FACULTY OF HEALTH

UNIVERSITY OF CANBERRA

Treatment Practices, and Challenges in Managing Bacterial Skin Infections: Insights from Australian Primary Care Clinicians – A mixed methods study

19.11.2024

- **Ms Dhakshila Niyangoda** (BPharm, MPhil), PhD candidate, University of Canberra, University of Peradeniya, Sri Lanka)
- Assoc. Prof. Mary Bushell (University of Canberra)
- Dr Wubshet Tesfaye (University of Queensland)
- Assoc. Prof. Jackson Thomas (University of Canberra)

All other authors declare no conflicts of interest.

Outline of the presentation

UNIVERSITY OF CANBERRA

- Introduction
- Why this study?
- Methods
- Results
- Conclusion
- Future directions
- References
- Acknowledgments

Skin and Soft Tissue Infections (SSTIs): Etiology and Features

UNIVERSITY OF CANBERRA

Table 1: Skin infections commonly managed in primary care [1-3]

SSTI	Description	Etiology
Cellulitis 	Acute spreading infection of the skin involving the subcutaneous tissues	*Staphylococcus aureus, Streptococcus pyogenes*
Erysipelas 	Superficial, brilliant red, oedematous, painful infection of the skin, with induration, well-defined margins and rapid progression	*S. pyogenes*
Crusted or non-bullous impetigo 	Erythematous papules → vesicles and pustules → honey-colored crusts on an erythematous base	*S. aureus,* *S. pyogenes*
Bullous Impetigo 	Fragile, thin roofed vesico-pustules → crusted, erythematous erosions, often surrounded by a collar of the roof's remnants	*S. aureus*
Cutaneous abscess 	A localized collection of pus within the dermis and deeper skin tissues	*S. aureus*
Bacterial folliculitis 	Superficial infections of the hair follicle.	
Boils/furuncles 	Deeper infections of the hair follicle.	*S. aureus*
Carbuncles 	Infection involving several adjacent follicles.	*S. aureus,* *S. pyogenes*

Images were reproduced with permission from ©DermNet www.dermnetnz.org 2024 [4]

Introduction: Incidence of bacterial SSTIs

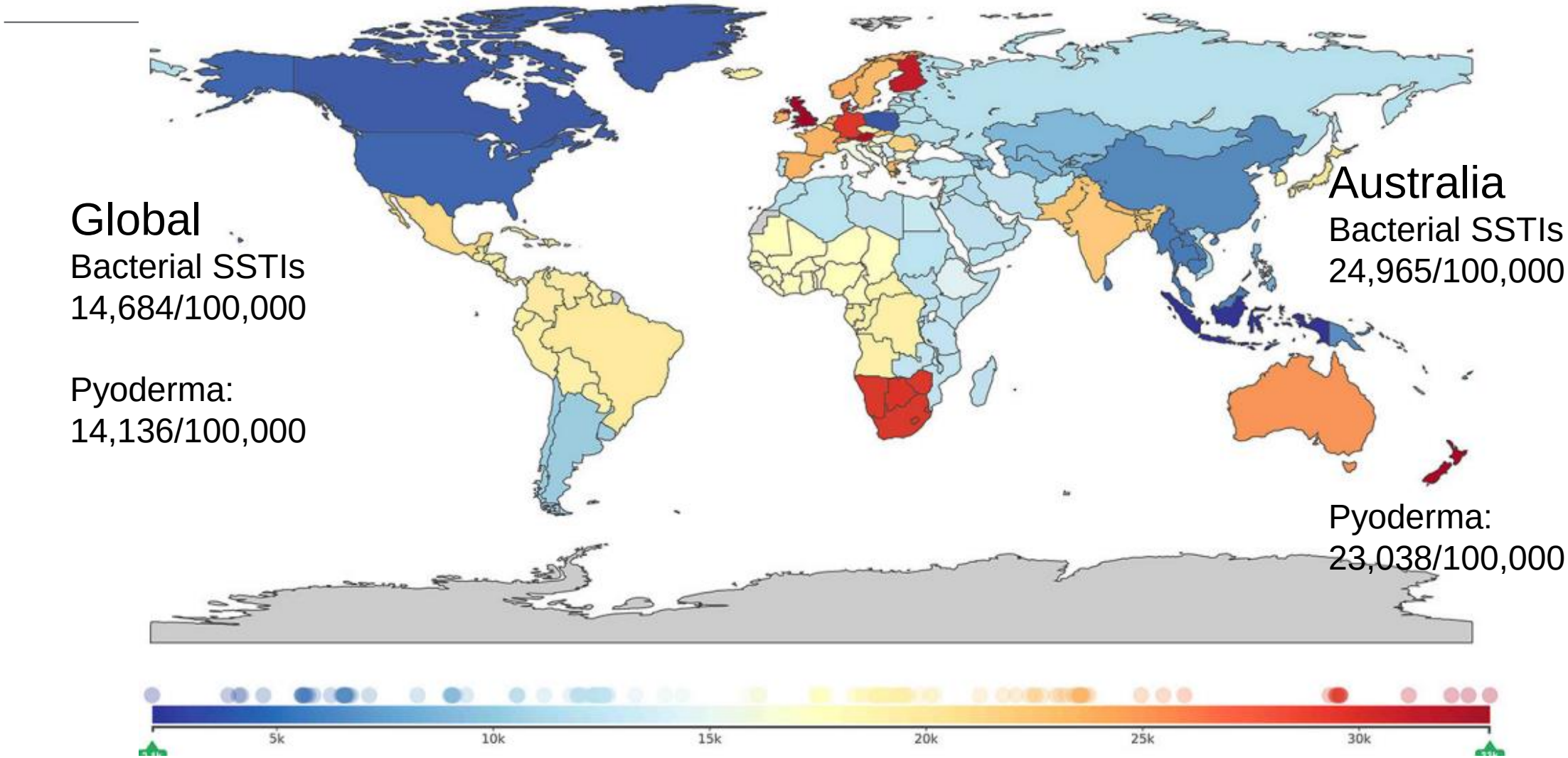


Figure 1: Incidence (new cases/100,000) of bacterial skin diseases in 2019 [5]

Bacterial SSTIs in Australia

UNIVERSITY OF CANBERRA

- **Childhood Impetigo Prevalence**: Highest global rate (44.5%) among First Nations children in rural/remote Australia [6].
- **Primary Care Presentations**: SSTIs accounted for 0.4-16% of cases [7-10].
- **Treatment Failure**: SSTI treatment failure rates were 15-50% after 6 weeks [11].
- **Cost of Admission**: Minimum cost per SSTI admission in Northwestern Queensland was $9,584 [12].
- **High-Risk Populations**: First Nations Australians, rural/remote communities, elderly, children, people with comorbidities, and custodial populations [9,10,13].
- **Antibiotic Prescription**: There is a high national use of antibiotics for SSTIs, with 21% of cefalexin prescriptions were for SSTIs [14].

Challenges in Bacterial SSTIs Management

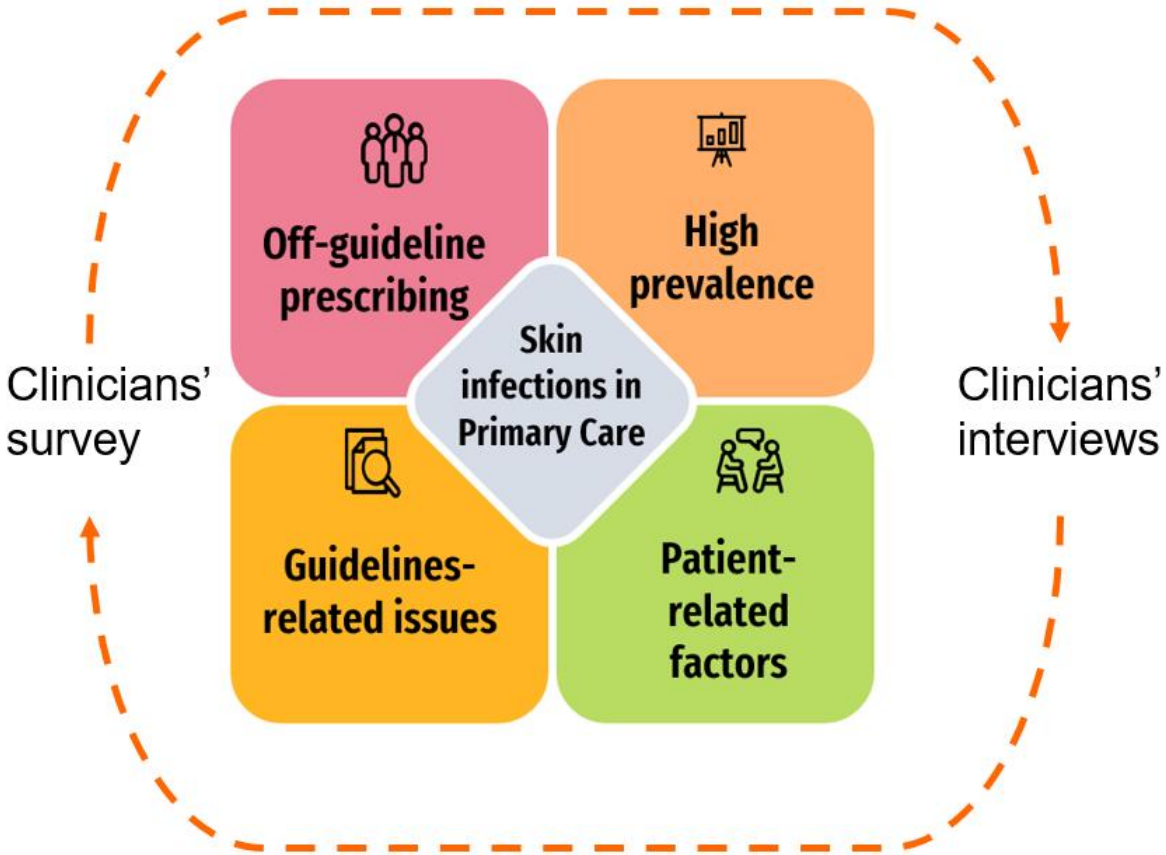


Figure 2: Challenges for the successful management of bacterial SSTIs [6,9,10,13-19]

Why this study?

- Majority of SSTIs are managed in primary care [10,11]
- Limited research on treatment practices for SSTIs in Australia [15-17].
- Existing studies focused solely on rural/remote areas [15-17].
- Issues had not issue had not been viewed through lens of frontline practitioners at national level
- There is a clear need for a comprehensive understanding of clinician decision-making across the country.

Why this study?

UNIVERSITY OF CANBERRA

Research Aim

- To explore Australian clinicians' current treatment practices in managing bacterial SSTIs, with a particular focus on identifying the enablers and barriers they face

Methods

Participants: Clinicians with prescribing authority for bacterial SSTIs in Australia.

Ethics Approval: University of Canberra Low-Risk Ethics Committee Approval Numbers: 6858, 13260

Study period: Oct 2022 - May 2024

Data analysis:

- Quantitative: Descriptive statistics, Chi-square test and Fisher's exact test to assess associations
- Qualitative: Thematic analysis

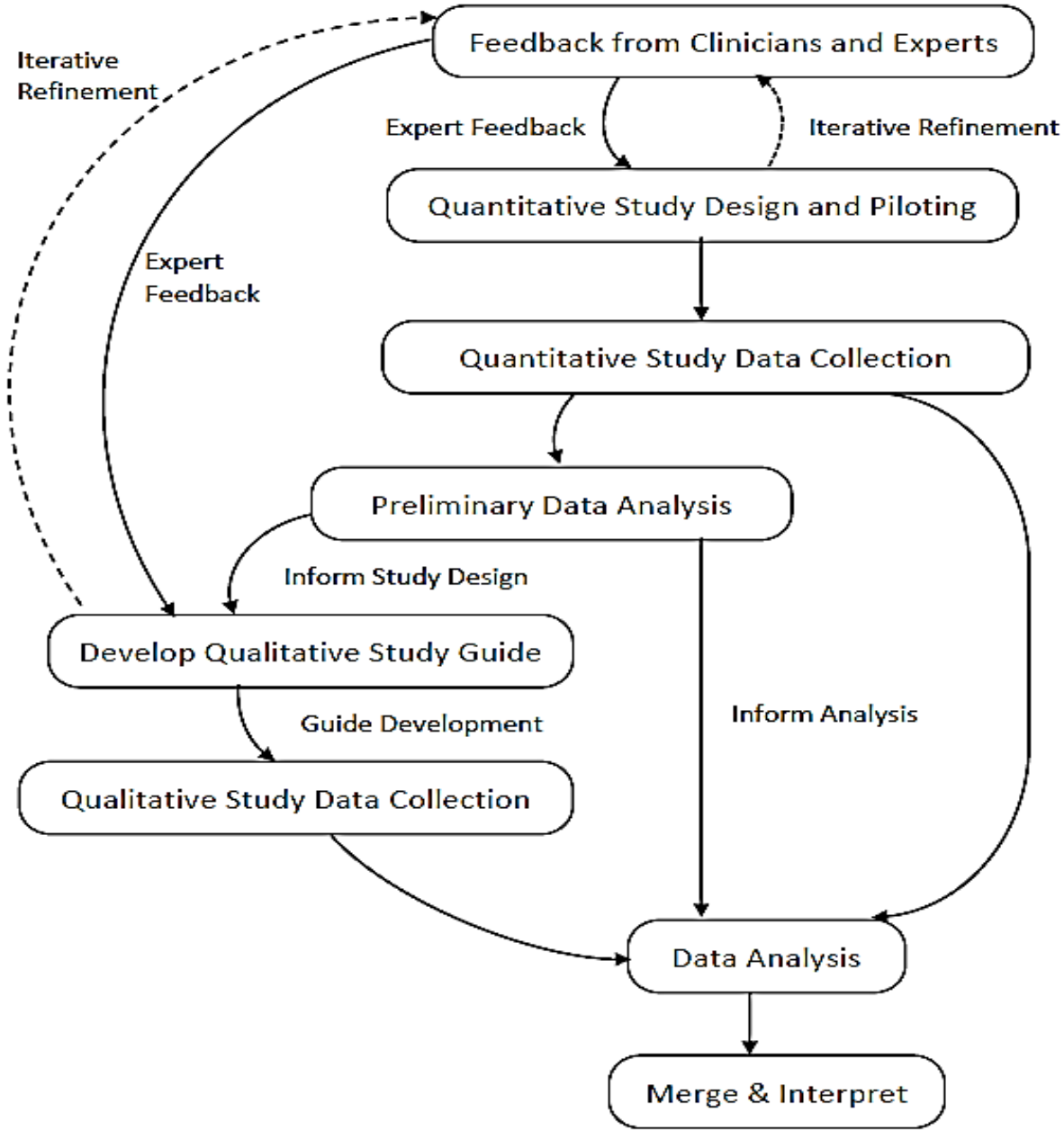


Figure 3: Study design flow chart

Results: Survey

- 70 responses in the survey.
- 51 entries were eligible for data analysis.

Table 2: Demographic details of the survey participants

Characteristic	(n, %)
Profession (number of valid responses: 50)	
General Practitioner	28 (56.0)
Nurse Practitioner	16 (32.0)
Aboriginal and/or Torres Strait Islander Health Practitioners	3 (6.0)
Other	3 (6.0)
Age (n=51)	
Under 30 years	3 (5.9)
30-39 years	22 (43.1)
40-49 years	11 (21.6)
50-59 years	11 (21.6)
60-69 years	4 (7.8)
Experience in current position (n=51)	
0-1 years	3 (5.9)
1-5 years	8 (15.7)
5-10 years	17 (33.3)
10-15 years	7 (13.7)
15-20 years	6 (11.8)
>20 years	10 (19.6)
Geographical location (Modified Monash Model classification) (n=50)	
Metropolitan areas and regional centres	38 (76.0)
Large rural towns, and Medium rural towns	0 (0)
Small rural towns	5 (10.0)
Remote communities and Very remote communities	7 (14.0)
State or territory (n=50)	
Australian Capital Territory	8 (16.0)
New South Wales	24 (48.0)
Northern Territory	2 (4.0)
Queensland	5 (10.0)
Tasmania	2 (4.0)
Victoria	5 (10.0)
Western Australia	4 (8.0)

Results – Treatment Practices

UNIVERSITY OF CANBERRA

Table 3: Dosage and Duration choices for Commonly Prescribed Drugs for Impetigo by the Survey Participants

Drug	Route of administration	Bullous impetigo on a limb of a 50 kg adult		Non-bullous impetigo on a limb of a 30 kg child		Non-bullous impetigo around the mouth of a 30 kg child	
		Dose and Frequency	Duration (days)	Dose and Frequency	Duration (days)	Dose and Frequency	Duration (days)
Benzathine benzylpenicillin	Intramuscular	**1.2 million units/2.3ml (equiv. 900 mg/2.3 ml)**	**Stat**	**1.2 million units /2.3ml (equiv. 900 mg/2.3 ml)**	**Stat**	**1.2 million units /2.3ml (equiv. 900 mg/2.3 ml)**	**Stat**
Cefalexin	Oral	250-500mg tds 500mg tds **500mg qid** 1g bd	5-7	240mg qid 250mg tds 250mg qid 400mg qid 450mg qid 500mg qid 990mg bd (33mg/kg bd)	5	250mg tds 250mg qid 400mg qid 450mg tds (15mg/kg tds) 450mg qid 500mg bd **750mg bd**	5-10
Dicloxacillin	Oral	**500mg qid**	7 OR review in 2-3 days	**375mg qid**	7		
Flucloxacillin	Oral	**500mg qid** 1g bd	5-10 OR **until resolved**	250mg qid 500mg bd 500mg qid	5-10	250mg qid **375mg qid** 500mg bd 500mg qid	5-**7**
Mupirocin	Topical	**2% tds**	**5**-10	**2% tds**	**5**-10	**2% tds**	**5**-10
Trimethoprim/ sulfamethoxazole	Oral	**160mg+800mg bd**	**3**-5	160mg+800mg bd **120+600mg bd**	5 **3**	160mg+800mg bd	5

Note: Bolded options are recommended by Australian Therapeutic Guidelines (eTG).

Results – Clinician Challenges

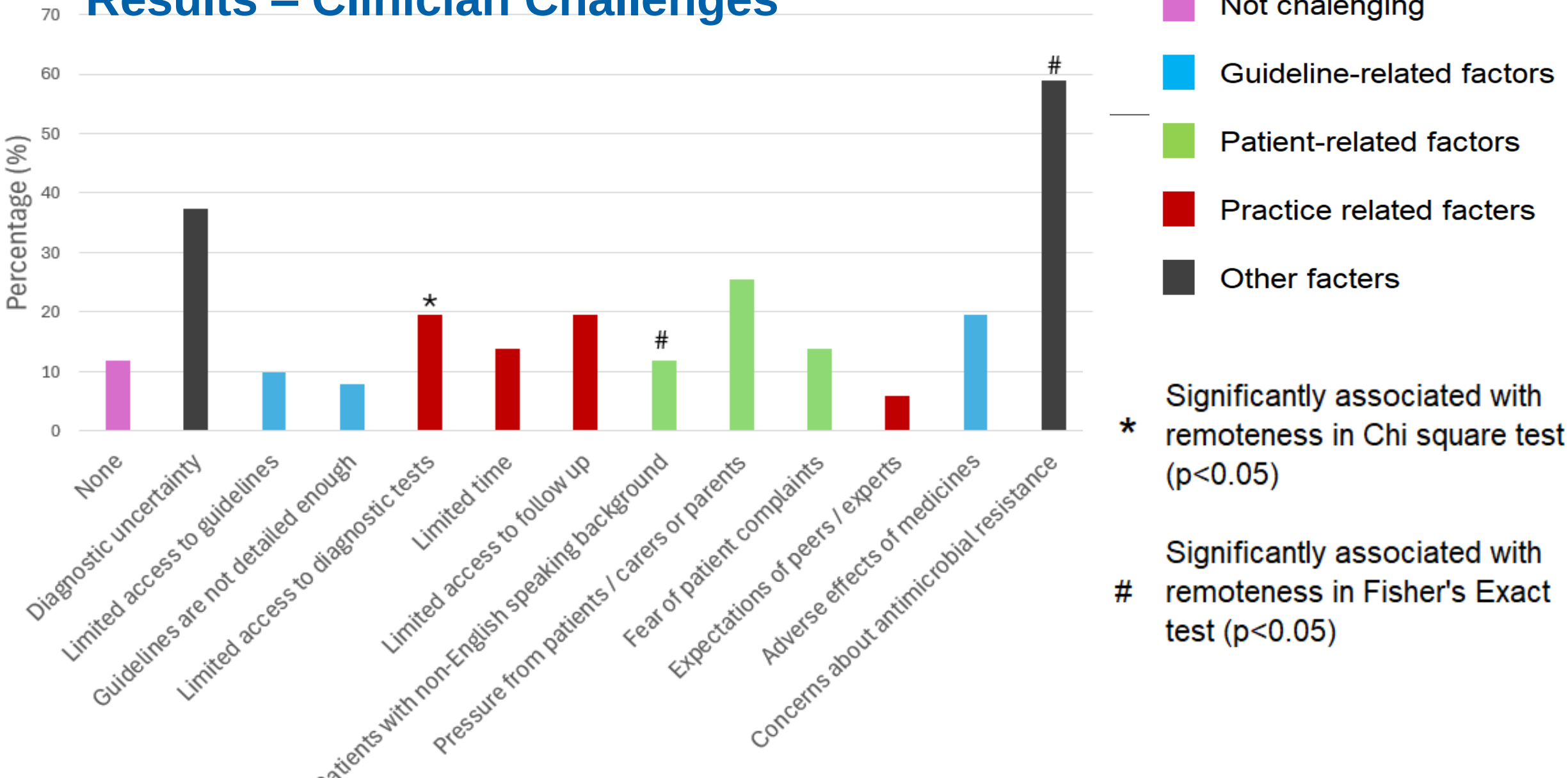


Figure 4: Everyday challenges clinicians face when treating bacterial SSTIs

Results - Sources of Information

- Clinicians used various sources to inform treatment strategies for impetigo, with 63% consulting multiple sources

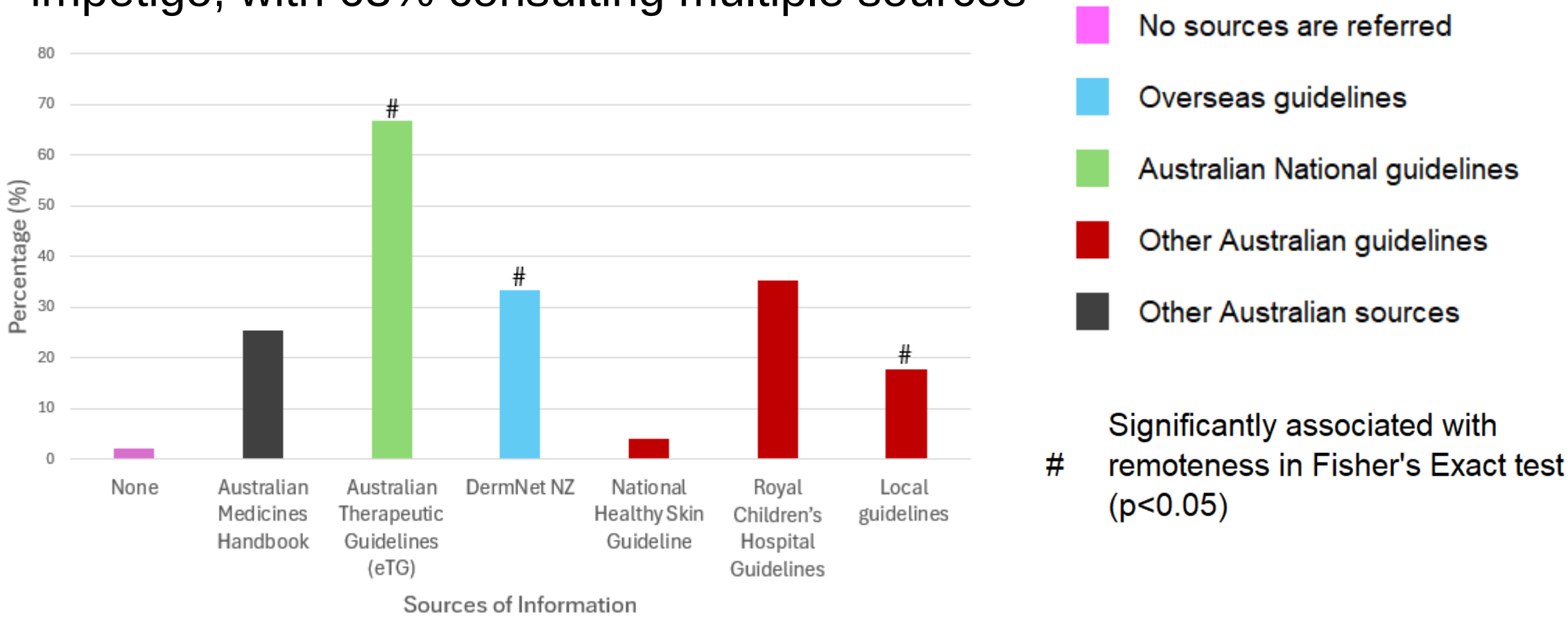


Figure 5: The trusted sources of information for the clinicians when treating bacterial SSTIs

Results – Prescribing guidelines

UNIVERSITY OF CANBERRA

Table 4: Suggested improvements to prescribing guidelines

Suggested improvements to prescribing guidelines	Percentage (%)
Inclusion of non-antibiotic management	61.9#
More options for topical preparations	61.9
Inclusion of severity score or other measure of assessment for impetigo	57.1
Linking the guidelines with local antimicrobial resistance patterns	47.6
Consideration of practical aspects of administration when recommending drugs such as prioritising less frequent administration	4.8
Culture and sensitivity prior to prescribing oral antibiotics	4.8
Inclusion of RHD prophylaxis	4.8

Significantly associated with remoteness in Fisher's Exact test ($p<0.05$)

Qualitative study Results - Theme Tree

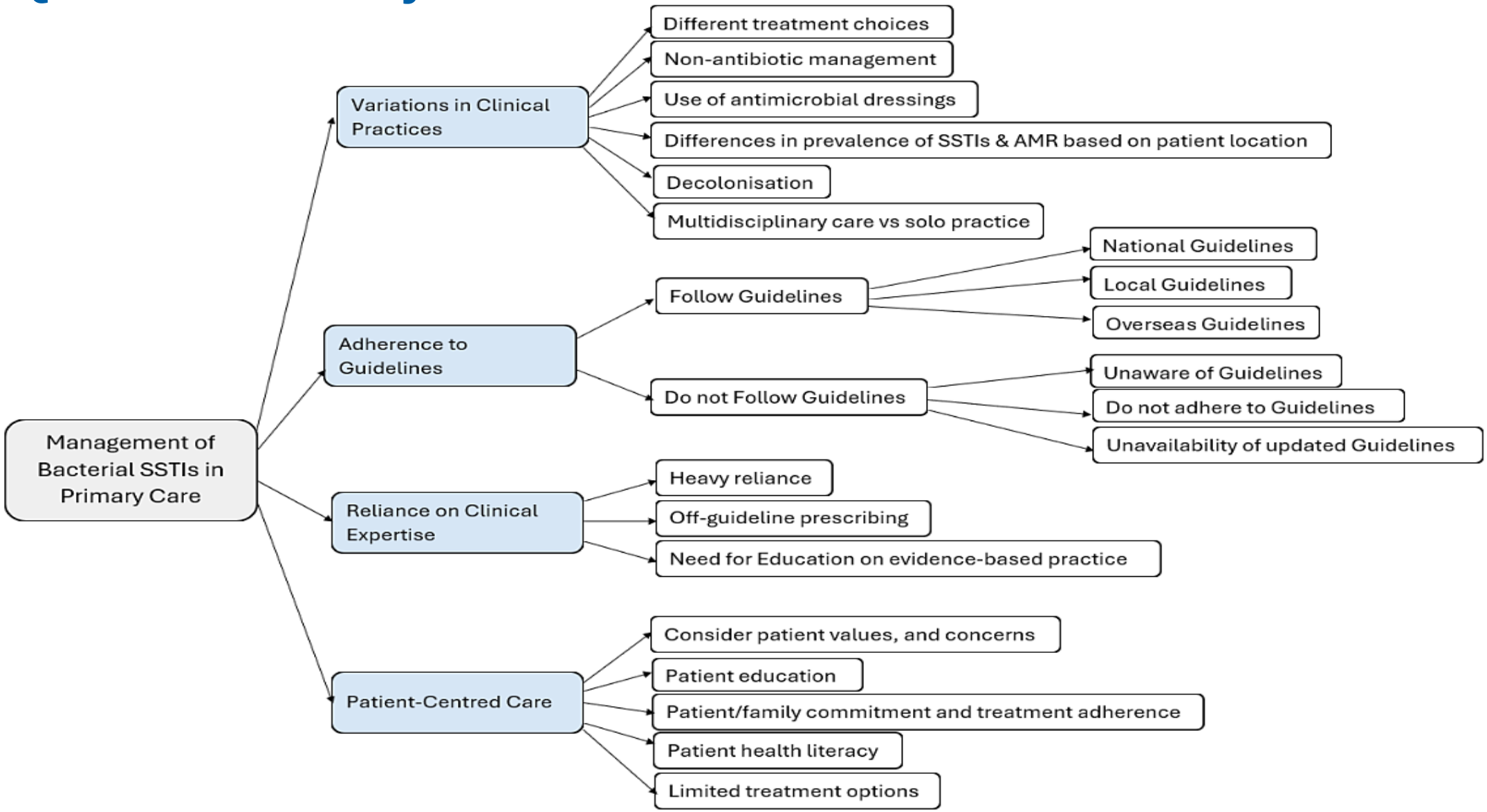


Figure 6: A summary of key factors influencing the management of bacterial SSTIs in primary care

Conclusion

UNIVERSITY OF CANBERRA

Variations in SSTI Management:

- Significant inconsistencies in management practices across Australia.
- Guidelines frequently used: Therapeutic, Royal Children's Hospital, DermNetNZ, ChAMP, PCCM, and CARPA.

Barriers to Effective Management:

- Unavailability of tailored guidelines and insufficient details in current guidelines.
- Concerns about AMR and diagnostic uncertainty.
- Challenges like painful IM injections and treatment failures.

Key Enablers for Successful SSTI Management:

- Multidisciplinary care, dedicated clinicians, use of wound dressings.
- Access to guidelines, ongoing education, and patient-related factors like strong family commitment and high health literacy.
- Most enablers appear context-specific.

Future Directions

UNIVERSITY OF CANBERRA

- Develop guidelines specifically for custodial settings.
- Revise national guidelines to include:
  - Impetigo severity scales.
  - Dressing and lesion care recommendations.

- Investigate:
  - Decolonization strategies and topical antibacterials.
  - Use of stay-on bandages for better treatment adherence.

- Research new formulations:
  - Flavour-friendly flucloxacillin.
  - Extended-release versions of dicloxacillin and flucloxacillin.

References

1. Therapeutic Guidelines, Australia. (https://www.tg.org.au/), Accessed on 31.05.2024.
2. Esposito S, Bassetti M, Concia E, et al. Diagnosis and management of skin and soft-tissue infections (SSTI). A literature review and consensus statement: an update. Journal of Chemotherapy 2017;29(4):197-214. DOI: 10.1080/1120009x.2017.1311398.
3. Stevens DL, Alan L. Bisno, Henry FC, et al. Practice Guidelines for the Diagnosis and Management of Skin and Soft Tissue Infections: 2014 Update by the Infectious Diseases Society of America. Clinical Infectious Diseases 2014;59(2):147-159. DOI: 10.1093/cid/ciu296.
4. DermNetNZ, All about the skin, The worlds leading free dermatology website. (https://dermnetnz.org/), Accessed on 13.11.2024.
5. Xue Y, Zhou J, Xu B, et al. Global burden of bacterial skin diseases: A Systematic Analysis Combined With Sociodemographic Index, 1990-2019. Frontiers in medicine 2022;9:861115. DOI: 10.3389/fmed.2022.861115.
6. Bowen AC, Mahe A, Hay RJ, et al. The global epidemiology of impetigo: A Systematic Review of the Population Prevalence of Impetigo and Pyoderma. PLoS One 2015;10(8):e0136789. DOI: 10.1371/journal.pone.0136789.
7. Heal C, Gorges H, van Driel ML, et al. Antibiotic stewardship in skin infections: a cross-sectional analysis of early-career GP's management of impetigo. BMJ Open 2019;9(10):e031527. (In English). DOI: 10.1136/bmjopen-2019-031527.
8. Gorges H, Heal C, van Driel M, et al. Prevalence and Associations of General Practice Registrars' Management of Impetigo: A Cross-Sectional Analysis From the Registrar Clinical Encounters in Training (ReCEnT) Study. Dermatology practical & conceptual 2020;10(2):e2020043. DOI: 10.5826/dpc.1002a43.
9. Yeoh DK, Anderson A, Cleland G, Bowen AC. Are scabies and impetigo "normalised"? A cross-sectional comparative study of hospitalised children in northern Australia assessing clinical recognition and treatment of skin infections. PLoS Neglected Tropical Diseases 2017;11(7):e0005726. (Comparative Study;). DOI: 10.1371/journal.pntd.0005726.

Acknowledgments

- Participants
- Reviewers and Experts
- Supervisory team
- University of Canberra
- University of Peradeniya
- AHEAD operation
- Friends and family

Thank you!

Data analysis

UNIVERSITY OF CANBERRA

Quantitative Analysis:

•Descriptive statistics for summarizing data.

•Chi-square test and Fisher's exact test to assess associations.

Qualitative Analysis:

•Coded and analyzed using NVivo 14 software.

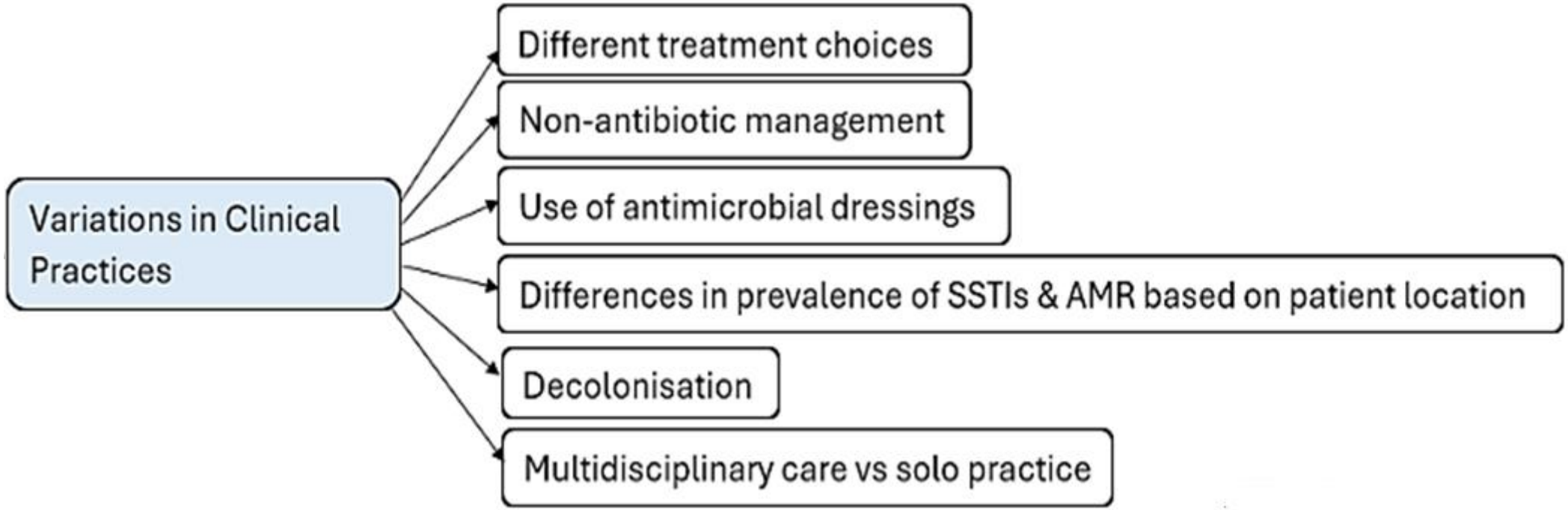
•Employed an inductive-deductive content analysis approach.

•Initial codes are refined into themes and sub-themes through an iterative process.

•Data saturation is determined through team discussions and verification by a second coder.

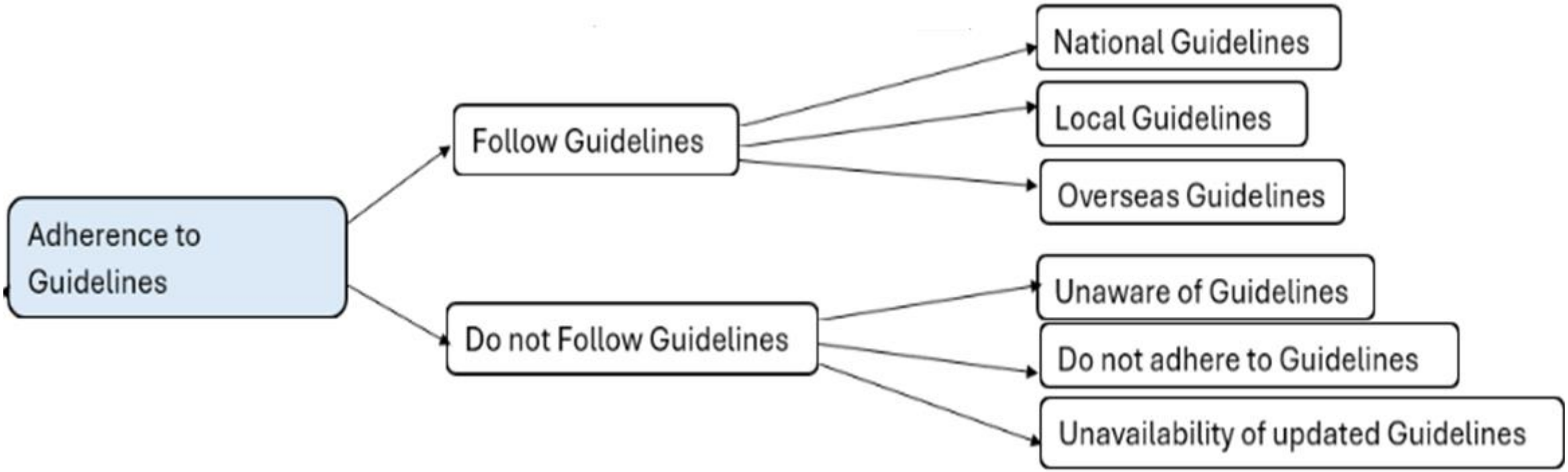
•Independent validation of transcripts and codes by a second researcher to ensure reliability.

Qualitative study Results cont.



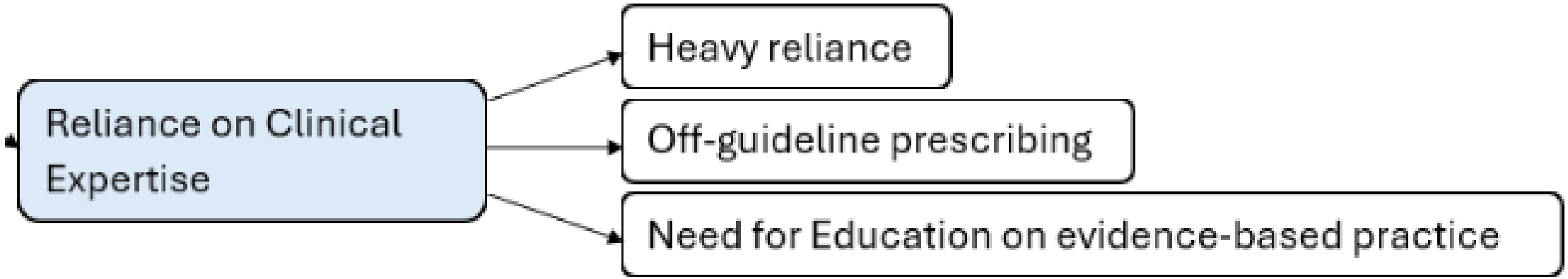
"*I don't use topical, I usually use oral*."
— GP8, General Practitioner, Metropolitan areas

Qualitative study Results cont.



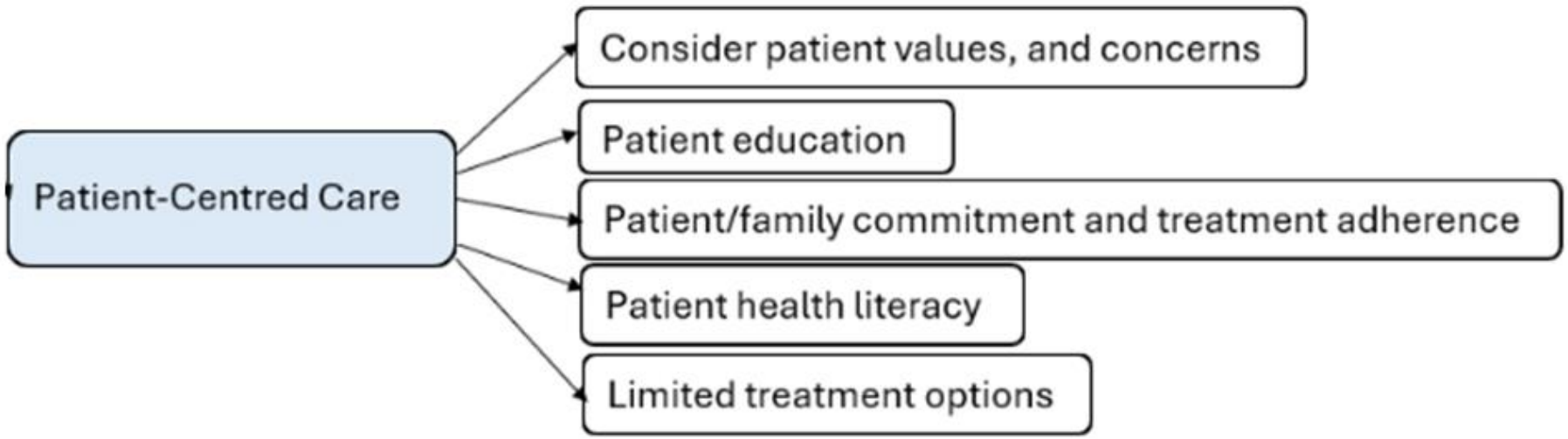
"*There's no practice guidelines given to us….. we practice however we want*."
— GP2, General Practitioner, Metropolitan areas

Qualitative study Results cont.



"*My antibiotic choice would generally be cefalexin*."
— GP3, General Practitioner, Metropolitan areas

Qualitative study Results cont.



"*There's a large amount of MRSA in prison*."
— NP1, Nurse Practitioner, Custodial setting

"*I was watching one kid die every month [broken voice, emotional], you know, and that's that, that's from sores. That's from these infections. So, we need um good, good research and evidence on how to clean and kill the bugs and how to cover them. Simple as that. Kill it and cover it.*"
— NP3, Nurse Practitioner, Very remote communities

References cont.

10. Hendrickx D, Bowen AC, Marsh JA, Carapetis JR, Walker R. Ascertaining infectious disease burden through primary care clinic attendance among young Aboriginal children living in four remote communities in Western Australia. PLoS One 2018;13(9):e0203684. DOI: 10.1371/journal.pone.0203684.

11. Spurling G, Askew D, King D, Mitchell GK. Bacterial skin infections - An observational study. Australian Family Physician 2009;38(7):547-551.

12. Whitehall J, Kuzulugil D, Sheldrick K, Wood A. Burden of paediatric pyoderma and scabies in North West Queensland. Journal of Paediatrics & Child Health 2013;49(2):141-143. DOI: 10.1111/jpc.12095.

13. Haysom L, Cross M, Anastasas R, Hampton S, Harris M, Sneddon K. Methicillin-resistant *Staphylococcus aureus* skin and soft tissue infections in young people in custody in New South Wales. Journal of Paediatrics and Child Health 2019;55(2):224-228. DOI: 10.1111/jpc.14188.

14. AURA 2023: Fifth Australian report on antimicrobial use and resistance in human health - Report.

15. Amgarth-Duff I, Hendrickx D, Bowen A, et al. Talking skin: Attitude and practice around skin infection,treatment options, and their clinical management in a remote region in Western Australia. Rural and Remote Health 2019;19(3):5227. DOI: 10.22605/RRH5227.

16. Thomas S, Crooks K, Taylor K, Massey PD, Williams R, Pearce G. Reducing recurrence of bacterial skin infections in Aboriginal children in rural communities: new ways of thinking, new ways of working. Australian Journal of Primary Health 2017;23(3):229-235. DOI: https://doi.org/10.1071/PY16135.

17. Broom A, Broom J, Kirby E, Gibson A, Davis M. Antibiotic optimisation in ‘the bush’: Local know-how and core-periphery relations. Health & Place 2017;48:56-62. DOI: https://doi.org/10.1016/j.healthplace.2017.09.003.