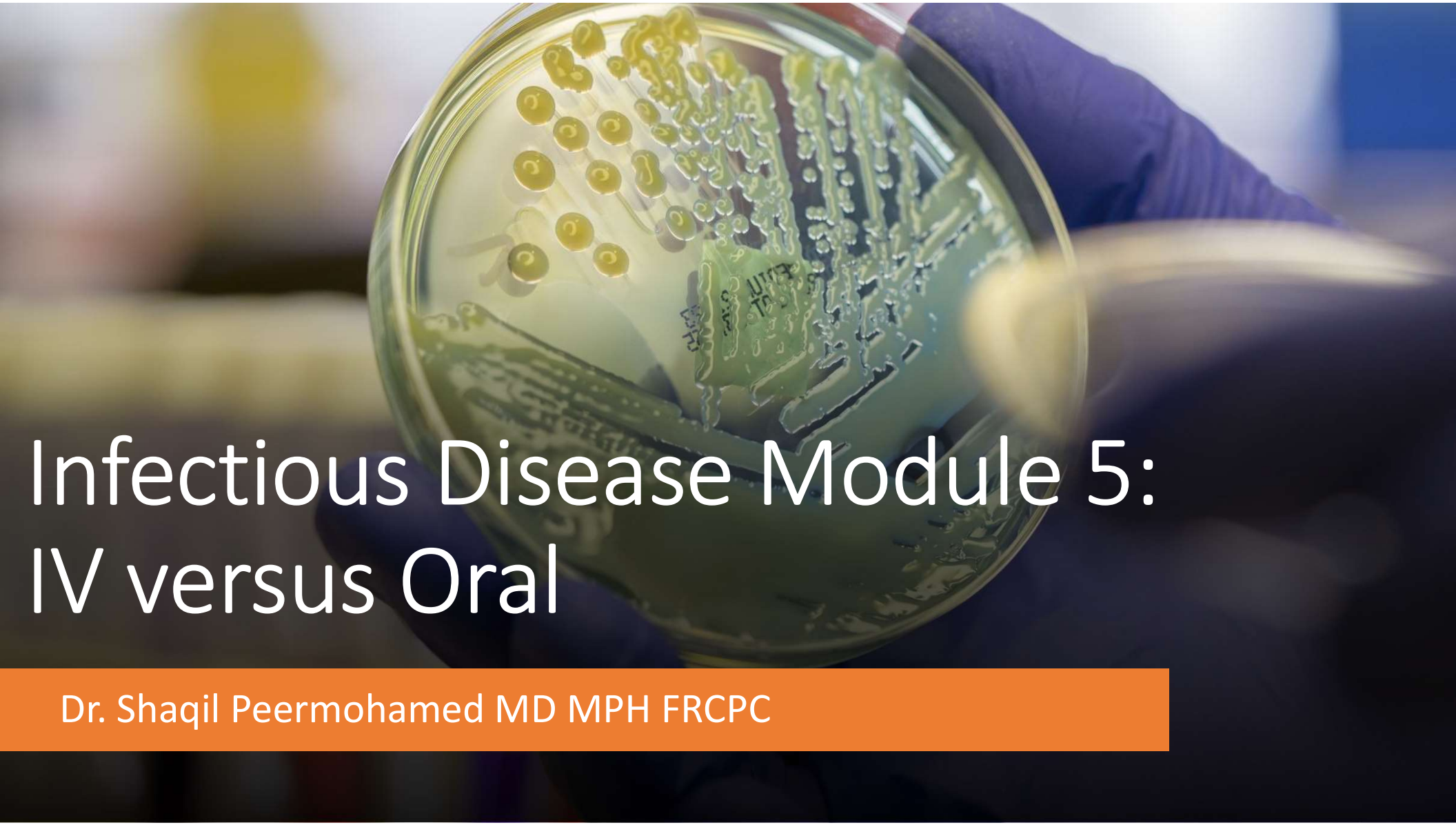


Infectious Disease Module 5: IV versus Oral

Dr. Shaqil Peermohamed MD MPH FRCPC

Objectives

- Develop a curriculum with monthly modules teaching key concepts relevant to common infectious diseases

- Create an interactive and fun learning environment with case-based learning and Kahoot

"That's the way it's always been…"

Open Forum Infectious Diseases

PERSPECTIVES

Can the Future of ID Escape the Inertial Dogma of Its Past? The Exemplars of Shorter Is Better and Oral Is the New IV

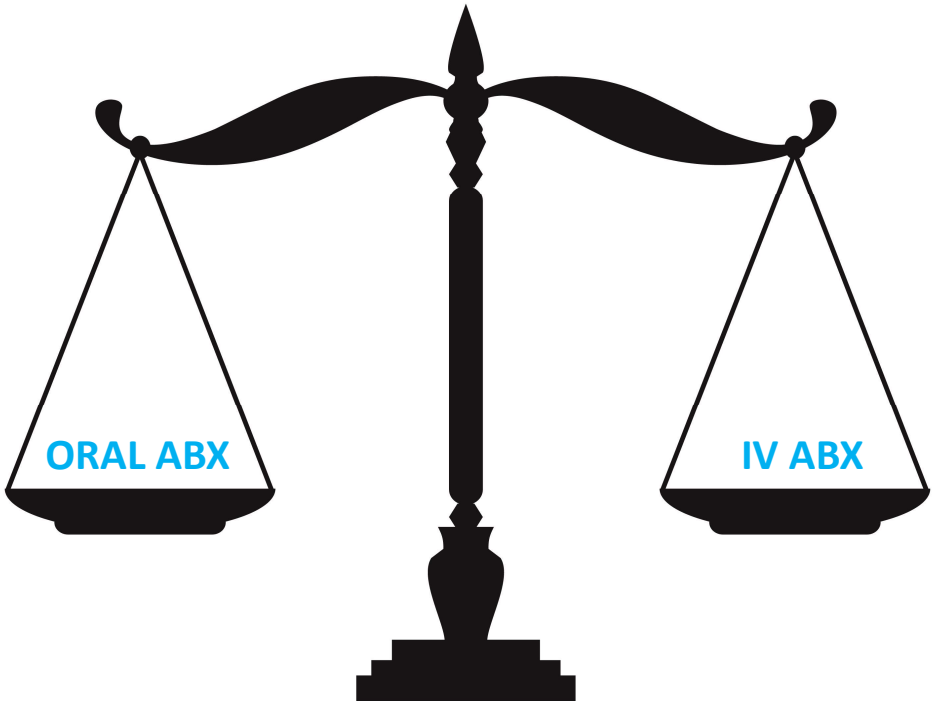
Kusha Davar,[1] Devin Clark,[1] Robert M. Centor,[2] Fernando Dominguez,[1] Bassam Ghanem,[3] Rachael Lee,[4] Todd C. Lee,[5] Emily G. McDonald,[6] Matthew C. Phillips,[7,8] Parham Sendi,[9] and Brad Spellberg[1]

Table 2. Summary of Randomized Controlled Trials of Oral vs IV-Only Therapy

Diagnosis	No. of RCTs Demonstrating IV > Oral	No. of RCTs Demonstrating Oral ≥ IV	References
Osteomyelitis	0	9 (all equal)	[103–111]
Bacteremia	0	10 (8 equal, 2 superior cure for oral)	[109, 112–120]
Endocarditis	0	3 (2 equal, 1 superior mortality for oral)	[121–123]

Abbreviations: IV, intravenous; RCT, randomized controlled trial.

In small groups, brainstorm 1-2 potential advantages and disadvantages of using highly bioavailable oral antibiotics?



Use of Highly Bioavailable Oral Antimicrobials

Antibiotic	Oral Bioavailability (%)
Linezolid	~100
TMP/SMX	~100
Levofloxacin	99
Moxifloxacin	90
Clindamycin	90
Cephalexin	90
Doxycycline	85
Rifampin	70-90
Amoxicillin	70-80
Ciprofloxacin	70-80

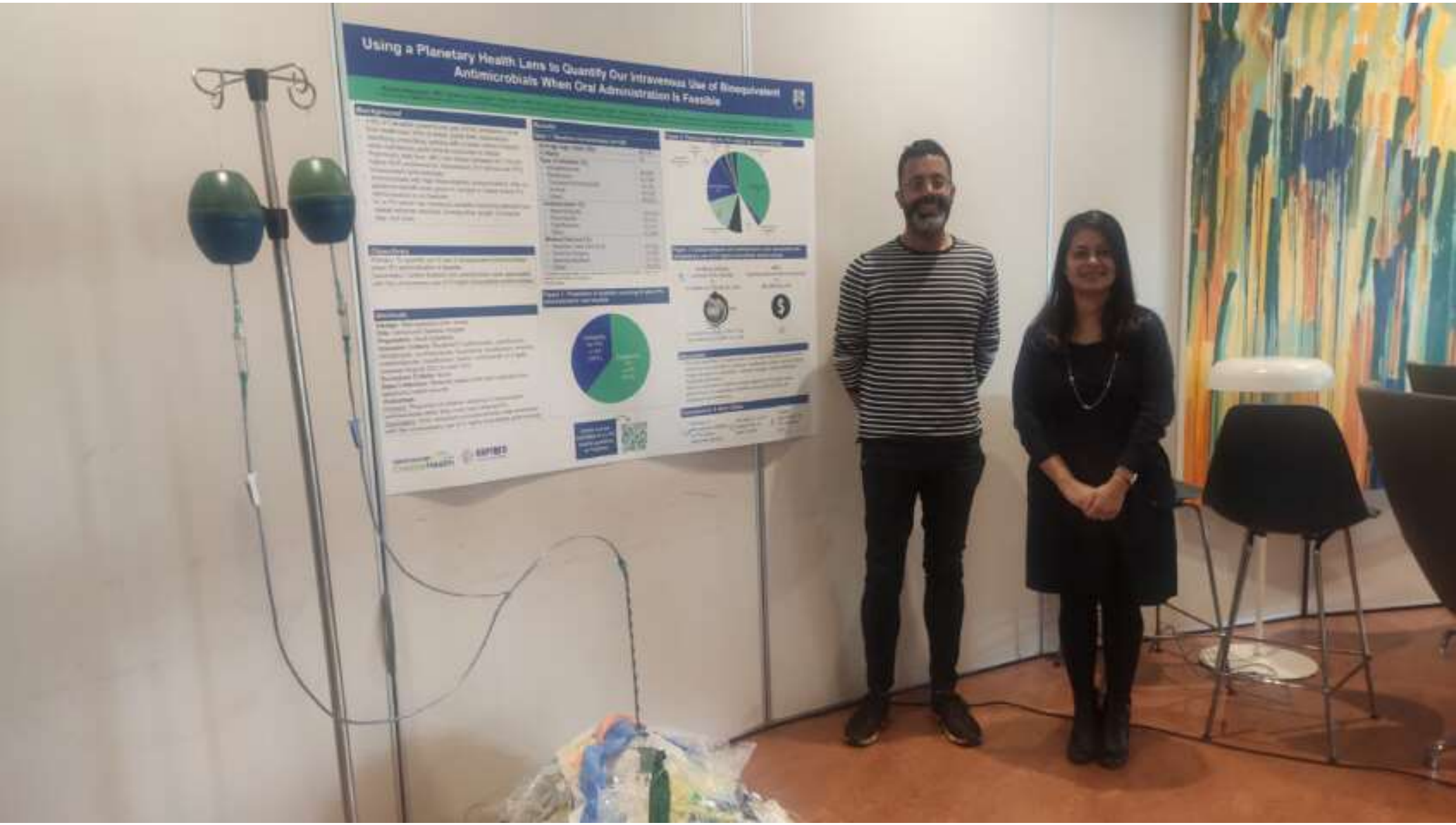
Advantages	Disadvantages
• ↓ catheter complications • ↓ nursing requirements • ↓ overall costs • ↑ patient quality of life	• Possible financial barriers • Adherence to therapy • Uncertain PK/PD of certain agents • Drug interactions

Krah 2019; McMeekin 2019; Trautner 2019; Azamgharhi 2021

Keller 2018 & 2020; Kovacich 2016; Quintens 2020; Gilchrist 2022

Carbon footprint

Hui Zhu, Dr. Xiaotao Bi, 2024


Using a Planetary Health Lens to Quantify Our Intravenous Use of Bioequivalent Antimicrobials When Oral Administration Is Feasible

CLINICAL RESEARCH STUDY

THE AMERICAN JOURNAL of MEDICINE®

Link to Systematic Review and Meta-Analysis (with forest plots)

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

Noah Wald-Dickler, MD,[a,b,c] Paul D. Holtom, MD,[a,b] Matthew C. Phillips, MD,[a] Robert M. Centor, MD,[d,e] Rachael. A. Lee, MD,[d,e] Rachel Baden, MD,[a] Brad Spellberg, MD[a]

[a]Los Angeles County + University of Southern California Medical Center, Los Angeles; [b]Department of Medicine, Keck School of Medicine, University of Southern California, Los Angeles; [c]Department of Preventive Medicine, Keck School of Medicine, University of Southern California, Los Angeles; [d]Department of Medicine, University of Alabama at Birmingham School of Medicine, Birmingham; [e]Birmingham Veterans Affairs (VA) Medical Center, Birmingham, Ala.

Wald-Dickler 2022

The myth of six weeks of IV treatment for osteomyelitis

"In our experience…osteomyelitis is rarely controlled without the combination of careful, complete surgical debridement and prolonged (4 to 6 weeks) <u>parenteral</u> antibiotic therapy at high dosage."

- Retrospective, uncontrolled experience with 247 patients in the 1960s treated with IV Penicillin and aminoglycosides
- Highly heterogenous patients (acute and chronic osteomyelitis; children and adults; contiguous and hematogenous pathogenesis)
- Oral antibiotic treatment was not even considered since the only oral agents at this time included sulfa, tetracycline, erythromycin

Waldvogel 1970

The myth of IV treatment for endocarditis

372 THE NEW ENGLAND JOURNAL OF MEDICINE Mar. 4, 1954

Vol. 250 No. 9

MEDICAL PROGRESS

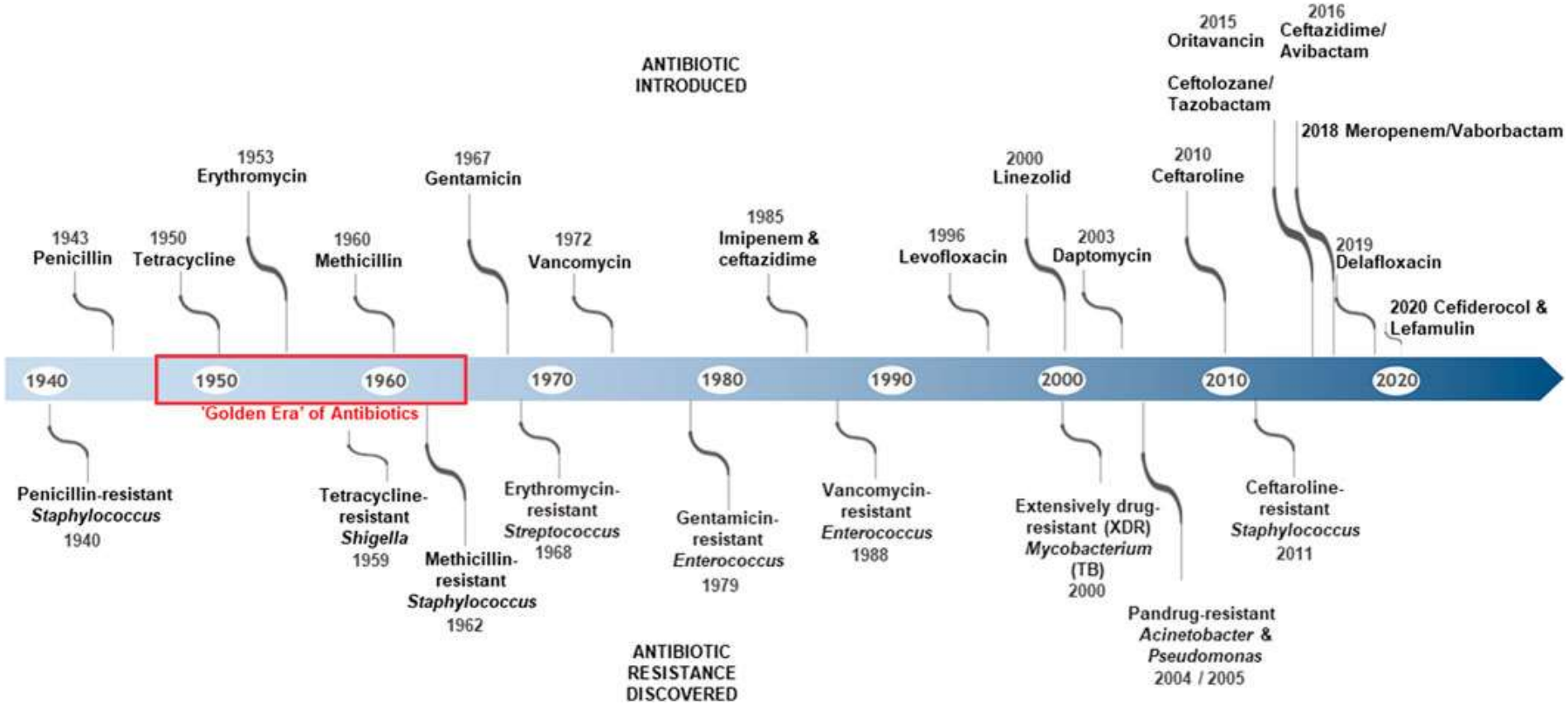
TREATMENT OF BACTERIAL ENDOCARDITIS*

MAXWELL FINLAND, M.D.†

BOSTON

- "Presumably, the oral route is at times successful...it is more likely, however, that such usage is responsible for many therapeutic failures…However, little of this type of experience is recorded, and therefore this assumption cannot be authenticated."

Finland 1954



[History of antibiotic development – Antibiotics – ReAct]

Oral vs. IV Abx for Osteomyelitis

Author	Yr	N	Regimen (Oral vs. IV)	Success
Greenberg	'87	30	Ciprofloxacin vs. std IV	50% (7/14) v 65% (11/16)
Gentry	'90	59	Ciprofloxacin vs. βL+aminoglyc	77% (24/31) v 79% (22/28)
Mader	'90	26	Ciproflox vs. βL/clinda+aminoglyc	79% (11/14) v 83% (10/12)
Gentry	'91	33	Ofloxacin vs. cephalosporin	74% (14/19) v 86% (12/14)
Gomis	'99	32	Ofloxacin vs. imipenem	69% (11/16) v 50% (8/16)
Schrenzel	'04	39	Fleroxacin+rifampin v βL/vanco	82% (18/22) v 65% (11/17)
Euba	'09	48	TMP-SMX+rifampin vs. cloxacillin	81% (17/21) v 77% (21/27)
Li	'19	1054	Std oral vs. std IV	87% (457/527) v 85% (450/527)
Manning	'22	60	PJI/DAIR: Std oral vs. std IV	71% (22/31) v 76% (22/29)
METRC*	'25	233	Std oral vs. std IV	63% (73/115) v 64% (76/118)
Total (N=10 RCT)		1,614		81% (654/810) v 80% (643/804)

Oral vs. IV Abx for Bacteremia

Author	Yr	N	Regimen (Oral vs. IV)	Success
Amodio-Groton	'96	50	Ciprofloxacin oral vs. IV—GNB	83% (20/24) v 77% (20/26)
San Pedro	'02	51	Linezolid vs. ceph—*S. pneumo*	93% (27/29) v 68% (15/22)
Deville	'03	36	Linezolid vs. vanco—GPC (peds)	80% (20/25) v 64% (7/11)
Jantausch	'03	103	Linezolid vs. vanco—GPC (peds)	72% (54/75) v 64% (18/28)
Kaplan	'03	80	Linezolid vs. vanco—GPC (peds)	82% (47/57) v 74% (17/23)
Schrenzel	'04	67	FQ + rif vs. βL/vanco—*Staph*	87% (34/39) v 89% (25/28)
Wilcox	'04	56	Linezolid vs. teicoplanin—GPC	89% (23/26) v 57% (17/30)
Wilcox	'09	166	Linezolid vs. vancomycin—GPC	75% (70/93) v 81% (59/73)
Monmaturopaj*	'12	17	Cefditoren vs. ceftriaxone—GNB	100% (6/6) v 91% (10/11)
Park	'14	59	Ciprofloxacin vs. std IV—GNB	93% (27/29) v 93% (28/30)
Omrani	'23	165	FQ/TMPSMX/BL vs. std IV—GNB	78% (65/83) v 74% (61/82)
Kaasch	'24	213	Various Abx IV/Oral—*S. aureus*	87% (94/108) v 88% (92/105)
Total (N=12 RCTs)		1063		82% (487/594) v 79% (369/469)

Oral vs. IV Abx for Endocarditis

Author	Yr	N	Regimen (Oral vs. IV)	Success
Stamboulian	'91	30	Amox 1 gm qid vs. CTX—*Strep*	100% (15/15) v 100% (15/15)
Heldman	'96	93	Cipro + Rif vs. std IV—*Staph*	95% (18/19) v 88% (22/25)
Iversen/ Bungaard‡	'19	400	Std oral vs. std IV—GPC	74% (146/199) v 62% (125/201)
*Tissot-Dupont**	*'19*	*341*	*TMP-SMX+clinda vs. std IV--Staph*	*81% (138/171) v 70% (119/170)*
Totals (N=3 RCTs) *(+ 1 quasi expt*)*	523 *(864)*			77% (179/233) v 70% (162/241) *78% (317/404) v 68% (281/411)*

5-10 minutes for group discussion

- What has your experience been with using oral antimicrobials for bacteremia, bone and joint infections, and osteomyelitis?

- Any cases or examples you would like to share?

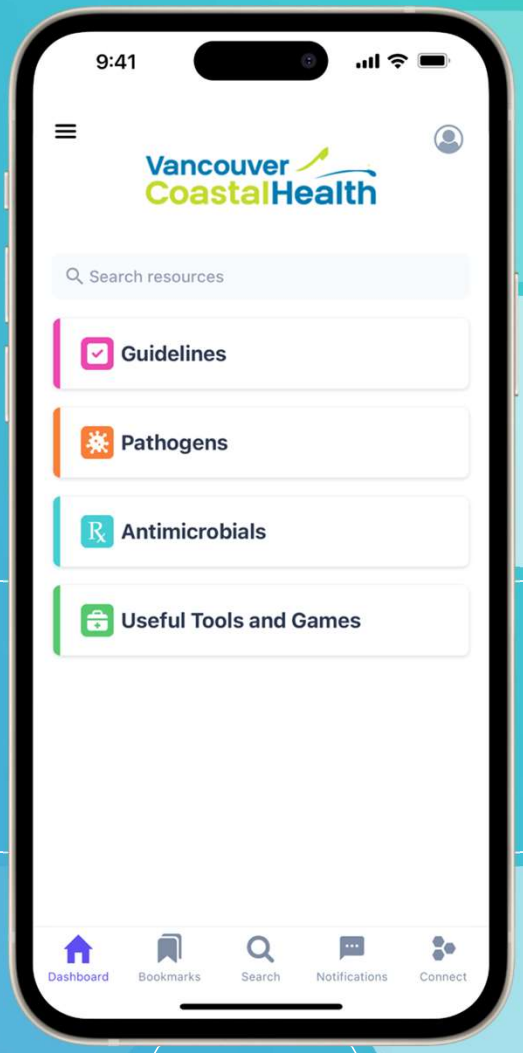
Fill in the following table

Antimicrobial	Adverse Effects
Fluoroquinolones	
TMP-SMX	
Linezolid	
Doxycycline	
Clindamycin	

Antibiotic	Adverse Effects
Fluoroquinolones	Avoid dairy & multivitamins at time of FQ dosing; Prolongs QT; Counsel pt re: rare but serious AEs (tendonitis & tendon rupture, aortic aneurysm, retinal detachment)
TMP/SMX	HyperK with ACEIs/ARBs and spironolactone
Linezolid	Serotonin syndrome risk low except with (es)citalopram, methadone, or >2 DDIs, pancytopenia and potentially irreversible neuropathy (peripheral + optic) with long term (≥4wk) use
Doxycycline	Photosensitivity; esophagitis
Clindamycin	*Clostridioides* difficile; GI intolerance

Deliver a stronger dose of antimicrobial stewardship

Effortlessly tap into our local infectious disease guidance and antimicrobial dosing information in seconds with Firstline.



Vancouver CoastalHealth

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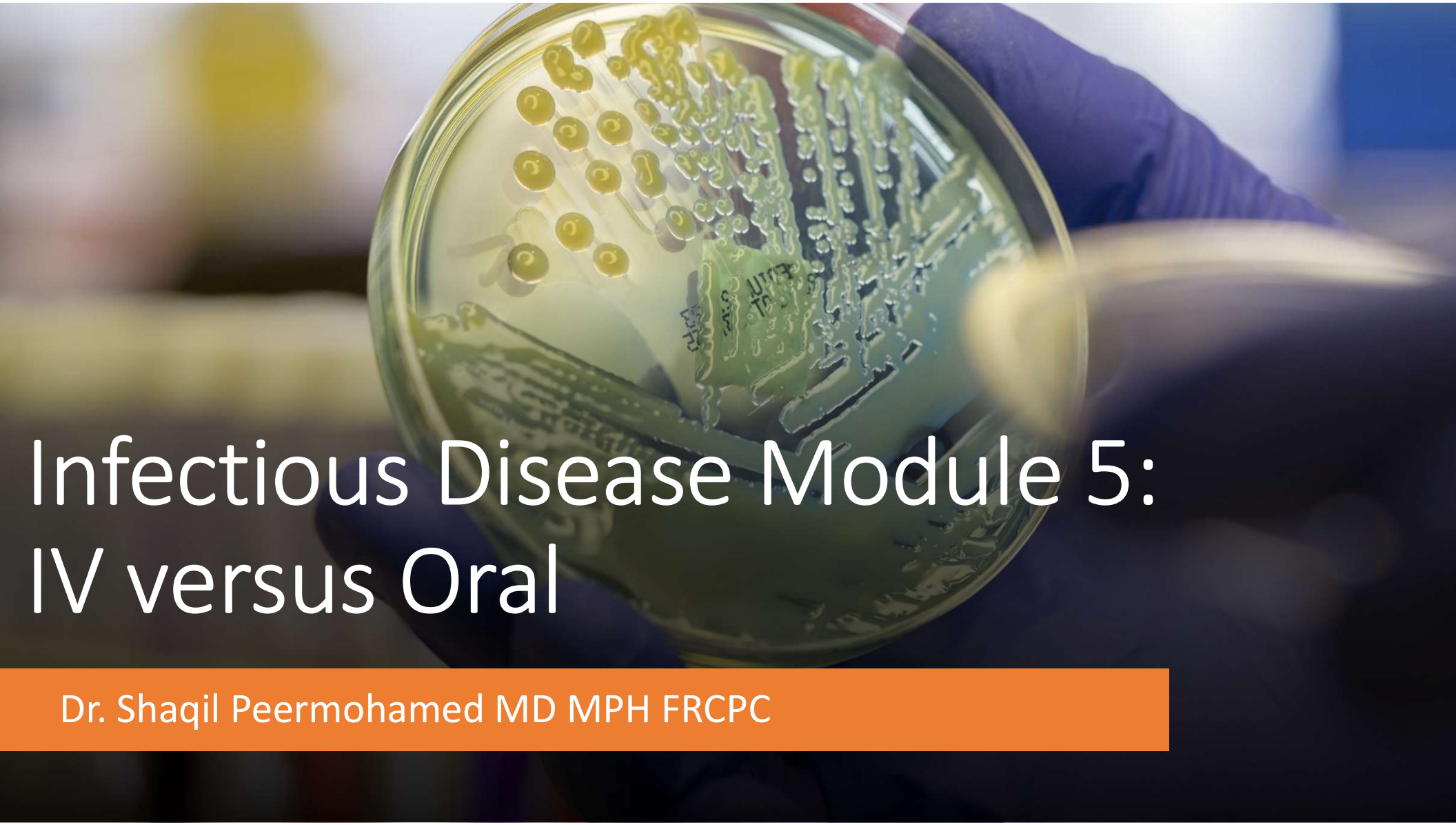

Infectious Disease Module 5: IV versus Oral

Dr. Shaqil Peermohamed MD MPH FRCPC