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## Physicians' perspectives on defining older adult patients and making appropriate prescribing decisions

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## **PHYSICIANS' PERSPECTIVES ON DEFINING AN OLDER ADULT PATIENT AND IN MAKING APPROPRIATE PRESCRIBING DECISIONS**

### **ABSTRACT**

**BACKGROUND:** Older patients are major users of pharmacotherapy due to a higher incidence of health issues. However, there is evidence of age-biased prescribing, leading to over or under prescribing of medication and suboptimal clinical outcomes. Many guidelines provide cautionary statements about the use of medicines in older patients, however, they fail to identify what this practically means. There is no accepted definition of an older adult that appropriately characterises this patient group. As a result, there is potential for physicians to have variable interpretations of individuals within this patient population, leading to potential inconsistencies when making pharmacotherapeutic decisions.

**OBJECTIVE:** To explore how Australian medical physicians practically defined an older adult patient in the context of providing pharmacotherapeutic care to this population.

**METHODS:** Two-stage study comprising a scenario-based questionnaire (quantitative phase) and semi-structured individual interviews (qualitative phase) with Australian physicians. Qualitative data was thematically analysed and manual inductive coding was used to generate core themes.

**RESULTS:** A total of 15 physicians participated in the study. Overall, in regard to providing care to their older patients, the three key themes that emerged from physicians' discussions were: a) Using a number-based vs. health status-based definition of an older patient, b) Patient 'red flags' influence prescribing decisions and c) Lack of guideline support in prescribing for older patients. Most physicians ultimately defined older adult patients using a number-based description (between 65 – 90 years), because they felt they needed some sort of 'cut-off' point to guide their decision-making. However, in assessing an older patient, physicians considered a multitude of patient factors as influencers of their decision-making during prescribing including co-morbidities, cognitive function, frailty, polypharmacy etc. and did not solely focus on the patients age.

**CONCLUSION:** Physicians describe the complexity of decision-making for older adult patients, and how this is influenced by a diverse range of factors, yet ultimately simplify the process by defaulting to number-based (age in years) guidelines and procedures.

#### **KEY POINTS**

- Decision-making performed by clinicians does not always align with that done by policy-makers, as each party is driven by different perspectives. Clinicians are often more focused on individual patients and practicalities, and their cognitive processes, knowledge and attitudes, influence their decision-making for patients. In comparison, policy makers are often focused on medico-legal requirements, politics, regulations and economics.
- Age-based decision-making has been previously reported in a number of conditions, including rheumatoid arthritis, congestive heart failure and atrial fibrillation.
- Many guidelines provide cautionary statements about the use of medicines in older patients, however, they fail to identify what this practically means.
- This study highlights that Australian physicians do not have a uniform approach in appropriately assessing and describing a patient as being older adult, which may impact upon the treatment approach undertaken by each doctor.
- The results draw attention to the need to develop a contemporary definition of an older adult patient and incorporate it into current guidelines to better assist doctors in making appropriate prescribing decisions and to minimise the potential for medication misuse.

## **INTRODUCTION**

Older adult patients receive 3.6 times more prescription medication compared to their younger counterparts [1]. Whilst they are major users of pharmacotherapy due to a higher incidence of health issues, it is reported that prescribing practices for this patient group are often inappropriate. Inappropriate prescribing is regarded as being a serious global healthcare problem for older adults, leading to the over (polypharmacy) and underutilisation of medication and adverse drug reactions (ADRs), rendering these patients susceptible to sub-optimal clinical outcomes, reduced quality of life and compromised physical and mental function [2-5]. These practices are often attributed to age-based decision-making, which has been previously reported in a number of conditions, including rheumatoid arthritis [6], congestive heart failure [7] and atrial fibrillation [8] and has been linked to morbidity, mortality and wastage of health resources [5, 4]. Cahir et.al. highlighted the impact of inappropriate prescribing using the Screening Tool of Older Person's Prescriptions (STOPP) [9]. This study demonstrated that older patients in the community setting with two or more potentially inappropriate prescriptions (PIP's) were more likely to experience an adverse drug event (ADE), have a lower health related quality of life and have a nearly two-fold increased risk in being admitted to the emergency department [9]. The medications most commonly associated with inappropriate prescribing in this patient group include anxiolytics, anti-depressants, and non-steroidal anti-inflammatory and anti-rheumatic products [10].

Many guidelines provide cautionary statements about the use of medicines in older patients, however, they fail to identify what this practically means [11]. This is largely because the list of factors associated with ageing is extensive, and there is a limited

amount of evidence-based literature to support the use of medicines in older persons, which pose challenges to accurately defining an extremely heterogeneous older patient population [12]. Only certain clinical guidelines have drawn attention to age-based decision-making, recommending that physicians consider the biological age (rather than chronological age) of patients in making more holistic treatment decisions [13]. Cho et.al. highlighted that biological age is more appropriate in representing an individuals aging and it is associated with health status, in comparison to chronological age which simply indicates a period of living [14]. Several biomarkers have been used to calculate biological age and range from those representing physical fitness and strength i.e. body mass index (BMI), body fat percentage (BFP) to those representing biochemical factors i.e. low-density lipoprotein (LDL) and triglycerides (TG) [14-16]. However, there is no accepted definition of an older adult that appropriately characterizes this patient group [11]. This is particularly important when considering the focus on patient-centered care in modern clinical practice. Singh and Bajorek highlight that clinical practice guidelines aimed at individualized care must take into account appropriate features of ageing [11]. As a result of the heterogeneity seen in defining older patients, there is potential for physicians to have variable interpretations of individuals within this patient population, leading to potential inconsistencies when making pharmacotherapeutic decisions [17, 18]. Subsequently, this may result in inappropriate medication management in this patient group with potential impact upon patient outcomes. It is important to explore how physicians approach prescribing in older patients to understand where improvements are needed to better support individualized, pharmacotherapeutic-related decision-making.

Geriatric medicine is a major specialty branch of medicine within Australia [19]. In 2012, it was estimated that there were 450 registered geriatricians practicing in Australia. Recent data highlights there were 221 physicians undertaking advanced geriatric training in 2017, demonstrating the rapid expansion of this workforce [20]. In order to become qualified, candidates must complete the geriatric medicine advanced training program, giving them national accreditation to work as geriatricians. In addition, during their intern year, medical residents have the option of undertaking a non-core geriatric medicine rotation [21]. To support physicians in their practice, a multi-disciplinary team of health care professionals including nurse practitioners, who have prescribing authority, as well as general practitioners, pharmacists and occupational therapists assist in ensuring the timeliness and quality of care [22].

The aim of this study was to explore how Australian physicians making prescribing decisions in older patients, defined the term 'older adult'. A specific objective was to identify key factors that influenced their prescribing decisions in older patients.

## **METHOD**

### *Study design*

We conducted a two-stage study mixed-method study over a 2-month period (February to March 2015). A scenario-based questionnaire (quantitative) and semi-structured individual interviews (qualitative) were administered to Australian physicians caring for older patients. Approval for the conduct of this study was granted by the University of Technology Sydney (UTS) Human Research Ethics Committee (UTS HREC REF NO. 2014000645). The COREQ guidelines provided a framework for the structure of this research.

### *Setting and participants*

Participants were recruited via purposive sampling [23]. Physicians were recruited based on the following inclusion criteria:

- primary care practitioners (general practitioners: GPs) or tertiary care practitioners/specialists (geriatricians, cardiologists, neurologists) with  $\geq 1$  year of experience in prescribing and managing treatment in older patients
- practicing within the Sydney metropolitan area of New South Wales, Australia

The initial sampling frame comprised three geographical locations that were known to have a larger population of older persons (i.e., northern Sydney, inner west Sydney, western Sydney) [24]. A list of medical practices or health facilities within these local areas was created following an online search (via telephone directories, e.g., Sydney White Pages, [www.whitepages.com.au](http://www.whitepages.com.au)). Sites were then randomly selected from this list (via random number generation in Microsoft Excel™) to generate a short-list of sites to be sent an invitational study flyer (via email, post, hand-delivery). Individuals who expressed an interest to participate were then provided the full study details; written informed consent was obtained from all participants. Sites and interested individuals were also invited to forward the study flyer on to colleagues (i.e., chain referral sampling) to broaden the sampling frame. The target sample size was based on the number of participants needed to achieve data saturation, and was set at a minimum of 6 participants in each subgroup (6 tertiary care specialists, 6 GPs) [25]. According to Guest et.al. interview studies which ‘aim to understand common perceptions and experiences among a group of relatively homogeneous individuals, twelve interviews should suffice to attain data saturation and enable the development of meaningful themes and useful interpretations [25].’ Data

saturation was defined as the point when no new information was being provided by participants that would add to or modify the findings [26].

### *Researcher characteristics*

There was no relationship between the researchers and the participants prior to the study. The research team comprised pharmacists based in academia who each have varying degrees of experience in qualitative research and each hold qualifications in pharmacy. NK and SS are PhD candidates and BB is a full-time academic and a hospital pharmacist. The researchers' characteristics were not used to influence the outcomes of this research.

### *Data collection*

It is important to note that, in accordance with recommendations presented by Lundebjerg et.al. the language used throughout the study sought to eliminate the possibility of negative stereotyping of older adults [27]. The researchers refrained from using terminology such as elderly, aged and seniors.

### **Stage 1**

Participating physicians were presented paper-based scenarios depicting three hypothetical patients, modeled on real life cases. These scenarios were developed by two researchers, (SS and BB), based on a review of the literature and modeled on patients encountered in their clinical practice. Each patient had different characteristics, varying in relation to comorbidities, medication history, physical features, and social status (Table 1). Importantly, the patient's age was not stated in the scenario. Each physician was asked to review the three

hypothetical patients and estimate their ages, and to list the three critical features of each patient that informed this estimate. Physicians were then asked to state the three key characteristics of old age that underpinned their general decision-making.

## **Stage 2**

After completing Stage 1, the same physicians were interviewed to elaborate on the responses provided to the scenarios. Semi-structured interviews were facilitated by one nominated researcher (SS) using a purpose-designed interview guide to ensure consistency in data collection. The interview guide comprised nine key open-ended questions, canvassing the clinically relevant characteristics (i.e., patient features and resources) that contributed to physicians' decision-making around medication use for older patients:

- What is different about older patients in terms of their clinical management?
- What are the key issues that influence clinical decision-making in older patients?
- What key resources do you use to help guide your decision-making in older patients?
- How helpful are the clinical practice guidelines in understanding the specific needs of an older patient?
- In what situations would you not follow the clinical guidelines? For e.g. in a patient say 65 years old or over
- What modifications would you like to see in these resources?
- How do you define an older patient?
- What are the limitations of using a chronological age-based definition of an older patient?

- If we took the number out of the equation, what would help to better optimize medication use in older patients?

The interview guide was pilot-tested (with 2 GPs, 1 qualitative researcher, 1 pharmacist) for question clarity prior to use and was refined accordingly. The average interview time was approximately 20 minutes and field notes were taken by the researcher (SS) during each interview. All interviews were digitally (audio)-recorded and later transcribed verbatim by one researcher (SS). All participants were invited to provide feedback on their transcripts and on initially derived themes from the thematic analysis.

#### *Data Analysis*

Quantitative data were analyzed using descriptive statistics (percentages, frequencies, means, medians) using the Statistical Package for the Social Sciences (SPSS) Version 22. For the qualitative data, the interview transcripts were thematically analyzed. Manual inductive coding was used, which involved the identification of significant statements from participants responses and subsequent categorization into key themes around the study objectives [28]. To ensure correct interpretation and coding of data into emerging themes, two researchers (SS, BB) independently analyzed the data before comparing the themes to attain consensus. A pragmatic approach was used to frame the analysis; this method enables the researcher to undertake data analysis without the limitations of any specific philosophy, and enables triangulation of data using a mixed method approach [29]. Triangulation may involve the use of: [30]

- various data sources (data triangulation)
- several different researchers (investigator triangulation)

- multiple perspectives to interpret the results (theory triangulation)
- multiple methods to study a research problem (methodological triangulation)

A mixed methods approach, involving both qualitative and quantitative data collection, is regarded as the most effective method in providing a gain a fuller understanding of practice [31]. Hansen states that 'by combining what is learnt from multiple methods, these approaches can help to characterize complex healthcare systems, identify the mechanisms of complex problems such as medical errors and understand aspects of human interaction such as communication, behavior and team performance [31].' As such, this method was thought to be the most appropriate in understanding physician perspectives towards defining an older patient and their decision-making behind prescribing.

Microsoft word and SPSS were used to manage all data obtained in the study, as well as codes emerging from the thematic analysis.

## **RESULTS**

Due to the chain referral sampling method used to recruit participants, an accurate response rate cannot be calculated. Furthermore, as potential participants were asked to contact the researchers if they were interested in the study, it is unknown how many declined to participate.

### *Participant characteristics*

Fifteen participants (7 tertiary care specialists, 8 GPs) completed the scenario-based questionnaire and agreed to be interviewed. The mean age of the participants was 48.3 years (SD = 13.0, range 26.0-67.0), and the average length of practice experience was 18.2 years (SD = 11.8, CI 11.6-24.8). One-third of the physicians were female. The average number of

older patients' aged  $\geq 65$  that these physicians reviewed in their practice on a daily basis (self-reported) was 12.5 (SD = 7.3, 95% CI 8.4-16.5).

### *Scenario-based questionnaire*

Physicians reviewed three hypothetical patient scenarios in which they estimated ages for each of these patients; there was agreement between specialists and GPs in ranking the patients from oldest to youngest (Table 2). Overall, Patient 1 was deemed the oldest with an estimated age of 76.1 years (specialists: mean age = 77.6 years; GPs: mean age = 74.7 years), whereas Patient 3 was considered to be the youngest with an estimated age of 68.1 years (specialists: mean age = 71.7 years; GPs: mean age = 65.0 years). In terms of the key factors underpinning their age estimates, those most commonly cited by GPs included patient's functional status, renal function, and level of comorbidity. Specialists also commonly cited comorbidity and renal function as key factors, but where the GPs included functional status in their top three factors, the specialists included polypharmacy. (Tables 1 and 2).

When asked to identify the three factors influencing their therapeutic decision-making in general (not specific to the cases), GPs most frequently highlighted cognitive function, renal function, and polypharmacy, whilst the specialists cited functional status, renal function, and cognitive function. Cognitive function was reported for Patient 1 (estimated to be the oldest patient by all physicians), although none of the physicians cited this as a key factor in guiding their age estimates in the scenarios.

### *Qualitative analysis*

Three major themes emerged from the interviews:

- Using a number-based vs. health status-based definition of an older patient
- Patient 'red flags' influence prescribing decisions
- Lack of guideline support in prescribing for older patients

***Theme 1: Using a number-based vs. health status-based definition of an older patient***

Broadly, within this theme, participants can be categorized into those participants who use a number-based definition of an older patient (n = 9) and those participants who ignore the number and use patient's overall health and other factors (comorbidity, social factors etc.) (n = 6). In their approach to define an older patient, there were no differences observed between specialists and GPs. (Table 1)

*“Certainly not based necessarily on the age. I think it is a combination of chronological age plus things like frailty and comorbidity. Age is not the main factor, so you can have a 90 year old who is living independently at home, fit and healthy and I would classify them quite differently to a 70 year old who is with 15 clinical conditions and on 20 medications.” (S04)*

*“So, I do not have, you know, one specific thing when I think about elderly. So, I think it is about multiple comorbidities and I think it is about general decline in terms of homeostatic function. But I do not assign a specific age.” (SP07)*

*“You can go chronologically by what their age is. But I tend to define someone as elderly by more how physically fit they are, what their medical condition is.” (GP01)*

*“I do not think it is by age. I find in this demography, I have a lot of very fit, healthy, no medication 65 year olds. So I do not think it is an age, even 70 years old.” (GP03)*

Those who advocated using a number-based definition of an older adult felt that having a specific value to define was a useful prompt for physicians, alerting them to be more cautious in their decision-making. Furthermore, physicians recognized that some guidelines made age-specific recommendations, given the way clinical trials were conducted and results reported.

*“... it would be nice to have that safety blanket that sort of prompts you, here is this patient over 65 or under 65. Just as a prompt, did I forget this patient is elderly? Removing it, I do not think it is doing any harm by being there except it can be a distraction.” (GP03)*

*“Because a lot of studies and things are actually age-based and have age-based risk factors. I cannot account for what other doctors have said, as long as they are doing studies which show that if you give this medication to someone who is above 70 you can increase gastric bleeding, as long as studies are doing that I think the number would be useful.” (GP02)*

Using a number-based definition, physicians identified an age range from 65 – 90 years of age as an older adult patient. There was some variability in these numbers between GP’s and specialists, with specialists tending to put forward a higher age range (75 – 90), whereas GP’s cited a younger age range (65 – 75).

*“I think really over 75 or over 80 years. Most people will say not over 65 anymore.”*

(S01)

*“I guess 95 is clearly elderly and 60 is not elderly. And somewhere in between is a grey border, probably starts at about 65 in some people and probably goes all the way up to 90 in other people.”* (S06)

*“In general, aged 70 and above. But as I said, elderly you can have someone who is well and elderly someone who is not well. Generally, I consider people 70+ in age as elderly.”* (GP02)

*“Depends, so I guess, someone over 70 classically would be elderly, or even 65...but anyone above 80 is elderly regardless of how many medical issues they have.”* (GP05)

Interestingly, there was a difference observed between how prescribers define older patient and how they perceive someone as an older adult. Participants' definition of an older patient was often number-based, however, their description of an older patient was more so based on physical features, comorbidities, polypharmacy, functional status, and cognitive function. In their description of an older patient, participants acknowledged that there exists a huge heterogeneity in older adults, but their definition of an older patient was based on age. This difference in their definition of an older patient and description of someone as an older patient may affect how they treat their patients.

*“Often once you get to a certain age you are likely, although age is not always the reason, to have more comorbidities to take into account. Renal impairment, liver*

*dysfunction, you may have significant mobility issues, you may have cognition issues that started to occur. So, I think they are more likely to be complex.” (S01)*

*“So there are two aspects to call someone elderly. But I think most common one from my point of view would be the age-related one. It is how I think of the term but it is not how I think of the person if that makes sense.” (S02)*

*“Once I think about someone as elderly, I start thinking about getting the pharmacists to do Webster paks<sup>TM1</sup>, getting them home services, and I start thinking in a slightly different way.” (GP07)*

## **Theme 2: Patient ‘red flags’ influence prescribing decisions**

Medication prescribing was recognized as a challenge in older adult patients by almost all physicians. Several patient-associated factors, including comorbidity, polypharmacy and cognitive impairment were cited as important signals or ‘red flags’ for physicians, which then guided how they prescribed and managed medication in this patient group.

*“Things like mobility, their cognition, and their support situation that they have at home is important. So if they are living alone at home and nobody checks on them, you are sort of little bit more conservative with their treatment, but at the same time you want tighter control of their illnesses as well, you just have to balance it out.” (GP03)*

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<sup>1</sup> “Multi dose, dose administration aid designed to assist people to correctly take their medication as prescribed” [32].

*“Yeah, if they are very infirmed, or they have got cognition issues, or they are quite frail, living their own, then you would not put them for example on some sort of major anticoagulation if they are at high risk of falls. But if they are living in a supported environment with a high AF burden, high CHADS<sub>2</sub> score, then you might be swayed a little bit, you know, they are not managing things completely on their own.” (S02)*

*“Depending on the condition of the elderly patient and what goal do we want, like if someone is very fit he does not have a lot of comorbidities, we can be a little more aggressive in their treatment. But if someone has poor medical status, they are demented, our role is more of a palliative role just keeping them comfortable.” (GP01)*

*“Dealing with multi-morbidity, that is the thing we have no idea how to manage in older people. So treatment for one condition might be contraindicated for another condition, or lead to two therapies that interact. Or some combinations of those certainly will lead to polypharmacy and polytreatments.” (S03)*

### ***Theme 3: Lack of guideline support in prescribing for older patients***

As a key objective of this research was to identify any factors that influenced prescribing decisions made for older patients, a significant issue identified by the participants related to the lack of quality evidence supporting and guiding direct treatment decisions in older adult patients and was viewed as a challenge in prescribing. This theme was expressed more strongly among specialists than GPs, underpinned by the fact that GPs often rely on specialists

when managing older patients: *it is really nice to have a specialist who understands elderly people (GP07).* (Table 4)

*“I think it would be nice to actually have more data in the aged population specifically, that is real world data not just based on eGFR across a group of patients... For e.g., the warfarin and the NOACs (novel oral anticoagulants), we would like to put a lot more people, I would personally like to put a lot more people on NOACs but we do not have great data. And I am bit worried about putting a lot of them on. So, you know, if that data was there you would feel more confident doing it.”* (S02)

Clinical practice guidelines were deemed inadequate in guiding pharmacotherapeutic decision-making in older adult patients, particularly for those with comorbidities. Both specialists and GPs stated that guidelines needed to incorporate more information on how to manage older patients with comorbidities.

*“... One is that they rarely, if at all, address issue what to do in someone who’s got multi-morbidity. So, treating a single disease by guideline may be very effective, but majority of older people with single disease have multiple other illnesses. And that we know from work we have done and work that other people have done, that if you are an old person with single disease, 95% of them will have two or more other diseases to go with it. So, the lack of understanding of multi-morbidity is a key issue.”* (S03)

Some physicians felt that guidelines often made it more difficult for them to prescribe medications because they placed greater emphasis on 'risk' than 'benefit'. For this reason, GPs were more likely to rely more upon their clinical experience. It is important to note that it is not clear how these comments are specific to this patient group as they apply to all patient populations. However, according to the responses obtained previously, physicians may have been referring to the lack of 'specificity' in guidelines towards the characteristics of the older patient population.

*"Guidelines are often directed very much at safety as opposed to efficacy. And you know, we see this a lot that they are so focused on not doing harm, that the chances of getting a benefit can be reduced."* (S05)

*"Mainly just go by experience, what I have learnt in the past...I assume they (guidelines) would be helpful, I do not tend to use them much."* (GP01)

*"Normally, I do not use clinical guidelines. I think most of the guidelines are helpful but their practical applicability is a question."* (GP06)

*"I think doctors usually do not go with guidelines, but we try to adjust it to the patient's age and other health issues. So, we try to balance things and sometimes it is not exactly in the guidelines."* (GP08)

A few physicians also raised the need for guidelines to address both medication prescribing and de-prescribing, as both were particularly important processes when treating older persons.

*“For example, if you get someone on warfarin and you know they are at a high risk of stroke and they are also really getting frail on their feet, when is the point to start to feel that is probably better to stop it?” (S02)*

*“And you know, as a GP we find it very difficult (to de-prescribe), because if you de-prescribe something and then they have a stroke, it is like, well, so we are in a difficult situation. So I think few more guidelines on de-prescribing would be very useful.”*  
(GP05)

## **DISCUSSION**

To the best of our knowledge, this is the first exploratory research to have qualitatively analyzed the perspectives of physicians towards defining an older adult patient. The most important finding of this study highlights that there are inconsistencies among the surveyed physicians in defining an older adult patient; with some using a number-based definition, and others using various patient-related factors. These findings indicate that as a result, there may be variances seen in the prescribing patterns of these physicians, which may impact upon the quality use of medicines in this patient group. Consistency in care is identified as a cornerstone domain in the delivery of quality patient care [33]. High variability in practice among practitioners has been identified as a significant issue for health care systems [33]. March highlights that it is important to keep practice within a narrow range to ensure a more

effective and efficient level of care as well as improved patient outcomes [33]. As such, there is a need for the development of consistent definitions and consensus guidelines that incorporate a positive approach to ageing, and evaluate older patients from a more holistic level [34].

It is noteworthy that whilst some physicians used a number based definition of an older patient, overall participants were conscious of the heterogeneity of the older patient group and of the implications of age-biased prescribing. In assessing an older patient, physicians considered a multitude of patient factors as influencers of their decision-making during prescribing including co-morbidities, cognitive function, frailty, polypharmacy etc. and did not solely focus on the patients age. This indicates that physicians may also utilize a specific patient definition more as a guiding element or as an alert when designing an appropriate pharmacotherapeutic regimen, rather than as a significant contributor to the prescribing process. It is particularly important when undertaking pharmacotherapeutic-related decision-making, for physicians to consider the mental status changes among older patients, due to their potential significant influences on medication adherence. A systematic review conducted by Campbell et.al. highlighted that older adults with cognitive impairment experienced unique barriers to medication compliance, including difficulty understanding medication directions, organizing medication administration into the daily routine, and using potentially inappropriate medications [35].

Another important finding of this study emphasizes that the prescribing of medications in older adult patients is a complex process, compounded by a limited level of evidence-based medicine (EBM). Current EBM that physicians rely upon while making treatment decisions in

older adult patients is not strong enough to influence appropriate prescribing. This is similar to findings presented by Adams et.al. who also performed a qualitative, interview-based study investigating the perceptions of primary care physicians on caring for older patients [36]. In their research, Adams et.al. found that physicians experienced difficulty in treating older patients due to increased medical complexity and chronicity [36].

Clinical practice guidelines are key resources developed to assist practitioners in making sound clinical decisions. However, previous studies have highlighted issues around the use of practice guidelines in older patients, involving mainly disease driven rather than patient-centered guidelines [37, 38, 11]. Similarly, this study has provided some insight into key areas where improvement is required so that these guidelines can be better utilized at the time of making important prescribing decisions. First, comorbidity should be better addressed in clinical practice guidelines. Clinical guidelines have often been criticized for their 'single disease-driven' approach and their application in patients with comorbid conditions can lead to undesirable effects including polypharmacy, adverse drug reactions, and high financial burdens [38]. Second, when making recommendations, these guidelines should provide detailed descriptions relating to the studies and the associated participant groups from which the information was sourced. This will help physicians in matching patients with the respective study participants (in studies from where the information was sourced) more closely. This also indicates that guidelines should provide a detailed description of their definition of an older adult patient in their recommendations. A previous study has highlighted that clinical practice guidelines either define older adult patients using a number-based definition or do not provide any definition at all [11]. Third, practice guidelines need to shed more light on the process of medication de-prescribing. Medication de-prescribing

provides an opportunity to the physicians' to reassess the use of ongoing medications [39]. Reeve et.al. highlighted that the impact of de-prescribing can have both beneficial and harmful effects on patients [40]. Benefits included better patient outcomes related to the resolution of adverse drug events (ADR's), reduced financial costs and improved patient adherence [40-43]. However, withdrawal symptoms and a recurrence of the original medication condition were also noted as consequences of decreasing the number of medicines prescribed. Both of these effects may have significant influence on the quality of life of an older patient, and are important considerations for physicians [40-43].

Interestingly, when defining an older adult patient many participants highlighted the need to increase the age cut-off from 65 years to at least 70 years. Some studies in the past have also argued that the age cut-off to define older persons should be increased [44]. This illustrates that with advances in health and life expectancy, the concept of age changes over time. As such, using a person's chronological age to make prescribing decisions is akin to aiming at a moving target; this number is not static and is prone to change over generations as populations get older, and as physicians age [44-46]. Therefore, it is imperative to develop new measures of population aging that take into consideration longevity over time and place [47]. Other measures to define an older adult patient include the use of biological age and geriatric syndromes (including frailty) [46]. For instance, Rockwood et. al. suggested the use of a frailty index (total number of deficits that a person has accumulated) in calculating the biological age of a patient [48].

From the hypothetical patient scenarios, it was identified that physicians found it difficult to assign an age to these patients due to their comorbid conditions and polypharmacy.

Physicians cited comorbidity and polypharmacy as characteristic features of old age, yet when presented with the scenarios, these features failed to trigger a response. Physicians relied more on features of old age (e.g. functional impairment, living status) while assigning patient ages. This distinct lack of uniformity in appropriately assessing and describing a patient as older adult may impact upon the treatment approach undertaken by each doctor [49]. These varying perceptions of older patients may directly influence the quality of care provided, including the intensity and type of medications prescribed, leading to potential inequities in patient care [49]. Therefore, there is a need to develop a contemporary definition of an older adult patient and incorporate this into current guidelines to better assist doctors in making appropriate prescribing decisions and minimize the potential for medication misuse. Alternatively, from a different perspective, given the patient-centered nature of geriatric care, it may be more useful to develop better frailty criteria that are independent of age. A definition may not necessarily be as effective in decision-making as criteria that directly affect prescribing decisions.

The differences observed in the findings of this research demonstrate that there is a need for future research to further explore Australian physicians' perspectives towards prescribing in older patient, on a larger scale. This future research could help inform the need for consensus guidelines to promote consistency in prescribing practices, to ensure the quality use of medicines in this patient group.

## **LIMITATIONS**

In considering the findings of this study it is important to acknowledge some of the limitations. First, this is a small sample of selected participants, and may not be representative of all

physicians. These results have limited generalizability as they have been derived from a very small portion of the Australian healthcare workforce. In canvassing these perspectives, it is possible that those who agreed to be interviewed had particular or strong viewpoints that they wanted to express, which may not represent broader perspectives in practice.

## **CONCLUSION**

Physicians describe the complexity of decision-making for older adult patients, and how this is influenced by a diverse range of factors, yet ultimately simplify the process by defaulting to number-based (age in years) guidelines and procedures. It is apparent that the lack of a supportive classification system for physicians to refer to and guide their decision-making in older adults, may have implications on the quality use of medicines including polypharmacy, inappropriate prescribing and over/underutilization of medicines. Further work is needed on how to develop guidelines that are less focused on the patient's age in years, and more focused on those factors that actually affect medical management, including de-prescribing practices.

## **CONFLICT OF INTEREST**

The authors have no conflicts of interest to declare.

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None to declare

## **REFERENCES**

1. Hubbard RE, O'Mahony MS, Woodhouse KW. Medication prescribing in frail older people. *European Journal of Clinical Pharmacology*. 2012;69(3):319-26. doi:10.1007/s00228-012-1387-2.

2. Older, wiser, safer. NPS MedicineWise, MedicineWise News. 2013.  
<http://www.nps.org.au/publications/health-professional/medicinewise-news/2013/older-wiser-safer>. Accessed 29/03/2017.
3. Gallagher P, Barry P, O'Mahony D. Inappropriate prescribing in the elderly. *J Clin Pharm Ther*. 2007;32(2):113-21. doi:10.1111/j.1365-2710.2007.00793.x.
4. Spinewine A, Swine C, Dhillon S, Franklin BD, Tulkens PM, Wilmotte L et al. Appropriateness of use of medicines in elderly inpatients: qualitative study. *Bmj*. 2005;331(7522):935.
5. O'Mahony D, Gallagher PF. Inappropriate prescribing in the older population: need for new criteria. *Age and Ageing*. 2008;37(2):138-41. doi:10.1093/ageing/afm189.
6. Kievit W, van Hulst L, van Riel P, Fraenkel L. Factors that influence rheumatologists' decisions to escalate care in rheumatoid arthritis: Results from a choice-based conjoint analysis. *Arthritis Care & Research*. 2010;62(6):842-7. doi:10.1002/acr.20123.
7. Boyles PJ, Peterson GM, Bleasel MD, Vial JH. Undertreatment of congestive heart failure in an Australian setting. *Journal of Clinical Pharmacy and Therapeutics*. 2004;29(1):15-22. doi:10.1046/j.1365-2710.2003.00531.x.
8. Bajorek BV, Krass I, Ogle SJ, Duguid MJ, Shenfield GM. The impact of age on antithrombotic use in elderly patients with non-valvular atrial fibrillation. *Aust J Ageing*. 2002;21(1):36-41. doi:10.1111/j.1741-6612.2002.tb00413.x.
9. Cahir C, Bennett K, Teljeur C, Fahey T. Potentially inappropriate prescribing and adverse health outcomes in community dwelling older patients. *Br J Clin Pharmacol*. 2014;77(1):201-10. doi:10.1111/bcp.12161.
10. Tommelein E, Mehuys E, Petrovic M, Somers A, Colin P, Boussery K. Potentially inappropriate prescribing in community-dwelling older people across Europe: a systematic literature review. *European journal of clinical pharmacology*. 2015;71(12):1415-27. doi:10.1007/s00228-015-1954-4.
11. Singh S, Bajorek B. Defining 'elderly' in clinical practice guidelines for pharmacotherapy. *Pharm Pract*. 2014;12:489.
12. Cruz-Jentoft AJ, Carpena-Ruiz M, Montero-Erasquin B, Sánchez-Castellano C, Sánchez-García E. Exclusion of Older Adults from Ongoing Clinical Trials About Type 2 Diabetes Mellitus. *Journal of the American Geriatrics Society*. 2013;61(5):734-8. doi:10.1111/jgs.12215.
13. Bellmunt J, Négrier S, Escudier B, Awada A, Aapro M. The medical treatment of metastatic renal cell cancer in the elderly: position paper of a SIOG Taskforce. *Critical reviews in oncology/hematology*. 2009;69(1):64-72.
14. Cho ER, Yoo J, Jee SH, Kim Y. Biological age as a useful index to predict seventeen-year survival and mortality in Koreans. *BMC geriatrics*. 2017;17(1):7.
15. Jee H, Jeon BH, Kim YH, Kim H-K, Choe J, Park J et al. Development and application of biological age prediction models with physical fitness and physiological components in Korean adults. *Gerontology*. 2012;58(4):344-53.
16. Nakamura E, Miyao K. A method for identifying biomarkers of aging and constructing an index of biological age in humans. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*. 2007;62(10):1096-105.
17. Meid AD, Lampert A, Burnett A, Seidling HM, Haefeli WE. The impact of pharmaceutical care interventions for medication underuse in older people: a systematic review and meta-analysis. *British journal of clinical pharmacology*. 2015;80(4):768-76.
18. Vrdoljak D, Borovac JA. Medication in the elderly-considerations and therapy prescription guidelines. *Acta medica academica*. 2015;44(2):159-68.
19. House Standing Committee on Health and Ageing Inquiry into Dementia: Early

diagnosis and Intervention

Response by The Royal Australasian College of Physicians and the Australian

and New Zealand Society for Geriatric Medicine to the Questions on Notice. The Royal Australasian College of Physicians (RACP) and the Australian and New Zealand

Society for Geriatric Medicine (ANZSGM)2012.

20. Australian and New Zealand Society for Geriatric Medicine. Why train in Geriatric Medicine? 2017. <http://www.anzsgm.org/training.asp>. Accessed 25/10/2017.

21. Postgraduate Medical Council of Victoria. Intern Year. 2017. <http://www.pmcv.com.au/accreditation/intern-year>. Accessed 25/10/17.

22. Australian Aged Care Quality Agency. Nurse practitioners. Australian Government. 2014. <https://www.aacqa.gov.au/providers/promoting-quality/better-practice-awards/2014-better-practice-award-winners/nurse-practitioners>. Accessed 15/12/17.

23. Bajramovic J, Emmerton L, Tett SE. Perceptions around concordance – focus groups and semi-structured interviews conducted with consumers, pharmacists and general practitioners. *Health Expectations*. 2004;7(3):221-34. doi:10.1111/j.1369-7625.2004.00280.x

24. Population Composition: Regional population ageing. Australian Bureau of Statistics. 2006. <http://www.abs.gov.au/ausstats/ABS@.nsf/2f762f95845417aeca25706c00834efa/851dece969d9182cca2570ec000a2501!OpenDocument>. Accessed 15/12/2016.

25. Guest G, Bunce A, Johnson L. How many interviews are enough? An experiment with data saturation and variability. *Field methods*. 2006;18(1):59-82.

26. Data Saturation – numbers left out in the rain, or something else? NSF Consulting. 2017. <http://nsfconsulting.com.au/data-saturation/>. Accessed 25/10/2017.

27. Lundebjerg NE, Trucil DE, Hammond EC, Applegate WB. When It Comes to Older Adults, Language Matters: Journal of the American Geriatrics Society Adopts Modified American Medical Association Style. *Journal of the American Geriatrics Society*. 2017;65(7):1386–8. doi:10.1111/jgs.14941.

28. Thomas DR. A general inductive approach for qualitative data analysis. *American Journal of Evaluation*. 2006;27(2):237-46. doi:10.1177/1098214005283748.

29. Cooper S, Endacott R. Generic qualitative research: a design for qualitative research in emergency care? *Emergency Medicine Journal : EMJ*. 2007;24(12):816-9. doi:10.1136/emj.2007.050641.

30. The four main approaches. Alzheimer Europe, Luxembourg. 2009. <http://www.alzheimer-europe.org/Research/Understanding-dementia-research/Types-of-research/The-four-main-approaches>. Accessed 28/03/2017.

31. Hansen M, O'Brien K, Meckler G, Chang AM, Guise JM. Understanding the value of mixed methods research: the Children's Safety Initiative-Emergency Medical Services. *Emergency medicine journal : EMJ*. 2016;33(7):489-94. doi:10.1136/emered-2015-205277.

32. Webster-pak Community: Dispensing procedures manual. Manrex Pty Ltd, Leichhardt. 2014. [http://www.webstercare.com.au/files/Webster-pak\\_Community\\_Dispensing\\_Procedures\\_Manual\\_v3.pdf](http://www.webstercare.com.au/files/Webster-pak_Community_Dispensing_Procedures_Manual_v3.pdf).

33. March A. Perspective: Consistency, Continuity, and Coordination—The 3Cs of Seamless Patient Care. *Quality Matters Archive* 2006.

34. VanderWalde N, Hurria A, Jagsi R. Improving Consistency and Quality of Care for Older Adults With Cancer: The Challenges of Developing Consensus Guidelines for Radiation Therapy. *International Journal of Radiation Oncology• Biology• Physics*. 2017;98(4):721-5.

35. Campbell NL, Boustani MA, Skopelja EN, Gao S, Unverzagt FW, Murray MD. Medication Adherence in Older Adults With Cognitive Impairment: A Systematic Evidence-Based Review. *The American Journal of Geriatric Pharmacotherapy*. 2012;10(3):165-77. doi:<https://doi.org/10.1016/j.amjopharm.2012.04.004>.

36. Adams WL, McIlvain HE, Lacy NL, Magsi H, Crabtree BF, Yenny SK et al. Primary Care for Elderly People Why Do Doctors Find It So Hard? *The Gerontologist*. 2002;42(6):835-42. doi:10.1093/geront/42.6.835.

37. Mutasingwa DR, Ge H, Upshur RE. How applicable are clinical practice guidelines to elderly patients with comorbidities? *Canadian Family Physician*. 2011;57(7):e253-e62.

38. Boyd CM, Darer J, Boult C, Fried LP, Boult L, Wu AW. Clinical practice guidelines and quality of care for older patients with multiple comorbid diseases. *JAMA: the journal of the American Medical Association*. 2005;294(6):716-24.
39. Scott IA, Hilmer SN, Reeve E, Potter K, Le Couteur D, Rigby D et al. Reducing Inappropriate Polypharmacy: The Process of Deprescribing. *JAMA internal medicine*. 2015;175(5):827-34.
40. Reeve E, Shakib S, Hendrix I, Roberts MS, Wiese MD. The benefits and harms of deprescribing. *The Medical Journal of Australia*. 2014;201(7):386-9. doi:10.5694/mja13.00200.
41. Garfinkel D, Mangin D. Feasibility study of a systematic approach for discontinuation of multiple medications in older adults: addressing polypharmacy. *Archives of internal medicine*. 2010;170(18):1648-54.
42. Iyer S, Naganathan V, McLachlan AJ, Le Couteur DG. Medication withdrawal trials in people aged 65 years and older. *Drugs & aging*. 2008;25(12):1021-31.
43. Reeve E, Wiese MD. Benefits of deprescribing on patients' adherence to medications. *International journal of clinical pharmacy*. 2014;36(1):26-9.
44. Orimo H, Ito H, Suzuki T, Araki A, Hosoi T, Sawabe M. Reviewing the definition of "elderly". *Geriatrics & gerontology international*. 2006;6(3):149-58.
45. Singh S, Bajorek B. Defining 'elderly' in clinical practice guidelines for pharmacotherapy. *Pharmacy Practice*. 2014;12(4):489.
46. Singh S, Bajorek B. Pharmacotherapy in the ageing patient: The impact of age per se (A review). *Ageing Research Reviews*. 2015;24, Part B:99-110. doi:<http://dx.doi.org/10.1016/j.arr.2015.07.006>.
47. Sanderson W, Scherbov S. Rethinking Age and Ageing. Washington: Population Reference Bureau2008 Contract No.: 4.
48. Rockwood K, Mitnitski A. Frailty in relation to the accumulation of deficits. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*. 2007;62(7):722-7.
49. Gunderson A, Tomkowiak J, Menachemi N, Brooks R. Rural Physicians' Attitudes Toward the Elderly: Evidence of Ageism? *Quality Management in Health Care*. 2005;14(3):167-76.

**TABLE 1 - HYPOTHETICAL PATIENT SCENARIOS PRESENTED TO PHYSICIANS**

	<b>PATIENT 1</b>	<b>PATIENT 2</b>	<b>PATIENT 3</b>
	 Increasing co-morbidity and polypharmacy		
	 Declining renal function		
	 Reducing physical abilities		
<b><u>CURRENT CONDITIONS</u></b>	Atrial fibrillation Diabetes Hypercholesterolemia	Atrial fibrillation Diabetes Dyslipidemia Osteoarthritis Hypertension Osteoporosis	Atrial Fibrillation Diabetes Hypercholesterolemia Osteoarthritis Hypertension Migraine
<b><u>CURRENT MEDICATION</u></b>	<u>Metformin 500mg</u> (2 Tab b.d.) <u>Rosuvastatin 40mg</u> (1 Tab daily)	<u>Metformin 500mg</u> (2 Tabs b.i.d.) <u>Rosuvastatin 20mg</u> (1 Tab daily) <u>Paracetamol 665mg</u> (2 Tab t.i.d. p.r.n.) <u>Perindopril/Amlodipine</u> 5mg/5mg (1 Tab daily) <u>Strontium ranelate 2g</u> (once daily) <u>Fenofibrate 145mg</u> (1 Tab daily) <u>Gliclazide 80mg</u> (2 Tabs b.i.d.)	<u>Metformin 1000 mg</u> (1 Tab b.d.) <u>Rosuvastatin 10 mg</u> (1 Tab daily) <u>Paracetamol 665 mg</u> (2 Tab t.i.d. p.r.n.) <u>Telmisartan/Hydrochlorthiazide</u> 40/12.5 (1 Tab daily) <u>Metoprolol 50mg</u> (1/2 tab bd) <u>Celecoxib 200mg</u> (1 Tab daily) <u>Eletriptan 40mg</u>
<b><u>OTHER PATIENT CHARACTERISTICS</u></b>	Male Walks with a stick History of falls Mild cognitive impairment eGFR: 64mL/min/1.73m <sup>2</sup>	Female Lives independently Mild urinary incontinence eGFR: 68mL/min/1.73m <sup>2</sup>	Male Lives independently  eGFR: 83mL/min/1.73m <sup>2</sup>

**TABLE 2 - PARTICIPANT CHARACTERISTICS AND ESTIMATED AGES OF THE HYPOTHETICAL PATIENTS**

<b>CATEGORY</b>	<b>SPECIALISTS (N=7)</b>	<b>GENERAL PRACTITIONERS (N=8)</b>	<b>TOTAL (N=15)</b>
<b>Mean age (years) (SD, Range)</b>	51.5 (9.1, 40.0-65.0)	45.5 (15.8, 26.0-67.0)	48.3 (13.0, 26.0-67.0)
<b>Female n (%)</b>	2 (28.6%)	3 (37.5%)	5 (33.3 %)
<b>Mean years of experience (years) (SD, 95%CI)</b>	18.8 (8.3, 11.0-26.6)	17.6 (14.7, 5.3-29.9)	18.2 (11.8, 11.6-24.7)
<b>Self-reported number of older patients managed on a daily basis (SD, Min - Max)</b>	12.7 (6.3, 2 - 20)	12.2 (8.5, 5 - 30)	12.5 (7.3, 2 - 30)
<b>Responses to Hypothetical Scenarios (patient cases)</b>			
<b>Mean patient 1 age (years) (SD, 95%CI)</b>	77.6 (5.6, 72.4-82.7)	74.7 (5.0, 70.5-79.0)	76.1 (5.3, 73.1-79.0)
<b>Mean patient 2 age (years) (SD, 95%CI)</b>	73.0 (6.6, 66.9-79.1)	67.9 (5.6, 63.1-72.6)	70.2 (6.4, 66.7-73.8)
<b>Mean patient 3 age (years) (SD, 95%CI)</b>	71.7 (7.1, 65.1-78.3)	65.0 (6.5, 59.5-70.4)	68.1 (7.4, 64.0-72.3)
<b>Factors influencing therapeutic decision-making in general</b>			
<b>Top 3 commonly cited factors affecting decision- making in older patients</b>	1. Functional status 2. Comorbidities 3. Renal Function	1. Functional status 2. Polypharmacy 3. Renal Function	N/A

**TABLE 3 – THEME 1: USING A NUMBER-BASED VS. HEALTH STATUS-BASED DEFINITION OF AN OLDER PATIENT - SELECTED QUOTATIONS FROM PARTICIPANTS**

<p><i>Age-based definition of an older adult</i></p>
<ul style="list-style-type: none"> <li>• I used to say 65 but now I say 75 or may be 70. (GP07)</li> <li>• I think I keep it simple, 65 I guess. (GP04)</li> <li>• I used to think 65 is old. But now I think 75 is the new 65. (S02)</li> <li>• It is changing. I think 20 years ago, elderly was people probably over 65. Now I think people in their early 80s as not being that elderly. I think elderly is over 85 and depends physiologically too. (S05)</li> </ul>
<p><i>Based on physical characteristics and other factors</i></p>
<ul style="list-style-type: none"> <li>• I think most people will accept over 80 is being very old. Even people over 80 and people less than 80 if they are frail, comorbid or cognitive impairment, on residential care they would be classed as elderly. (SP03)</li> <li>• It is very difficult to say what age defines elderly. (GP06)</li> <li>• Difficult, I do not know what age we call elderly. It depends upon the shape of the patient, how he looks, how fit he is. Sometimes older person we do not think is elderly and sometimes younger patients are elderly. (GP08)</li> </ul>
<p><i>Impact of age in definition of an older adult</i></p>
<ul style="list-style-type: none"> <li>• I guess the number is important, because it makes you think about whether you should then think about prescribing and stuff. So it gives you a starting point. (GP05)</li> <li>• It is not a perfect discriminator, but everything goes in certain direction as you get older, whether it gets a higher number or a lower number, it does correlate with age. So, it is not a bad way of classifying things...So it (age) is a factor but it is probably the least precise factor. It makes people think well this person is over 80 so that is one factor that tells me they are high-risk. (S02)</li> <li>• Well, I think having somebody's age is useful. It does not tell everything about the individual, but it gives you an idea of the problems that you might anticipate. (S05)</li> </ul>

**TABLE 4 - THEME 3: LACK OF GUIDELINE SUPPORT IN PRESCRIBING FOR OLDER PATIENTS**

- SELECTED QUOTATIONS FROM PARTICIPANTS

<i>Limited evidence base</i>
<ul style="list-style-type: none"><li>• One of the things that I become very particular about is looking at the clinical trials to see what evidence they have particularly about old people or frail people. For me it is not enough to say that there was an average benefit overall in this trail of x%, I want to see what has happened in the subgroup of people that are very elderly. (S03)</li><li>• And so you also need to know the literature on older people because they often behave very differently and they obviously largely not part of the general clinical trials for interventions whether they are medications or others. (S07)</li><li>• One is that evidence base falls apart in very elderly. So, things that are shown to be efficacious or effective in younger adults, we have no evidence in older people, or we have evidence of no benefit, or have evidence of harm. (S03)</li></ul>
<i>Clinical practice guidelines not able to be generalized to each patient</i>
<ul style="list-style-type: none"><li>• So, often times, when you have a medication, there is a big list of interactions and precautions and really often, especially in these patients with comorbidities, if you went strictly by the guidelines you would never be able to give any medication. (GP02)</li><li>• They are helpful to an extent, in that you can get an idea what others might do. But you also have to tailor it to the patient, and you know, to their specific kidney and liver function, their level of cognition, their coping abilities, and also any other comorbidities. (GP02)</li><li>• It is not that they are not helpful, but they are very specific to one problem. And we said already that elderly people usually do not have one problem. And then even you take into consideration that they have four disease states, that might not include the fact that they use a cane to walk, or they do not have a car, or their vision is impaired. (GP03)</li><li>• They (guidelines) are not (helpful). There are very few guidelines really mentioned anything specifically on older people. The older the person is, more comorbidities they have, the probability of following the guidelines become less and less. (S01)</li></ul>

- There are three problems with clinical guidelines that limit their use in older patients. One is that they rarely, if at all, address issue what to do in someone who's got multi-morbidity. So, treating a single disease by guideline may be very effective, but majority of older people with single disease have multiple other illnesses. And that we know from work we have done and work that other people have done, that if you are an old person with single disease, 95% of them will have two or more other diseases to go with it. So, the lack of understanding of multi-morbidity is a key issue. The second issue is that a lot of the guidelines are driven by commercial interests that are not aligned to the best outcomes to the patient. The third issue is that they do not consider the ethical framework that I have mentioned before. The guidelines are generally focused on what is the efficacy of the drug, therefore that the efficacy will be converted into effectiveness of the entire population. And they do not go how you generalize that to your particular patient, what are the harms, how do you balance the benefits and harms, what does the patient wants. (S03)
- I am not sure, because guidelines are a generalization. But we are not looking after a generalized patient; we are looking after an individual. I think that is one of the problems with the guidelines, they fit a population but they do not necessarily fit an individual. (S05)