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1 **Time efficiency assessment of antimicrobial stewardship strategies**

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3 Gabriele Pollara^{1,2}, Suparna Bali³, Michael Marks⁴, Ian Bates⁵, Sophie Collier¹, Indran Balakrishnan¹

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5 ¹ Department of Microbiology, Royal Free London, United Kingdom

6 ² Division of Infection and Immunity, University College London, United Kingdom

7 ³ Department of Pharmacy, Royal Free London, United Kingdom

8 ⁴ Clinical Research Department, London School of Hygiene and Tropical Medicine, United Kingdom

9 ⁵ UCL School of Pharmacy, United Kingdom

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11 **Correspondence:** Dr Gabriele Pollara, Division of Infection & Immunity, Cruciform Building, Gower
12 Street, London, WC1E 6BT, United Kingdom. Email: g.pollara@ucl.ac.uk

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17 To the Editor – We read with interest the recent manuscript in *Clinical Infectious Diseases* by Tamma
18 et al that focused on the efficacy of different antimicrobial stewardship methods, demonstrating
19 that post-prescription review with feedback (PPRF) was more effective at reducing antimicrobial
20 consumption over time than pre-prescription authorisation [1]. The study was performed on medical
21 inpatients, but hospitals contain many other cohorts, such as surgical inpatients, where antimicrobial
22 use is also high and often inappropriate [2]. PPRF can take many forms but is invariably both human
23 resource- and time-intensive. Many hospitals may lack the resources to initiate this level of
24 stewardship universally [3,4], and therefore, there is a need to identify the form of PPRF that most
25 efficiently impacts inappropriate antimicrobial prescribing [5,6].

26

27 We performed a prospective, observational study that compared different forms of PPRF: ward round
28 reviews on acute medical wards, ward round reviews on surgical recovery wards and telephone
29 reviews to clinical teams caring for patients receiving carbapenems, cephalosporines or quinolones.
30 Each stewardship review episode was performed by 2 microbiologists and a pharmacist, who collected
31 no more data than needed for routine practice and were not aware that the data would be used
32 comparatively in the study. Each form of stewardship occurred daily for 45, 90 and 60 minutes
33 respectively, and there was no overlap in the patients reviewed. All antimicrobial prescriptions
34 reviewed were quantified and any intervention recorded, defined as a change to antimicrobial
35 prescription, including starting or stopping a medicine, as well as modifying their duration or
36 administration. For the purpose of comparison, we considered telephone stewardship to be the
37 control group. We calculated both the proportion of reviews resulting in an intervention and the rate
38 of intervention per hour of stewardship across each of the three stewardship modalities.

39

40 A total of 1,928 antimicrobial prescriptions were reviewed. Both surgical (37.24%) and medical (9.35%)
41 stewardship ward rounds resulted in a significantly higher proportion of interventions compared to

42 telephone reviews (4.34%) (Table 1). However, after controlling for time, the rate of interventions per
43 hour was higher for medical stewardship rounds (2.26 interventions/hour) compared to both surgical
44 rounds (1.70 interventions/hour) and telephone rounds (0.48 interventions/hour) (Table 1).

45

46 In conclusion, our study supports the observations made by Tamma et al that hospital ward based
47 PPRF, though resource intensive, is an effective form of antimicrobial stewardship. We extend their
48 findings by raising the importance of time efficiency, demonstrating that whilst surgical patient
49 stewardship rounds result in a high absolute number and proportion of interventions, they are labour
50 intensive and that medical ward rounds resulted in a similar number of interventions per hour of
51 stewardship time. Both approaches were significantly better than telephone stewardship in terms of
52 both the proportion and rate of stewardship interventions. We propose that other hospitals looking
53 to assess and prioritise the impact of their stewardship programs should also incorporate a
54 standardised time-based measure of stewardship efficiency.

55

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59 References

- 60 1. Tamma PD, Avdic E, Keenan JF, et al. What is the More Effective Antibiotic Stewardship
61 Intervention: Pre-Prescription Authorization or Post-Prescription Review with Feedback? Clin.
62 Infect. Dis. Available at: [https://academic.oup.com/cid/article-
63 abstract/doi/10.1093/cid/ciw780/2623953/What-is-the-More-Effective-Antibiotic-Stewardship](https://academic.oup.com/cid/article-abstract/doi/10.1093/cid/ciw780/2623953/What-is-the-More-Effective-Antibiotic-Stewardship).
64 Accessed 10 February 2017.

- 65 2. Cusini A, Rampini SK, Bansal V, et al. Different Patterns of Inappropriate Antimicrobial Use in
66 Surgical and Medical Units at a Tertiary Care Hospital in Switzerland: A Prevalence Survey. PLOS
67 ONE **2010**; 5:e14011.
- 68 3. Livorsi DJ, Heintz B, Jacob JT, Krein SL, Morgan DJ, Perencevich EN. Audit and Feedback
69 Processes Among Antimicrobial Stewardship Programs: A Survey of the Society for Healthcare
70 Epidemiology of America Research Network. *Infect. Control Hosp. Epidemiol.* **2016**; 37:704–706.
- 71 4. Le Coz P, Carlet J, Roblot F, Pulcini C. Human resources needed to perform antimicrobial
72 stewardship teams' activities in French hospitals. *Médecine Mal. Infect.* **2016**; 46:200–206.
- 73 5. Davey P, Brown E, Charani E, et al. Interventions to improve antibiotic prescribing practices for
74 hospital inpatients. In: The Cochrane Collaboration, ed. *Cochrane Database of Systematic*
75 *Reviews*. Chichester, UK: John Wiley & Sons, Ltd, 2013. Available at:
76 <http://doi.wiley.com/10.1002/14651858.CD003543.pub3>. Accessed 8 February 2017.
- 77 6. Panesar P, Jones A, Aldous A, et al. Attitudes and Behaviours to Antimicrobial Prescribing
78 following Introduction of a Smartphone App. PLOS ONE **2016**; 11:e0154202.
- 79