

1 **Evaluating the role of Primary Care Pharmacy Technicians in Antimicrobial Stewardship (AMS) and**

2 **Acne Management using TARGET resources**

3 Alishah Lakha¹ Naomi Fleming¹, Kimberly Sonnex², Tracey Thornley², Claire Anderson², Kieran Hand¹ and Diane

4 Ashiru-Oredope³

5 ¹NHS England

6 ²University of Nottingham, School of Pharmacy, Division of Pharmacy Practice and Policy,

7 Nottingham, UK

8 ³UK Health Security Agency

9 *Correspondence: Kimberley.Sonnex@nottingham.ac.uk

10

11 **Background**

Comment [DAO1]: Depending on journal, the abstract might be too long

12 Inappropriate antibiotic prescribing is accelerating antimicrobial resistance (AMR)⁽¹⁾. Pharmacy
13 professionals (Pharmacists and Pharmacy Technicians) promote good antibiotic prescribing practice.

14 **The** traditional role of pharmacy technicians in supporting pharmacists and patients has expanded

Comment [NF2]: Reference for previous sentence?

15 alongside the clinical expansion of pharmacist roles⁽²⁾. This paper focuses on the opinion of

16 pharmacy technicians and their role in the review of acne management and the evaluation of the

17 UKHSA TARGET 'How to review acne' resources.

18 **Aims:**

19 To explore the impact of the TARGET resources on the capability, opportunity and motivation of

20 pharmacy technicians in general practice in managing patients with acne,

21 To evaluate the usefulness of the 'How to review acne' resources.

22 **Methods**

23 A quantitative study using an electronic survey asking UK-based pharmacy technicians to rate their

24 agreement on a 5-point Likert scale with 21 predefined statements, themed on the COM-B model

25 and usefulness of the specific TARGET resources for acne.

26 **Findings**

27 The survey found that capability and opportunity in managing acne in the group familiar with
28 TARGET resources was higher than the group not familiar with TARGET resources. Scores for
29 motivation in both groups were high; pharmacy technicians have the motivation to undertake
30 infection management roles, whether or not they are familiar with the TARGET toolkit.

Comment [NF3]: Only use the word significant if the stats show it is mathematically ©

31 The toolkit 'How to review acne' resources were overall rated as useful in supporting the review of
32 patients with acne.

33 **Conclusion**

34 The TARGET toolkit is an effective resource that helps to upskill pharmacy technicians in the area of
35 AMS, increasing capability and opportunity in the management of acne.

36

37 **Key words**

38 Acne; pharmacy technicians; pharmacists; antimicrobial stewardship; COM-B, antimicrobial
39 resistance; infection management; GP practice; primary care

40

41 **Introduction**

42 Acne Vulgaris (hereafter referred to as acne) is a common chronic skin condition⁽³⁾. Treatment is
43 determined by the severity of the acne and how much it affects the individual. UK guidance
44 recommends fixed combination topical preparations containing retinoids, benzoyl peroxide or
45 antibiotics as a first-line treatment for mild-to-moderate acne or, for moderate-to-severe acne, a
46 fixed combination non-antibiotic topical agent alone or together with oral lymecycline or
47 doxycycline⁽⁴⁾. NICE guidance recommends that antibiotic treatment (topical or oral) for acne should
48 not be continued for more than 6 months unless in exceptional circumstances⁽⁵⁾.

49 There are growing concerns about antibiotic resistance in the treatment of acne^(6,7). Most acne
50 treatment in the UK is provided in general practice⁽⁸⁾. A cohort study analysed consultations and
51 prescribing for acne using the Clinical Practice Research Datalink.⁽⁹⁾ It found that the most common
52 prescription given at the initial acne consultation was an oral antibiotic alone (34%) against NICE
53 guidance, closely followed by topical antibiotics (32%)⁽⁹⁾ This is in line with earlier research, which
54 found that the most commonly prescribed treatment for acne was oral antibiotics⁽⁸⁾. A 2022 study
55 showed that 44.5% of people with a new acne diagnosis received a prescription for long-term oral
56 antibiotics⁽¹⁰⁾

Comment [TT(4)]: I've gone through and changed some of the font so that same but worth checking all text (as font size was slightly different). Also consistency reference full stops and references (some missing).

57 The Pharmacy Technician role has traditionally been to support pharmacists in the supply of
58 medicines in hospital and community settings. Increasingly, pharmacy technicians are undertaking
59 more generic medicines management based roles and assuming training, leadership and
60 development roles. The Audit Commission's publication "A spoonful of sugar, Medicines
61 management in NHS hospitals" (2001), recommended pharmacists work more closely with patients
62 and provide clinical services. This resulted in a significant transfer of responsibility to pharmacy
63 technicians. In 2011, the General Pharmaceutical Council (GPhC) introduced regulatory registration
64 for pharmacy technicians. Parallel to this, pharmacists in primary care roles began working with
65 general practitioners, advising on the evidence-based use of medicines, medication safety and
66 managing prescribing budgets. This work led to the creation of the primary care pharmacy
67 technician⁽¹¹⁾

Comment [TT(5)]: Just need to watch spacing as well. Have modified some but conscious could just be my viewer

68 Primary Care Networks (PCNs) are defined as groups of general practitioner (GP) practices working
69 with other health and social care services in their local area⁽¹²⁾. They were introduced in 2019 as part
70 of the NHS Long term plan. The Network Contract Direct Enhanced Service (DES) sets out the core
71 requirements and entitlements for a PCN. One of the clinical responsibilities that has been set out in
72 the DES is for Pharmacy Technicians is to support initiatives for antimicrobial stewardship to reduce
73 inappropriate antibiotic prescribing⁽¹³⁾ However, there is some evidence to suggest that pharmacy

74 professionals lack confidence in their ability to deliver clinical services^(14,15), and training has been
75 found to increase confidence and competence and positively impact behaviour and practice^(16,17).
76 The TARGET resources are produced by the UK Health Security Agency (UKHSA) and are hosted on
77 the Royal College of General Practitioner (RCGP) website www.rcgp.org.uk. TARGET materials are a
78 well-established resource that support health care professionals to implement AMS in their
79 practice. The TARGET acne “How to...” toolkit has been recently developed and supports health care
80 professionals in reviewing patients on acne treatment, ensuring that antimicrobial prescribing is
81 appropriate and reinforces the key messages of self-care and non-antimicrobial interventions.

Comment [KS(6)]: Add in reference to the website here

82 A survey was developed using the COM-B approach to gain insight into pharmacy professionals
83 (pharmacists and pharmacy technicians) opinions of their role in acne management. The COM-B
84 model is a comprehensive behavioural model developed by Michie et al⁽¹⁸⁾ and provides insight into
85 three components thought to underpin any change in behaviour (B); Capability (C), Opportunity (O),
86 and Motivation (M). Thus, in order for pharmacy technicians to be able to manage patients with
87 acne, including reviewing antibiotic treatment and giving self-care advice, they must be physically
88 and psychologically capable (C), have the social and physical opportunity (O) and want or need to do
89 this more than other competing priorities (M). Each of these components interact and interventions
90 must target one or more of these in order to deliver and maintain the behavioural change^(18,19)

Comment [TT(7)]: Think its worth being clear here what we mean by pharmacy professionals

91 **Aims and Objectives**

92 The aim of this study was to gain insight into pharmacy technicians’ opinions of their role in acne
93 management and explore the impact of TARGET resources on the capability, opportunity and
94 motivation of pharmacy technicians in primary care to manage patients with acne. Additionally, the
95 newly developed acne “how to...” toolkit was evaluated for its usefulness in the management of
96 acne.

Comment [TT(8)]: Think we need to add into the method that this was designed for pharmacists and pharmacy technicians, and distributed by similar channel. That the pharmacy results are reported elsewhere, but that this paper focuses on the PT results. We may also need to state why we have separated them out.

97 **Materials and Methods**

Comment [DAO9]: Agree, also worth referencing the other article – you can add in review on the reference list. Hopefully will be published before this goes through the full review process and you can add the full details

98 *Study design and participants:* A mixed-methods, but primarily quantitative study was undertaken.
99 This was carried out as a pilot study as the TARGET acne toolkit had been newly developed and
100 therefore an initial evaluation was undertaken prior to any further development and wider use.
101 Participants were UK-based pharmacy professionals (pharmacists and pharmacy technicians)
102 working in general practice and community pharmacy. The survey was distributed widely via
103 pharmacy networks, NHS England regional Antimicrobial Stewardship (AMS) leads, NHS England
104 AMS communications and social media platforms (LinkedIn and Twitter). Results for both
105 pharmacists and pharmacy technicians as pharmacy professionals working in community pharmacy
106 have been published www.sciencedirect.com. Combined results for GP setting for both pharmacists
107 and pharmacy technicians are, at the time of writing this article, due to be published. This paper
108 focuses on responses from pharmacy technicians from the GP survey in order to analyse the
109 responses from this workforce in depth.

110 *Survey Method:* The COM-B model has been previously used to assess the behaviour change of
111 healthcare professionals after implementation of evidence-based interventions⁽¹⁸⁾. The model was
112 applied here to assess capability, opportunity and motivation of pharmacists and pharmacy
113 technicians working in general practice around acne management before and after piloting of the
114 TARGET acne 'How to...' resources <https://elearning.rcgp.org.uk/mod/book/view.php?id=12649>. An
115 electronic questionnaire was developed and the Qualtrics XM platform used for deployment. The
116 TARGET acne "How to..." toolkit link to the RCGP website was sent⁽¹⁹⁾ in addition to clinical scenarios
117 that were developed to be used with the acne "How to..." toolkit (found in the supplementary
118 information).

119 Participants rated their agreement with 21 predefined statements on a 5-point Likert scale aligned
120 to the COM-B model components. (scale 1-5; strongly disagree to strongly agree) and a free-text
121 response to allow participants to provide further feedback on the resources. Mean and standard
122 deviation of the 5-point Likert responses were calculated. P values less than 0.05 were deemed

Comment [TT(10): Just need to be careful where full stops have disappeared with formatting.

123 significant. Demographic data on the profession of the participants, duration of professional
124 registration and region of the UK they practiced in were also collected.

125 *Data analysis:* Question types included 5-point Likert questions (scale 1 to 5; strongly disagree to
126 strongly agree), yes/no and free-text response. Mean and standard deviation of the 5-point Likert
127 responses were calculated, followed by T-tests to investigate statistical significance before and after
128 use of the toolkit, as has been demonstrated to be an acceptable statistical method previously (17).
129 Demographic data on the profession of the participants, duration of professional registration and
130 region of the UK they practiced in were also collected.

131

132 *Ethical approval:* This study was reviewed and approved by the University of Nottingham
133 School of Pharmacy Research Ethics Committee (Ref: 009-2023)

134

135 **Results**

136 Thirty-one registered pharmacy technicians responded to the survey. Of the respondents, 17 were
137 familiar with TARGET resources and 14 were not. From the group that were familiar with the
138 TARGET resources, two used these resources regularly in their practice and 1 had used the acne
139 “how to...” toolkit. Responses were received from England and Wales; with a range of post-
140 registration experience from 0-5 years to over 20 years. The results will be presented comparing
141 pharmacy technicians familiar with the TARGET resources in comparison to those not familiar with
142 the TARGET resources.

143 ***Awareness and engagement with AMS initiatives***

144 All respondents reported having accessed resources to improve their awareness of AMR in the past.
145 Aside from TARGET resources, the majority of respondents reported having accessed resources from
146 Centre For Postgraduate Pharmacy Education (CPPE), PrescQIPP and e-learning for health (e-lfh), as
147 well as their organisations own prescribing guidance. Where RCGP TARGET resources were utilised

Comment [KS(11): Need to expand these abbreviations

148 by respondents, audit templates e.g. Urinary Tract Infection (UTI), cough and information leaflets
149 discussing Respiratory Tract Infections (RTIs) and UTIs were the most popular.

150 The respondents were also asked if they would be willing to join an AMS community of practice for
151 AMR, of which 20 answered and 14 said yes. This supports the high score for motivation seen in both
152 groups whether familiar with the TARGET toolkit or not.

153 ***Awareness of PCN DES requirements and national targets for antibiotic prescribing***

154 AMS is part of the England PCN DES contract and antimicrobial prescribing competency framework.
155 Out of the 23 responses to this question, 18 (78%) were aware that AMS is part of the PCN DES and
156 of the national outcome framework targets for antibiotic prescribing.

157 ***COM-B Analysis***

158 The responses from the survey, using scoring from the 5-point Likert scale and comparison of the
159 groups familiar with TARGET versus not familiar with TARGET resources can be seen in Table 1.

160 ***Capability***

161 Pharmacy technicians that were familiar with TARGET resources self-reported higher capability in
162 managing patients with acne than those not familiar with TARGET resources; 3.01 (SD 0.84) vs 2.25
163 (SD 0.82) respectively *p value 0.034*

164 Interestingly, the two respondents that used TARGET resources regularly self-reported higher
165 capability; 3.75 with capability being the highest for the one pharmacy technician that had used the
166 acne "How to.." toolkit; 4.5

167 Self-reported assessment for capability was highest overall for "I have the skill to run clinical
168 searches on my clinical system" and "I understand the risks of long-term antibiotic treatment".

169 Capability was lowest overall for "I am confident undertaking clinical review for patients with
170 repeated or long-term use of antibiotics for acne management".

171 **Opportunity**

172 Opportunity was also higher in the groups that were familiar with TARGET resources compared to
173 those that were not familiar; 3.84 (SD 0.31) vs 3.26 (SD 0.27) *p value 0.011*

Comment [NF12]: Add p value here

174 The two respondents that used TARGET resources regularly self-reported higher opportunity; 4.0
175 with opportunity being reported as highest for the one pharmacy technician that had used the acne
176 “How To...” toolkit; 4.6

177 For opportunity, highest scores were for “ In the last three months I have the opportunity to run
178 searches on the clinical system for quality improvement initiatives” and “I am able to undertake
179 quality improvement initiatives on the areas of prescribing that I have an interest in”. Lowest scores
180 for opportunity were for “There are support staff to run searches on my behalf”

181 **Motivation**

182 Both TARGET familiar and unfamiliar groups self-reported similar scores for motivation; 4.15 (SD
183 0.31) vs 3.85 (SD 0.74) *p value 0.208*

Comment [NF13]: Put the numbers in here

184 For motivation, the highest score was for “managing acne appropriately is important for the
185 patient’s quality of life” and lowest for “The review of patients on treatment for acne gives me job
186 satisfaction”

187

	All n=31		Familiar with TARGET n= 17		Not familiar with TARGET n=14		<i>p value (familiar vs not familiar)</i>
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
I have enough knowledge to manage people with acne	2.22	0.96	2.47	0.96	1.92	0.86	
I am confident in managing people with acne	2.22	1.07	2.40	1.08	2.00	1.00	
I am able to give self-care advice to people with acne	2.96	1.14	3.00	1.03	2.92	1.26	
I have enough knowledge to undertake reviews with patients with repeated or long-term use of antibiotics for acne management	2.00	1.02	2.43	1.12	1.50	0.65	
I am confident undertaking clinical review for patients with repeated or long-term use of antibiotics for acne management	1.81	0.90	2.00	0.97	1.58	0.76	
I understand the risks of long-term antibiotic treatment	3.78	1.10	4.33	0.60	3.08	1.19	
I have the skills to run searches on my clinical system	4.52	0.88	4.80	0.40	4.17	1.14	
I understand the review criteria for stepping up treatment for acne	2.33	1.28	2.87	1.26	1.67	0.94	
I understand the review criteria for a trial-off antibiotic treatment for acne	2.30	1.30	2.87	1.26	1.58	0.95	
I understand when onward referral is needed	2.56	1.42	2.93	1.44	2.08	1.26	
Capability mean	2.67	0.81	3.01	0.84	2.25	0.82	0.034
I have the opportunity to run searches on the practice's clinical system for quality improvement initiatives	3.72	1.56	4.13	1.09	3.10	1.92	
Antimicrobial stewardship and antibiotic prescribing review are a priority in the practice(s) I work in	3.60	1.02	3.67	0.87	3.50	1.52	
Antimicrobial stewardship and antibiotic prescribing review are a PCN priority	3.76	1.11	3.93	1.06	3.50	1.12	
I am able to undertake quality improvement initiatives on areas of prescribing that I have an interest in	3.84	1.12	4.13	0.72	3.40	1.43	
There are support staff to run searches on my behalf	3.12	1.34	3.33	1.35	2.80	1.25	
Opportunity mean	3.61	0.26	3.84	0.31	3.26	0.27	0.011
Appropriate prescribing of antibiotics is of high importance in the context of other competing NHS priorities	4.35	0.63	4.36	0.61	4.33	0.67	
Appropriate self-care advice is important to avoid unnecessary antibiotic use for acne	4.22	0.98	4.21	1.01	4.22	0.92	
Managing the prescribing of antibiotics for acne appropriately can impact on antibiotic resistance	4.52	0.71	4.57	0.49	4.44	0.96	
Managing acne appropriately is important for the patient's quality of life	3.57	1.21	3.86	0.91	3.11	1.45	
I routinely share quality improvement outcomes with my colleagues	3.22	0.98	3.64	0.81	2.56	0.83	
The review of patients on treatment for acne gives me job satisfaction	4.35	0.63	4.29	1.03	4.44	0.96	
Motivation mean	4.04	0.48	4.15	0.31	3.85	0.74	0.208

189 *able 1. Mean 5-point Likert responses to COM-B survey components and comparison of responses from pharmacy technicians familiar*
190 *with TARGET resources versus not familiar with TARGET resources*

Comment [TT(14): Might be worth adding in the p values underneath table so that the last column is removed and makes it cleaner

191 ***Interventions and feedback on the “How to...” TARGET resources***

192 Respondents were asked if they had reviewed any patients on antibiotic treatment for acne in the
193 last 3 months. Four respondents answered affirmatively. Reported interventions from the reviews
194 included stepping down antibiotic treatment for their patient(s), giving advice on self-care and
195 referring patient to the GP or pharmacist. Only one had used the acne ‘How to..’ guide to structure
196 these reviews so far in practice suggesting a lack of awareness of the resource.

197 All respondents were asked for their opinion on the usefulness of the acne “How to...” toolkit in
198 reviewing and managing people with acne by rating its usefulness on a 5 -point Likert scale. Overall,
199 the respondents found the toolkit to be useful. In particular, areas of strong agreement were in
200 sections containing information on acne, self-care measures and treatment for acne. When asked for
201 further feedback on the acne “How to...” toolkit, respondents gave positive feedback, for example
202 “These are exactly the kind of resources required for pharmacy technicians to be able to carry out
203 reviews” and “for a technician, this was all useful to implement a patient facing technician review
204 clinic”

205

<i>Usefulness of sections of “How to...” acne toolkit</i>	Mean	S.D
Information on Acne	4.21	1.06
Information on aggravating and modifiable risk factors	3.95	1
Undertake baseline search and analysis	3.63	1.13
Develop implementation plan	3.79	1.15
During the patient consultation	3.68	1.13

Self-care measures	4.11	0.97
Treatment of acne vulgaris	4.00	0.97
Referral to specialist care	3.74	1.25
Flowchart to review long-term and repeated antibiotic use in acne	3.95	1.23
Undertake post review search and analysis	3.55	1.22
Share key themes and embed quality improvement practice.	3.70	1.23
Overall	3.85	0.20

206 *Table 2. Mean 5-point Likert responses on the usefulness of sections of the acne "how to.." toolkit*

207 **Discussion**

208 Findings from this survey show that many of the respondents were aware of the long-term risks of
 209 antibiotic treatments and recognise the opportunity to undertake quality improvement initiatives in
 210 AMS. The number of respondents who wanted to join a community of practice for AMS and the high
 211 level of motivation scores across both groups supports a willingness to engage in best practice
 212 around use of antimicrobials. The results show that capability and opportunity scores were higher in
 213 those that were familiar with the TARGET materials, which suggests that the knowledge base that
 214 supports capability also supports pharmacy technicians to identify opportunities in their place of
 215 work. However, aspects of the pharmacy technician role in AMS may not be so well defined in a
 216 primary care setting which may consequently impact on how pharmacy technicians self-report their
 217 capability and opportunity. This could also explain why some respondents scored certain sections of
 218 the toolkit less useful than others.

219 There is currently no literature on the management of acne, with the reviewing of oral and topical
 220 antibiotics, by pharmacy technicians in general practice; our survey shows that at least some
 221 pharmacy technicians were already carrying out this role making interventions in the management
 222 of acne. Familiarity with the TARGET materials and the associated increase in the capability score of

Comment [KS(15): I would always start with a short statement on what the aims of the study were again and then ensure you discuss these.

As one of the aims was to look at COM-B, I think this needs to be discussed further and put into the context of the very limited literature (maybe any wider literature on PTs working in GP). Even though capability was higher in those familiar with TARGET, it was still quite low. Is this because it is not a part of their job? Or is there an unmet training need?

Also a bit of discussion about the usefulness of the acne resources is needed – sections that weren't useful – is that because these are not part of the PT role?

Comment [AL16]: Limited word count so will leave out for now

Comment [DAO17]: I think discussion needs expansion and links to other published literature. Any other publications on pharmacy technicians – AMS ideal but other areas that are applicable and can provide learning and signposting too useful to include too

I think also important to link to the other published paper from this project

Comment [AL18]: Link included above.

Comment [TT(19): Key reason why reported separately here (albeit small numbers)

223 respondents may uncover opportunities for pharmacy technicians to develop their role further in
224 AMS. There is some evidence in secondary care settings which supports the impact of pharmacy
225 technicians in AMS. A recent study found that an introduction of an Antimicrobial Pharmacy
226 Technician (AMPT) service to a ward team resulted in improved documentation of allergy status, oral
227 and IV antibiotic stop/review dates, recognition and management of antibiotic interactions and
228 compliance with the local antimicrobial policy²⁰ Another study carried out in 2022 highlighted the
229 positive impact of a pharmacy technician on AMS, reducing the number of inappropriate IV
230 antimicrobials continuing beyond 3 days²¹ However, more research is required to expand the
231 evidence base and understand the wider impact of pharmacy technicians in AMS across all settings.

232 There is evidence of the impact of pharmacy technicians in other clinically specialist areas,
233 preventing patient harm and reducing prescribing errors. An article in the Pharmaceutical Journal
234 (July 2022) looked at interventions that were carried out by trained clinical pharmacy technicians in
235 mental health triaging.²⁴ This included identifying prescribing errors, reviewing high-risk medicines,
236 high-dose monitoring and ECG prompts. There is also research that shows pharmacy technicians
237 have significantly lower discharge transcribing error rates compared with doctors; thus improving
238 patient safety and minimising inefficiencies from correcting errors.²⁵ International research also
239 shows pharmacy technicians being effectively deployed in vaccination services²⁶ and delivering
240 tobacco cessation interventions in community pharmacies²⁷.

Comment [TT(20)]: Do we need to talk about this alongside the pharmacy role so that we are bringing both together? Not one or other - but about role both sets of professionals have to play?

Comment [AL21]: Not relevant for this paper as we are focusing on PT roles

241 ***Implications for practice***

242 In the UK, the pharmacy technician title is one that is regulated under legislation and only those
243 meeting certain requirements can use the title "pharmacy technician". AMS pharmacy technician is
244 not a regulated title and there is no reliable definition of the knowledge, skills and behaviors that
245 define the role of an AMS pharmacy technician. In the UK the initial Education and Training
246 Standards (IETS) for Pharmacy Technicians (<https://www.pharmacyregulation.org/initial-PT>) make
247 no reference to AMS specific activities but do state tasks that may be considered part of a wider

248 clinical role for pharmacy technicians and relevant to AMS activities; for example medicines
249 optimisation, medicines safety and clinical governance. The current educational and training
250 framework in place for pharmacy technicians in primary care; the GP Pharmacy Technician
251 Medicines Optimisation Training Programme (GPPTMOTP) (www.pwds.nhs.uk) is aligned to the
252 APTUK/PCPA National Competency framework (NCF) .The framework includes in its clinical
253 knowledge and application competency, core practice criteria to understand AMR and the roles of
254 infection prevention, control and AMS measures ⁽²²⁾. A recent consensus building study which looked
255 at defining the role of a clinical pharmacy technician in a PCN environment found 79% agreement
256 among its expert panel of the importance of AMS in the primary care sector, with 90% agreement
257 for the importance of AMS in all sectors⁽²³⁾. Therefore, AMS can be regarded as part of a wider
258 clinical role of a pharmacy technician in primary care; however there needs to be a clear definition
259 what this means in terms of knowledge, skills and level of practice. Development of AMS
260 frameworks could promote standardisation and recognitions of level of practice for pharmacy
261 technicians. This may require development of educational resources at an appropriate academic
262 level and support for pharmacy technicians to access them..

263 In August 2023, the consultation was released for pharmacy technicians to be named on Patient
264 Group Directions (PGDs) for the supply and administration of medicines. The Common Conditions
265 Service (CCS), due to be rolled out in England, will allow community pharmacists to manage common
266 infections using PGDs to supply antibiotics. This means that the future for the pharmacy technician
267 scope of practice is potentially set to expand to include PGD supply of antimicrobials and the
268 management of common infections. Educational resources such as TARGET and courses which allow
269 for credentialing such as the higher education diplomas are therefore important in order to upskill
270 and train the workforce.

271

272 ***Strengths and Limitations***

273 Strengths: The survey successfully explored the impact of familiarity with TARGET resources on the
274 capability, opportunity and motivation of pharmacy technicians in primary care on AMS. The survey
275 was successful in understanding the usefulness of the “How to..” toolkit for structured clinical review
276 of patients with acne and clinical scenarios to pharmacy technicians in primary care in day to day
277 practice.

278 Limitations: There was a limited timeframe for completing the survey resulting in a limited reach to
279 pharmacy technicians in primary care. The relatively small sample size means that the results may
280 not be generalisable to the whole workforce and also meant that we were unable to do further
281 statistical analysis. There may also be a selection bias as those completing the survey may have more
282 of an interest in AMS. The data were self-reported by pharmacy technicians without independent
283 validation, so both inconsistent or inaccurate reporting cannot be ruled out. In addition, not all
284 respondents answered all questions.

285

286 **Conclusions**

287 The TARGET resources are an effective tool to increase the capability and opportunity of pharmacy
288 technicians in carrying out AMS initiatives in relation to the management of acne. The acne “How
289 to...” toolkit and clinical scenarios were perceived as useful for managing patients with acne.

290 The fact that pharmacy technicians were already reviewing patients with acne and making
291 interventions without using the acne ‘How to..’ toolkit form TARGET, indicates at need for this
292 resource to support clinical practice and a need for broader promotion of TARGET resources within
293 the pharmacy technician workforce to ensure that they are aware.. This can be done through
294 targeted campaigns and professional reinforcement through a community of practice model and
295 network dissemination.

Comment [DAO22]: Conclusion is almost the same length as discussion – think might need to reduce length as the discussion is not long. May not even be needed with a short discussion

Comment [AL23]: I have extended the discussion so please review in light of this

296 This study adds to a small body of evidence of the potential impact of antimicrobial stewardship
297 roles for pharmacy technicians on patient safety and patient care. Larger scale research would
298 provide further evidence for more clinical roles for pharmacy technicians amongst other healthcare
299 professionals and policy makers and on the evolving pharmacy technician role in AMS

300 **Acknowledgements**

301 We would like to thank all the participants who took part in the survey

302

303 **Funding**

304 This project was funded by the United Kingdom Health Security Agency (UKHSA) HCAI and AMR
305 Programme

306

307 **Transparency declarations**

308 The authors have no conflicts of interest to declare

309

310 **Supplementary information**

311 1. Acne “how to...” clinical scenarios [Antibiotic stewardship tools, audits and other resources:](#)
312 [How to..? Resources \(repeat and long term antibiotics\) \(rcgp.org.uk\)](#)

313

314 **References**

315 1. Antibiotic resistant infections and associated deaths increase [Antibiotic resistant infections](#)
316 [and associated deaths increase - GOV.UK \(www.gov.uk\)](#) Accessed Nov 2023

- 317 2. Boughen,M, Fenn,T Practice, Skill Mix and Education: The Evolving role of pharmacy
318 technicians in Great Britain (2020) [Practice, Skill Mix, and Education: The Evolving Role of](#)
319 [Pharmacy Technicians in Great Britain - PMC \(nih.gov\)](#)
- 320 3. Hay RJ, Johns NE, Williams HC, et al. (2014) The global burden of skin disease in 2010: an
321 analysis of the prevalence and impact of skin conditions. *J Invest Dermatol* 134, 6, 1527–
322 1534.[CrossRefPubMedGoogle Scholar](#)
- 323 4. Xu J, Mavranezouli I, Kuznetsov L, Stephen Murphy M, Healy E, Guideline Committee
324 Management of acne vulgaris: summary of NICE
325 guidance. *BMJ*2021;374:n1800. doi:10.1136/bmj.n1800 pmid:34544730[FREE Full TextGoogle](#)
326 [Scholar](#)
- 327 5. [Overview | Acne vulgaris: management | Guidance | NICE](#) Accessed June 2023
- 328 6. Walsh TR, Efthimiou J, Dréno B (2016) Systematic review of antibiotic resistance in acne: an
329 increasing topical and oral threat. *Lancet Infect Dis* 16, 3, e23–e33.[CrossRefGoogle Scholar](#)
- 330 7. Santer M, Francis NA, Platt D, et al.(2018) Stemming the tide of antimicrobial resistance:
331 implications for management of acne vulgaris. *Br J Gen Pract* 68, 667, 64–65.[FREE Full](#)
332 [TextGoogle Scholar](#)
- 333 8. Purdy S, Langston J, Tait L(2003) Presentation and management of acne in primary care: a
334 retrospective cohort study. *Br J Gen Pract* 53, 492, 525–529.[Abstract/FREE Full TextGoogle](#)
335 [Scholar](#)
- 336 9. Francis NA, Entwistle K, Santer M, et al.(2017) The management of acne vulgaris in primary
337 care: a cohort study of consulting and prescribing patterns using the Clinical Practice
338 Research Datalink. *Br J Dermatol* 176, 1, 107–115.[Google Scholar](#)
- 339 10. Bhate K, Mansfield KE, Sinnott S-J, Margolis DJ, Adesanya E, Francis N et al. Long-term oral
340 antibiotic use in people with acne vulgaris in UK primary care: a drug utilisation study. *British*
341 *Journal of Dermatology*. 2022;188(3):361-71
- 342 11. [Identifying PT roles Final Report Sept 16.pdf](#) Accessed August 2023

- 343 12. NHS England (NHSE). Primary care Networks 2022 [https://www.england.nhs.uk/primary-](https://www.england.nhs.uk/primary-care/primary-care-networks/)
344 [care/primary-care-networks/](https://www.england.nhs.uk/primary-care/primary-care-networks/)
- 345 13. [NHS England » Network Contract DES – contract specification for 2023/24 – PCN](#)
346 [requirements and entitlements](#) (page 83, accessed June 2023)
- 347 14. C.E.Eades, J.S.ferguson, O.C.Re Public Health in community pharmacy a systematic review of
348 pharmacist and consumer views BMC Publ Health, 11 (2011), p. 582
- 349 15. A.M.K.Hindi, S.Jacobs, E.I.Schafheutle Solidarity or dissonance? A systematic review of
350 pharmacist and GP views on community pharmacy services in the UK Health Soc Care
351 Community, 27 (2019), pp. 565-598
- 352 16. G.R. Donovan, V. Paudyal England's Healthy Living Pharmacy (HLP) initiative: facilitating the
353 engagement of pharmacy support staff in public health Res Soc Adm Pharm, 12 (2016),
354 pp. 281-292
- 355 17. S.C. Willis, E.M. Seston, H. Family, S. White, C. Cutts Extending the scope of community
356 pharmacists' practice to patients requiring urgent care – an evaluation of a training
357 programme using the Theoretical Domains Framework Health Soc Care
358 Community, 27 (2019), pp. 999-1010
- 359 18. The behaviour change wheel: a new method for characterising and designing behaviour
360 change interventions S.Michie, M.M van Stralen, R.West Implement Sci, 6 (2011),
361 p. 42, 10.1186/1748-5908-6-42
- 362 19. [02.09.19 COM-B and changing behaviour .pdf](#) (social-change.co.uk) Accessed June 2023
- 363 20. [P20 Addition of a pharmacy technician to the ward team improves antimicrobial stewardship](#)
364 [and patient care and safety | JAC-Antimicrobial Resistance | Oxford Academic \(oup.com\)](#)
- 365 21. [P33 Day 3 reviews led by pharmacy technicians—encouraging antimicrobial stewardship |](#)
366 [JAC-Antimicrobial Resistance | Oxford Academic \(oup.com\)](#)
- 367 22. [APTUK Nat Competency Framework WEB \(1\).pdf](#) Accessed June 2023

- 368 23. [consensus building study to define the role of a 'clinical' pharmacy technician in a Primary](#)
369 [Care Network environment in England | International Journal of Pharmacy Practice | Oxford](#)
370 [Academic \(oup.com\)](#) accessed August 2023
- 371 24. [Developing the clinical pharmacy technician role for mental health triaging - The](#)
372 [Pharmaceutical Journal \(pharmaceutical-journal.com\)](#) (accessed Sept 2023)
- 373 25. Comparison of pharmacy technicians' and doctors' medication transcribing errors at hospital
374 discharge <https://doi.org/10.1136/ejhpharm-2018-001538> (Accessed September 2023)
375 [The role of pharmacy technicians in vaccination services: a scoping review - PubMed \(nih.gov\)](#)
376 <https://doi.org/10.1016/j.japh.2021.09.016> (accessed September 2023)
- 377 26. [Community pharmacy technicians' engagement in the delivery of brief tobacco cessation](#)
378 [interventions: Results of a randomized trial - PubMed \(nih.gov\)](#)
379 <https://doi.org/10.1016/j.sapharm.2021.09.001> (accessed September 2023)

380

381

382

383