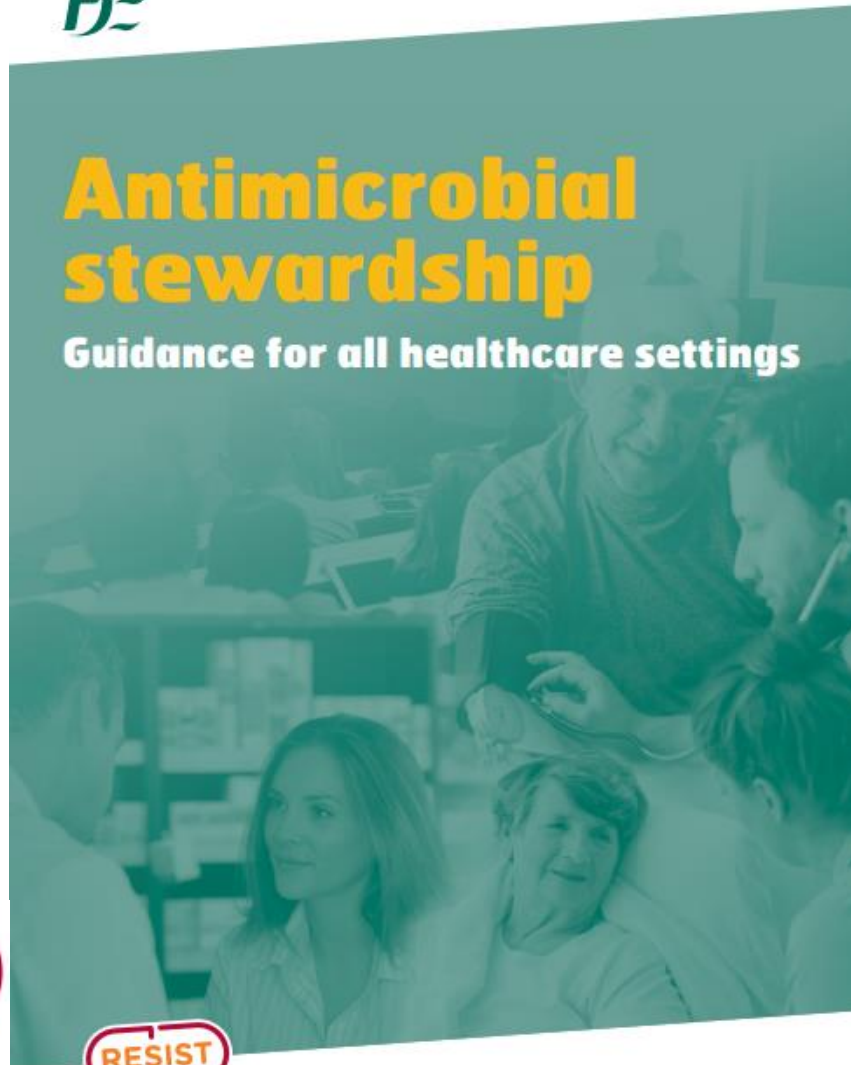


Stop, or Go PO

Reduce Plastic Waste



Toolkit to promote IVOS for antimicrobial therapy



Antimicrobial stewardship guidance for all healthcare settings 2022 advises the intravenous to oral switch (IVOS) is a key antimicrobial intervention.

A toolkit to promote IVOS locally was published in Feb 2025 on antibioticprescribing.ie including:

1. Information on identifying suitable patients for IVOS and bioavailability of common antimicrobial agents
2. A poster focusing on the environmental impact of IV antimicrobial waste
3. An implementation tool to assist in implementing IVOS locally
4. A presentation to deliver locally to help local AMS teams promote IVOS.





IVOS criteria for antimicrobial therapy-when to switch?

1. Timing of intravenous (IV) antimicrobial review:

- Most infections can be managed safely and effectively using the oral route
- For antimicrobials with excellent oral bioavailability, the oral route should be used from the outset, once the oral route is considered reliable.
- IVOS should be considered within the first 24 - 48 hours of the first dose of IV antimicrobial being administered
- If IVOS does not occur within the first 48 hours, a daily review thereafter should be undertaken with documentation of the treatment plan
- When reviewing a patient's antimicrobial for an IVOS, it should be considered if antimicrobial therapy is still indicated. If it is no longer indicated i.e. an infection has been ruled out, antimicrobial therapy should be stopped.

2. Clinical signs and symptoms

- Patient's signs and symptoms of infection are improving.
- Haemodynamically stable (i.e. heart rate and blood pressure are stable) or INEWS score decreasing.

3. Infection markers (if available) are improving

- It should be considered that infection markers could also indicate inflammation or be affected by, for example steroid treatment. An IVOS may still be considered if the C-reactive protein and white cell count are not decreasing or have not been repeated in a patient that is clinically improving.



IVOS Criteria for Antimicrobial Therapy

4. Enteral route:

Gastrointestinal tract must be functioning with no evidence of impaired oral absorption.

Conditions that may result in impaired oral absorption are shock, severe or persistent nausea/vomiting/diarrhoea, active gastrointestinal bleeding, ileus or GI obstruction, high enteric output and shortened GI transit time (malabsorption, short-gut).



Suitable oral switch option available, considering oral bioavailability, any clinically significant drug interactions or patient allergies and guided by culture and susceptibility results if available.

No significant concerns over patient adherence to oral treatment.





What does oral bioavailability mean?

- Oral bioavailability is the fraction of (percentage) of an antimicrobial that enters systemic circulation after administration
- What is the oral bioavailability of some commonly prescribed oral antimicrobials?

Ciprofloxacin

70-80%

Metronidazole

100%

Linezolid

100%

Clindamycin

90%



Antimicrobial Resistance &
Infection Control Programme

Check for any food or drug interactions when switching to oral antimicrobials as the absorption of the antimicrobial may be affected (i.e. reduced or delayed) which would impact the efficacy of the antimicrobial. Seek Pharmacy advice in relation to same if required.



National IVOS Guidance for Antimicrobial Therapy

Table 1 Antimicrobials with excellent bioavailability by the oral route.

Check for any food or drug interactions when switching to oral antimicrobials as the absorption of the antimicrobial may be affected (i.e. reduced or delayed) which would impact the efficacy of the antimicrobial. Seek Pharmacy advice in relation to same if required.

Antimicrobial	Oral Bioavailability
Ciprofloxacin	70-80%*
Clindamycin	90%
Co-trimoxazole	70-90%
Fluconazole	>90%
Fusidic Acid	91%
Isavuconazole	98%
Levofloxacin	99-100%
Linezolid	100%
Metronidazole	100%
Rifampicin	70-90%
Voriconazole	96%

References: Sanford Guide 2024 & *Martindale the Complete Drug Reference accessed online 4/09/2024



Table 2 Recommended oral agents when switching from IV to oral antimicrobials



IV Antimicrobial	Oral Switch Option
Amoxicillin 500mg – 1g every 8 hours	Amoxicillin 500mg – 1g every 8 hours
Benzylpenicillin 1.2g-2.4g every 6 hours	Amoxicillin 500mg – 1g every 8 hours or phenoxymethylpenicillin 666mg every 6 hours (Calvepen®) OR 500mg every 6 hours (Kopen®)
Cefuroxime	Oral cefuroxime is not advised due to poor oral bioavailability. Oral options may be available according to indication and microbiological sample results. Discuss with microbiology/infectious diseases/antimicrobial pharmacist if necessary
Ceftriaxone	There is no direct oral alternative. Oral options may be available according to indication and microbiological sample results. Discuss with microbiology/infectious diseases/antimicrobial pharmacist if necessary
Ciprofloxacin 400mg every 12 hours	Ciprofloxacin 500mg-750mg every 12 hours
Clarithromycin 500mg every 12 hours	Clarithromycin same dose
Clindamycin 600mg – 1.2g every 6 hours	Clindamycin 300mg - 450mg every 6 hours
Co-amoxiclav 1.2g every 8 hours	Co-amoxiclav 625mg (500mg/125mg) – 1g (875mg/125mg) every 8 hours
Co-trimoxazole	Co-trimoxazole same dose
Flucloxacillin 1-2g every 6 hours	Flucloxacillin 500mg - 1g every 6 hours
Fluconazole	Fluconazole same dose
Levofloxacin	Levofloxacin same dose
Linezolid 600mg every 12 hours	Linezolid same dose
Metronidazole 500mg every 8 hours	Metronidazole 400mg every 8 hours
Piperacillin-tazobactam	There is no direct oral alternative. Oral options may be available according to indication and microbiological sample results. Discuss with microbiology/infectious diseases/antimicrobial pharmacist
Rifampicin	Rifampicin same dose
Voriconazole	Patients > 40kg Voriconazole 400mg every 12 hours for 24 hours (if loading dose is required) then 200mg every 12 hours. In patients <40kg contact antimicrobial pharmacist for advice

- Doses included are for normal renal & hepatic function
- Doses are for oral capsules/tablets unless otherwise specified. Note: in some cases oral bioavailability for suspension can differ from tablets/capsules
- Review drug and food interactions. Some antimicrobials need to be taken on an empty stomach for better absorption
- Doses may need to be adjusted according to severity of infection
- See BNF, SmPC or seek pharmacist advice regarding dose adjustments





IVOS Criteria for Antimicrobial Therapy

5.Special Considerations

There is evidence that oral therapy can be considered for part or all of the course of treatment for some infections traditionally managed with intravenous treatment for the entire duration of therapy for example endocarditis, osteomyelitis, bacteraemia, intra-abdominal infection and complicated urinary tract infection.

It is reasonable to consider oral therapy when all of the following criteria are met:

- ✓ The patient is clinically and haemodynamically stable
- ✓ Pathogen and susceptibility are known and an oral option is available which achieves good levels at the site of infection
- ✓ Surgical or procedural source control has been achieved, if possible, with no persistent bacteraemia
- ✓ The patient is likely to be able to tolerate and absorb oral medications
- ✓ A published regimen is available with clinical outcomes data for targeted pathogens
- ✓ There are no psychosocial or logistical reasons to prefer intravenous therapy.



Antimicrobial Resistance &
Infection Control Programme

Infection Specialist (Microbiology or Infectious Disease) should be sought in the management of these infections



FULL TEXT ARTICLE

Oral Is the New IV. Challenging Decades of Blood and Bone Infection Dogma: A Systematic Review



Noah Wald-Dickler MD, Paul D. Holtom MD, Matthew C. Phillips MD, Robert M. Centor MD, Rachael A. Lee MD, Rachel Baden MD and Brad Spellberg MD

American Journal of Medicine, The, 2022-03-01, Volume 135, Issue 3, Pages 369-379.e1, Copyright © 2021 Elsevier Inc.



Aim:

To determine if controlled, prospective clinical data validate the long-standing belief that IV antibiotic therapy is required for the full duration of treatment for: osteomyelitis, bacteraemia, and infective endocarditis.

Methods:

A systematic review of published, prospective, controlled trials that compared IV-only to oral stepdown regimens in the treatment of these diseases.

Results:

- 21 studies demonstrated either no difference in clinical efficacy, or superiority of oral vs. IV-only antimicrobial therapy, including for mortality;
- The frequency of catheter-related adverse events and duration of inpatient hospitalization were both greater in IV-only groups.

Infection Specialist (Microbiology or Infectious Disease) should be sought in the management of these infections



Antimicrobial Resistance & Infection Control Programme



ORIGINAL ARTICLE

Oral versus Intravenous Antibiotics for Bone and Joint Infection

Authors: Ho-Kwong Li, M.R.C.P., Ines Rombach, D.Phil., Rhea Zambellas, M.Sc., A. Sarah Walker, Ph.D., Martin A. McNally, F.R.C.S.(Orth.), Bridget L. Atkins, F.R.C.P., Benjamin A. Lipsky, M.D., [+52](#), for the OVIVA Trial
Collaborators* [Author Info & Affiliations](#)

Published January 30, 2019 | N Engl J Med 2019;380:425-436 | DOI: 10.1056/NEJMoa1710926 | [VOL. 380 NO. 5](#)

[Copyright © 2019](#)

Conclusion:
Oral antibiotic therapy was non-inferior to intravenous antibiotic therapy when used during the first 6 weeks for complex orthopaedic infection, as assessed by treatment failure at 1 year.

Infection Specialist (Microbiology or Infectious Disease) should be sought in the management of these infections

 **RESIST**

National IVOS resources for antimicrobial therapy

- IVOS toolkit available at: <https://bit.ly/4fTKZKI>
 - ✓ IVOS Information Sheet
 - ✓ IVOS Implementation Tool
 - ✓ IVOS Teaching Presentation
 - ✓ IVOS Poster
 - ✓ Metronidazole Fact Sheet
- Involve local green teams as part of the local implementation team to promote the reduction of single use plastics



The poster features a dark green header with the HFE logo, the RESIST logo, and the text "We're taking climate action". Below this, a white section contains the text "Reduce the risk of bloodstream infections, save nursing time, improve patient mobility" and the main headline "Stop, or Go PO" in large red font, followed by "Reduce Plastic Waste" in orange. The central image shows a white tray of IV plastic waste and a glass with two white tablets. Callout boxes state "1 day of IV metronidazole" and "Give metronidazole orally if clinically suitable (100% orally absorbed)". A QR code is in the bottom left, and a green banner at the bottom reads "REMEMBER Double anaerobic cover is rarely indicated!".

RESIST

We're taking climate action

Reduce the risk of bloodstream infections, save nursing time, improve patient mobility

Stop, or Go PO

Reduce Plastic Waste

1 day of IV metronidazole

Give metronidazole orally if clinically suitable (100% orally absorbed)

REMEMBER Double anaerobic cover is rarely indicated!

February 2025 Version 1



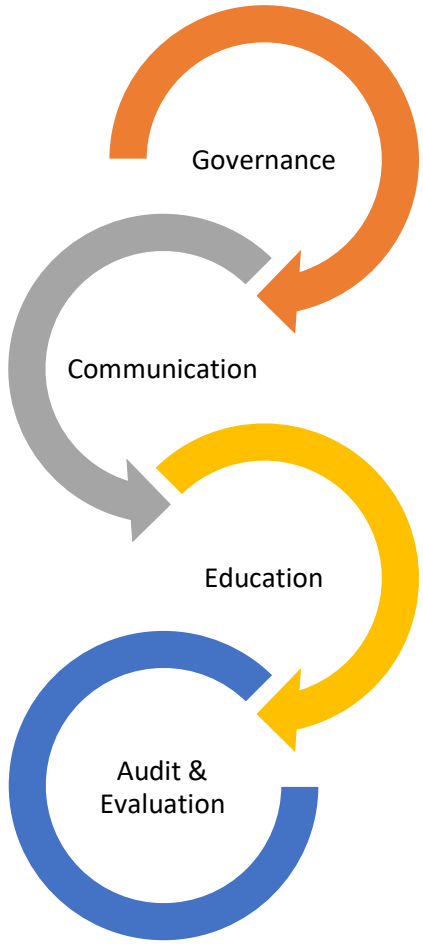
HSE AMRIC implementation tool for antimicrobial intravenous to oral switch toolkit



A toolkit to support intravenous to oral antimicrobial switching (IVOS) was developed by the HSE Antimicrobial Resistance and Infection Control Team (AMRIC) Acute Services Team and the HSE Antimicrobial Stewardship Advisory Group. This is a tool to aid with local implementation of this national recommendation within your hospital developed by AMRIC Acute Services Team. Please refer to the IVOS toolkit ([link to same below](#)) when using this implementation tool.

[Intravenous to oral switch \(IVOS\) toolkit](#)

Governance		Yes/ No/ Partial	Action (if no)	Person(s)/Team/Committee Responsible	Date action to be completed by
1	Local intravenous to oral switch (IVOS) guidelines are in place.		National IVOS toolkit to be reviewed and the local AMS team to agree local IVOS policy		
2	If yes then the following questions apply:				
3	These local IVOS guidelines have been reviewed in the last 2 years.		Local IVOS guidelines to be reviewed and updated.		
4	Local IVOS guidance aligns with the national IVOS toolkit and advocate for prompt switching of IV antimicrobials to oral antimicrobials as soon as clinically suitable.		Local IVOS guidelines to be reviewed and updated to align with the national IVOS toolkit.		
Communication		Yes / No	Action (if no)	Person(s)/Team/Committee Responsible	Date action to be completed by
1	All stakeholders* across management, medicine, surgery, ICU, pharmacy, nursing and antimicrobial stewardship (AMS) team in your local hospital are aware of the national IVOS guidance have been encouraged to engage in promoting patients receive timely switch (or stopping) of IV antimicrobials.		Communication locally to be delivered via email, educational sessions, audit reports and visual displays to all stakeholders encouraging them to follow local guidance.		
			IV to oral presentation		
2	Contact local hospital climate action team, highlight that the implementation of the intravenous to oral will reduce the consumption of single use plastic.				
3	HSE "GO PO" poster or locally developed posters promoting the IVOS guidance have been put on display in the hospital.		Posters promoting the IVOS guidance to be put on display in appropriate areas in the hospital. Link to same below.		
			IV to Oral Poster		



HSE



Antimicrobial Resistance &
Infection Control Programme

Thank you

