

# Improving management of urinary tract infections in residential aged care facilities

CPD 

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## Background

Antimicrobial resistance rates are higher in Australian residential aged care facilities (RACFs) than other community or hospital settings. This is driven by antibiotic overuse and misuse. Urinary tract infection (UTI) is consistently the most common infection treated with antibiotics in Australian RACFs.

## Objective

The aim of this article is to provide an overview of how general practitioners (GPs) can support appropriate UTI management in RACFs following antimicrobial stewardship (AMS) principles.

## Discussion

GPs are well placed to improve UTI management in RACFs. In this article, criteria for suspected, proven, recurrent and relapsed UTI are outlined, in addition to key AMS practices for the assessment, prevention, treatment and review of UTIs. Included are recommendations for the judicious use of urine dipstick testing, a widespread and longstanding practice in RACFs, and first-line empirical antibiotic prescribing for suspected UTIs.

**ANTIMICROBIAL RESISTANCE** (AMR) has been declared by the World Health Organization as one of the top 10 threats facing humanity.<sup>1</sup> Rates of AMR in certain organisms are higher in Australian residential aged care facilities (RACFs) than other community or hospital settings. A recent national report flagged methicillin-resistant *Staphylococcus aureus* rates of 26% in RACFs, compared with 22% in hospitals, and rates of *Escherichia coli* resistant to first-generation cephalosporins of 35% in RACFs, compared with 22% in hospitals.<sup>2</sup>

Overuse and misuse of antimicrobials are the main drivers of AMR.<sup>1</sup> Despite compelling evidence to address this priority issue, inappropriate antimicrobial use in Australian RACFs continues to increase.<sup>3,4</sup> There is wide variation in antibiotic prescribing that is not linked to prevalence of health conditions that would be expected to predispose residents to infections (eg chronic airways disease, diabetes, chronic infectious conditions and catheter care or wound care).<sup>5</sup>

In annual national point prevalence surveys, urinary tract infection (UTI) is consistently the most common infection managed with antibiotics in Australian RACFs. There is high use of broad-spectrum antibiotics such as cefalexin for UTI prophylaxis and

treatment as well as for asymptomatic bacteriuria (ASB), where antibiotics are not required.<sup>3</sup> Antibiotics are overprescribed for residents with non-UTI specific symptoms and signs such as falls or malaise.<sup>6,7</sup> Although commonly attributed to UTI, studies have found no association between positive urine culture results and UTI in residents with fever<sup>8</sup> or falls, and no association between bacteriuria and malaise, anorexia or fatigue.<sup>9</sup>

The role of urine dipstick testing to support suspected UTI diagnosis is widespread and longstanding in RACFs.<sup>10-12</sup> Commonly, this inexpensive, simple-to-perform point-of-care test is used as a confirmatory test for UTI, with results used to determine whether antibiotics should be prescribed. Overreliance on urine dipstick testing results without taking into account the resident's clinical presentation and other potential reasons for this contributes to overdiagnosis of UTI.<sup>11-14</sup>

Antimicrobial stewardship (AMS), a core component of infection management programs, refers to a set of commitments and actions designed to optimise the management of infection while reducing the adverse events associated with antimicrobial use.<sup>15</sup> RACFs providing Commonwealth-subsidised services are required to comply with Aged Care

Quality Standards; AMS is included as a standard to support the delivery of safe, effective and quality personal and clinical care.<sup>16</sup> The aim of this article is to provide an overview of how general practitioners (GPs) can support appropriate UTI management in RACFs following AMS principles.

### Infection management in residential aged care facilities

Infection management in RACFs is complex and differs from other community and hospital settings.<sup>10,17</sup> These differences can be considered as resident, workforce and infrastructure related.

UTI is one of the most commonly diagnosed infections in older adults, with estimates of more than 10% of women and 5% of men aged >65 years having reported a UTI within the previous 12 months.<sup>18</sup> While several estimates exist in the literature, the incidence of UTI in aged care residents is challenging since criteria used for diagnosis are not consistent across studies.<sup>19,20</sup> Residents generally have age-associated changes in immune function, with higher rates of conditions that predispose them to infection (eg diabetes, stroke, dementia) and UTI (eg faecal impaction, bowel or bladder incontinence, high urinary residual volumes and long-term indwelling catheters) when compared with younger people.<sup>17</sup> UTI and urosepsis can be more difficult to identify in older adults than younger adults. They can manifest acute illness with atypical signs and symptoms.<sup>6</sup> Clinical assessment can be more complex in residents with speech or hearing difficulties or with advanced dementia (where acute mental status change is challenging to identify and often transient). There can be difficulty or delays in pathology collection (including collecting an appropriate sample for urine culture in an incontinent resident). Pressure from family members to prescribe is well reported.<sup>7,10,21,22</sup>

In RACFs, off-site prescribers are often heavily reliant on inexperienced or non-trained direct care clinical staff to assess residents for possible infections.<sup>7,10,21</sup> The aged care workforce

is understaffed and undertrained.<sup>23</sup> Efforts to educate staff may be hampered by high staff turnover<sup>24</sup> and lack of local resources.<sup>7,10,21</sup> Prescribing by locum doctors<sup>5,10</sup> and limited opportunities for antimicrobial review by consultant pharmacists (usually through a scheduled Residential Medication Management Review)<sup>10,13</sup> have been identified as problematic.

The lack of local resistance data in a setting with a potentially high prevalence of resistant bacteria can contribute to prescribing complexity.<sup>10</sup> Separate documentation systems in RACFs requiring the GP to have a process to ensure a set of notes for their surgery, or for the nurse to undertake documentation, may result in gaps in documentation of clinical indication and review outcomes.<sup>25</sup> This may contribute to a reluctance to cease antibiotics, especially if the prescription has continued for months.

### Urinary tract infections

UTIs may be classified as suspected, proven, recurrent or relapsed (Table 1). Most residents in RACFs will have some localising urinary tract symptoms and signs.<sup>6,26</sup> A minority may manifest acute illness with non-specific systematic signs and symptoms such as behavioural changes, functional decline, falls and anorexia.<sup>6,26,27</sup> In those with advanced cognitive impairment where behavioural change may be the only observable symptom,<sup>28</sup> it is important to recognise that behavioural change alone is not a sensitive or specific symptom of infection, including UTI.<sup>6</sup>

ASB, as described in Table 1, is common in the RACF population. Of residents without indwelling catheters, 40–50% of women and 30–40% of men have ASB at any time. Residents who are more functionally impaired are more likely to have bacteriuria. Residents managed with long-term indwelling catheters are universally bacteriuric because of biofilm formation along the catheter.<sup>17</sup>

Key practices related to the assessment, prevention, treatment and review of UTIs that enable GPs to appropriately manage UTIs are outlined in Table 2. Important to

emphasise are recommended key practices for urine dipstick testing, antibiotic prescribing and urine microscopy, culture and sensitivity (MCS) testing.

### Recommended practice for dipstick testing

Judicious use of dipstick testing and its results is useful in supporting the GP to exclude UTI only when there is a clinical trigger and the source of clinical alteration remains unclear after careful assessment. Dipstick testing results cannot be interpreted in isolation without taking into consideration the resident's clinical symptoms and signs. If the clinical probability of UTI is moderate to high, a negative result on urine dipstick testing largely excludes UTI and serves as a prompt to pursue other potential causes. If the clinical probability of UTI is low, the usefulness of a positive result is questionable. Given the prevalence of ASB in the resident population, dipstick results are equally likely to be positive even if the resident does not have a UTI.<sup>28</sup>

### Recommended antibiotic prescribing approach

When contemplating antibiotic initiation in residents with suspected UTI, acuity of illness and goals of care should be considered:

- In residents who are clinically stable, provide supportive treatment, investigate with urine culture and perform close clinical observation, with antibiotic initiation guided by clinical progress and urine culture results.
- In residents who are mildly to moderately unwell or at high risk of urosepsis, initiate antibiotics while awaiting urine culture result, and review or cease the antibiotics if an alternative cause for clinical presentation emerges and/or urine culture result is not consistent with UTI.
- If a resident has symptoms or signs of sepsis, based on their goals of care, strongly consider starting empirical antibiotics without delay and organising transfer to hospital.

**Table 1. Urinary tract infection (UTI) and asymptomatic bacteriuria (ASB) definitions<sup>26</sup>**

| Definition    | Diagnostic criteria  |
|---------------|--|
| UTI           | <p>Infection of the urinary system including the lower urinary tract (bladder, prostate, epididymis) and/or upper urinary tract (kidneys).</p> <p>Localising urinary tract symptoms and signs include dysuria, new or worse urinary urgency, frequency, incontinence, suprapubic or costovertebral pain or tenderness and gross haematuria.</p> <p>Systemic symptoms and signs include fever, acute mental state change (change in level of consciousness), periods of altered perception and (in those with indwelling urinary catheters) rigors without identified cause.</p>  |
| Suspected UTI | <p>Criteria for suspected UTI include all three of:</p> <ul style="list-style-type: none"> <li>• localising urinary tract symptoms and signs or localising urinary tract symptoms and signs plus systemic symptoms and signs</li> <li>• symptoms and signs that are new or changed/worse</li> <li>• no alternative better reason identified for symptoms and signs.</li> </ul> <p>Criteria for symptoms and signs of suspected UTI are different for residents without and with indwelling urinary catheters.</p>  |
| Proven UTI    | <p>Criteria for proven UTI include both of:</p> <ul style="list-style-type: none"> <li>• symptoms and signs as for suspected UTI</li> <li>• confirmation by urine culture result with significant growth of bacteria recognised to be a uropathogen.</li> </ul> <p>Organisms commonly considered uropathogens include <i>Escherichia coli</i>, <i>Klebsiella pneumoniae</i> and <i>Enterococcus faecalis</i>.</p> <p>Organisms not commonly considered uropathogens include mixed growth in samples with large numbers of squamous epithelial cells, coagulase-negative staphylococci and <i>Candida</i> species.</p>  |
| Recurrent UTI | <p>Criteria for recurrent UTI include all three of:</p> <ul style="list-style-type: none"> <li>• symptoms and signs as for suspected UTI</li> <li>• confirmation by urine culture result with significant growth of bacteria recognised to be a uropathogen</li> <li>• two or more episodes in six months, or three or more episodes in 12 months.</li> </ul>  |
| Relapsed UTI  | <p>Criteria for relapsed UTI include all three of the following in a person with a proven UTI:</p> <ul style="list-style-type: none"> <li>• treatment with appropriate antibiotic treatment course as directed by urine culture</li> <li>• redevelopment of symptoms and signs</li> <li>• repeat urine culture growing same uropathogen.</li> </ul>  |
| ASB           | <p>Criteria for ASB include both of the following:</p> <ul style="list-style-type: none"> <li>• no signs or symptoms attributable to UTI</li> <li>• bacteria detected in urine by testing.</li> </ul> <p>The established definition of significant bacteriuria is <math>\geq 10^8</math> colony-forming units/mL<sup>26</sup> from a midstream urine sample or detection of bacteriuria using bedside dipstick testing (which can detect nitrites and leukocyte esterase).</p> <p>This condition is not a UTI and does not warrant antibiotic prescribing. However, misinterpretation of the significance of test findings contributes to antibiotic misuse.</p> |

Treatment of ASB with antibiotics is not required and does not reduce risk of UTI in the future.<sup>26</sup>

The prescribing approach for suspected UTI is different to that for proven UTI. For suspected UTI, prescribing should take into account the resident's assessment findings to be confident that antibiotics are warranted. Clinical symptoms and

signs may be typical or non-specific, and antibiotics, once started, should be ceased if an alternative diagnosis is identified. For proven UTI, urine microbiology guides antibiotic choice if the resident is slow to improve. The threshold for prescribing long antibiotic courses for UTI prophylaxis should be high if there is a reasonable possibility

that there were alternative reasons for episodes of suspected UTI.

Choice of antibiotic when prescribing for UTI should take into account worldwide emergence of drug-resistant Enterobacterales (including *E. coli*), especially extended-spectrum  $\beta$ -lactamase-producing strains, as well as consideration of efficacy, convenience,

**Table 2. Key practices for general practitioners to support appropriate urinary tract infection (UTI) management in residential aged care facilities (RACFs)**

|                   |  |  |
|-------------------|--|--|
| <b>Assessment</b> | <ul style="list-style-type: none"> <li>• Ensure direct clinical examination is performed by a nurse or doctor, and review of medication chart and pain assessment, as required, is part of determining whether a resident has a suspected UTI.<sup>21</sup></li> <li>• Apply clinical judgment when using guidelines. Recognise that elderly people may not be able to mount a temperature response,<sup>9</sup> or it may be blunted by long-acting paracetamol.</li> <li>• Consider and exclude alternative diagnoses to UTI (eg changes to medication, dehydration, undertreated pain, constipation, sleep deprivation, environmental stimuli, pneumonia or medication-related adverse event).<sup>26</sup></li> </ul>  | <ul style="list-style-type: none"> <li>• Do not investigate cloudy or malodorous urine unless other UTI signs and symptoms are present.<sup>26</sup></li> <li>• Do not request urinalysis or urine culture without an established clinical indication.<sup>26,31</sup></li> <li>• Collect urine culture before commencing antibiotic therapy where possible.<sup>32</sup></li> </ul>   |
| <b>Prevention</b> | <ul style="list-style-type: none"> <li>• Encourage non-pharmacological approaches, such as fluid intake to ensure residents are well hydrated (unless fluid restriction) and perineal hygiene.<sup>33</sup></li> <li>• Use urinary catheter management programs (bundles) to reduce catheter use.</li> <li>• Consider an approach of symptom-initiated treatment (antibiotics taken at onset of symptoms) instead of continuous prophylaxis; this can be safe and effective in reducing overall antibiotic exposure.<sup>26</sup></li> </ul>   | <ul style="list-style-type: none"> <li>• Discuss with consumers (residents, families) the effectiveness, or lack of effectiveness, of methenamine hippurate (in most situations) and cranberry products.<sup>26,33</sup></li> <li>• Consider intravaginal estrogen in postmenopausal women with recurrent UTIs. It has beneficial effects on vaginal flora and reduces the incidence of UTIs.<sup>26</sup></li> </ul>  |
| <b>Treatment</b>  | <ul style="list-style-type: none"> <li>• Do not prescribe antibiotics on the basis of a positive urine dipstick test result unless supported by clinical criteria.</li> <li>• Do not treat asymptomatic bacteriuria.<sup>26,31,33</sup></li> <li>• Correct dehydration; this can help alleviate symptoms such as dysuria.<sup>26</sup></li> <li>• Note some products (eg urinary alkalinisers) may relieve discomfort but do not prevent or treat UTIs.<sup>21</sup> Urinary alkalinisers taken at the same time as methenamine hippurate counteract the intended actions of both.</li> </ul>  | <ul style="list-style-type: none"> <li>• If applicable, remove catheters (and replace only if required); most antibiotics penetrate poorly into catheter biofilm.<sup>26</sup></li> <li>• Take into account the resident's illness severity, goals of care, allergy status and recent urine microbiology results (where available) when initiating antibiotics.</li> <li>• Prescribe first-line antibiotics as recommended unless contraindicated.<sup>26</sup></li> <li>• Do not perform post-treatment urine culture (or urine dipstick testing) to confirm resolution of UTI.<sup>26</sup></li> </ul>   |
| <b>Review</b>     | <ul style="list-style-type: none"> <li>• Review the resident's clinical response to management in a timely fashion.<sup>32</sup></li> <li>• Follow up urine culture results and cease antibiotics for UTI if this is excluded.<sup>32</sup></li> <li>• Do not modify the initial regimen even if the urine culture has grown a non-susceptible organism if the resident is improving on empirical therapy.<sup>26</sup></li> <li>• Modify the antibiotic prescription according to the uropathogen cultured if the resident is slow to improve or not improving, or if they have a serious infection.<sup>26</sup></li> <li>• When modifying antibiotics, choose the most narrow-spectrum agent to which the organism is susceptible.<sup>32</sup></li> <li>• Review residents with relapsed UTI for risk factors (eg organism resistant to prescribed antibiotic, antibiotic course not completed, missed doses, antibiotic not absorbed). If none are identified, consider seeking non-general practitioner specialist input (eg infectious diseases physician).<sup>26</sup></li> </ul> | <ul style="list-style-type: none"> <li>• When considering initiating antibiotic prophylaxis, check that the episodes were UTI-related and not asymptomatic bacteriuria (ASB).</li> <li>• When reviewing UTI prophylaxis, if treatment was for recurrent episodes of ASB rather than UTI, cease antibiotic.</li> <li>• Note for men with recurrent infection, urological evaluation is recommended.<sup>26</sup></li> <li>• Note for women, cystoscopy and diagnostic imaging have limited value<sup>26</sup> and are not required unless indicated on clinical history.</li> <li>• Engage accredited pharmacists to undertake residential medication management reviews.<sup>34</sup></li> </ul> |

cost, availability and harms associated with antibiotic use (eg adverse effects and the risk of being colonised or infected with a resistant organism).<sup>26</sup> As the prevalence of a pathogen's resistance to an antibiotic

increases, the likelihood of treatment failure increases, which outweighs the benefits of using a narrower-spectrum medication empirically for serious infections.

When prescribing for suspected UTI, narrow-spectrum antibiotics are recommended for mild suspected UTIs, while broader-spectrum oral agents such as amoxicillin/clavulanic acid are

**Table 3. National antimicrobial stewardship (AMS) initiatives or resources relevant to residential aged care facilities (RACFs)**

| Initiative   | Description  |
|--|--|
| National residential medication chart <sup>35</sup>  | Provides a medication chart specifically for use in RACFs that supports the documentation of key prescribing elements, <sup>32</sup> namely indication, active ingredient, dose, frequency, route, intended duration and review plan.  |
| Residential medication management review program <sup>34</sup>                                       | Enables medical practitioners to refer eligible residents living in approved Australian Government-funded RACFs to accredited pharmacists for detailed medication reviews.   |
| Aged Care National Antimicrobial Prescribing Survey <sup>3</sup>                                     | Provides a standardised survey that all RACFs are encouraged to complete at least annually to monitor infections (including UTIs) and antimicrobial use on a single day. Self-generated reports enable comparison against the previous year and national aggregate data.   |
| Quality Use of Medicine Services <sup>36</sup>   | Supports approved pharmacists to optimise medication management in RACFs via three facility-level groups of activities: education and training, clinical governance and resident-based activities.   |
| Antimicrobial Use and Resistance in Australia (AURA) surveillance system <sup>37</sup>               | Coordinates data from many sources to provide a comprehensive picture of patterns and trends in antimicrobial resistance and antimicrobial use in human health across Australia.   |
| Aged Care Quality and Safety Commission 'To Dip or Not to Dip' resources <sup>30</sup>               | Adapted from a successful international quality program <sup>11,29</sup> and focusing on increasing knowledge about suspected UTIs, asymptomatic bacteriuria and judicious use of urine dipstick testing, resources include a clinical pathway, <sup>26</sup> educational video, webinar and consumer brochures.   |
| <i>Therapeutic guidelines: Antibiotic</i> <sup>26*</sup>   | <p>Outlines an assessment and treatment management algorithm for RACF residents with suspected UTI.</p> <p>Provides the rationale for recommendations, guidance on first-line choices, choice if allergy is present, dose, frequency and course durations for cystitis, prostatitis, pyelonephritis, sepsis, recurrent UTI and catheter-associated UTI.</p> <p>Provides guidance on asymptomatic bacteriuria and non-antibiotic strategies to prevent recurrent UTI.</p> |
| <i>Australian Medicine Handbook: Aged Care Companion</i> <sup>33*</sup>                              | <p>Outlines a UTI management approach specifically for older people.</p> <p>Provides guidance on first-line choices, dose, frequency and course duration for cystitis.</p> <p>Provides guidance on recurrent UTI, mild pyelonephritis, catheter-associated UTI, asymptomatic bacteriuria and non-antibiotic strategies to prevent recurrent UTI.</p>   |
| <i>RACGP aged care clinical guide (Silver Book)</i> <sup>38*</sup>                                   | Outlines management approaches to infection (not specific to UTI) and sepsis, and urinary/faecal incontinence.   |
| <i>Guidance and resources for providers to support the Aged Care Quality Standards</i> <sup>39</sup> | Outlines reflective questions and examples of action and evidence that may assist RACFs to meet antimicrobial stewardship-related accreditation requirements.  |

\*These resources all describe general principles on appropriate medicine use.

recommended for pyelonephritis.<sup>26</sup> Approximately 20% of *E. coli* urine isolates from adults in the community are resistant to trimethoprim.<sup>26</sup> However, *Therapeutic guidelines: Antibiotic* recommends trimethoprim as first-line empirical therapy for acute suspected cystitis if the individual has minimal or mild symptoms or signs because the risk of adverse outcomes or treatment failure from trimethoprim is low (Box 1).

### Other recommended key practices

The use of clinical pathways has been shown to increase the reliability of assessment for suspected UTI and interprofessional communication of findings between direct care staff and GPs for decision making.<sup>11,29</sup> *Therapeutic guidelines: Antibiotic* has published a management algorithm for RACF residents with suspected UTI,<sup>26</sup> which has been adapted into a clinical pathway by the Aged Care Quality and Safety Commission (ACQSC).<sup>30</sup> This clinical pathway can be accessed online ([www.agedcarequality.gov.au/antimicrobial-stewardship/clinician-resources](http://www.agedcarequality.gov.au/antimicrobial-stewardship/clinician-resources)).

For residents with suspected UTI, it is recommended that a urine specimen is collected for MCS testing to confirm the UTI diagnosis in residents with typical symptoms, and also to guide antibiotic choice should they be slow to clinically improve. In situations where the resident has non-specific signs and symptoms, where no clear alternative clinical cause is identified, MCS testing can support or exclude the UTI diagnosis. It is useful to guide cessation of antibiotics (if they were commenced) and support conversations

### Box 1. Empirical antibiotic prescribing for suspected cystitis – first-line recommendations<sup>26</sup>

- Trimethoprim 300 mg orally, at night for three days (women) or seven days (men)
- Nitrofurantoin 100 mg orally, six-hourly for five days (women) or seven days (men)
- If neither of the above can be used, cefalexin 500 mg orally, 12-hourly for five days (women) or seven days (men)



with facility clinical staff, residents and families regarding whether UTI was a possible, confirmed or excluded diagnosis.

Preventive measures such as increased focus on hydration and perineal hygiene have been found to prevent UTI.<sup>26</sup>

### Antimicrobial stewardship initiatives and resources

General guidelines<sup>15,16</sup> that outline practical ways to initiate, expand, maintain and evaluate AMS programs and thereby further support appropriate UTI management in RACFs have been published. The Centers for Disease Control and Prevention (CDC) outlines seven core elements that are considered necessary for implementing successful AMS programs, namely: leadership commitment, accountability, drug expertise, action, tracking, reporting and education.<sup>15</sup> For each of these elements, RACFs are encouraged to incrementally implement one or more recommended activities.<sup>16</sup>

Some specific national initiatives or resources that GPs can use to support AMS (UTI) programs in Australian RACFs are listed in Table 3. Notably, the UK's 'To Dip or Not to Dip' project has been adapted by ACQSC and promoted to all Australian RACFs.<sup>30</sup> The UK quality improvement project, by increasing clinician education about recognition of suspected UTI and ASB, has led to a significant and impressive reduction in antibiotic prescribing for UTIs in UK RACFs.<sup>11</sup> ACQSC resources include a 16-minute video for direct care staff about ASB, a clinical pathway for assessment of residents with suspected UTI and a facilitator-delivered case-based presentation. Key messages to clinicians and consumers include the judicious use of dipstick testing, alternatives to antibiotics for preventing and treating UTIs, and the importance of hydration.<sup>30</sup>

### Conclusion

Inappropriate antibiotic use related to UTI management in Australian RACFs continues to be reported. GPs are well placed to improve the management of suspected, proven, recurrent and

relapsed UTIs in relation to four key areas: assessment, prevention, treatment and review. It is recommended that GPs access and follow national and locally adapted AMS guidance.

### Key points

- Inappropriate antimicrobial use in Australian RACFs continues to increase; certain rates of multidrug-resistant organisms are higher in Australian RACFs than other community or hospital settings.
- UTI is consistently the most common infection treated with antibiotics in Australian RACFs.
- ASB is common in the resident population and is overtreated with antibiotics.
- Overreliance on urine dipstick testing results without taking into account the resident's clinical presentation, and other potential reasons for this, contributes to overdiagnosis of UTI.
- Despite the complexity of infection management processes in RACFs, there are key AMS practices that GPs can follow to support appropriate UTI assessment, prevention, treatment and review.
- ACQSC's 'To Dip or Not to Dip' resources – which focus on increasing knowledge about recognition of UTIs and ASB, and judicious use of urine dipstick testing – is a key activity in RACFs that GPs can support.

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