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Journal of Medicines Optimisation

Developing a patient-centred approach to get best outcomes and value from medicines

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In this issue:

AIM OF THE JoMO

Medicines optimisation is a person-centred approach to safe and effective medicines use to ensure that people obtain the best possible outcomes from their medicines. The aim of the JoMO is to contribute to that process and play an influential and key part in shaping better patient care and the role that medicines can play. The JoMO provides a vehicle to enable healthcare professionals to stimulate ideas in colleagues and/or disseminate good practice that others can adapt or develop to suit their local circumstances.

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The JoMO is made available on a controlled circulation basis to healthcare professionals (e.g. pharmacists, doctors, nurses, etc) and industry colleagues who work with them.

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Correspondence may be edited for length, grammatical correctness, and journal style.

Authors of articles discussed in correspondence will be given the opportunity to respond.

The correspondence, together with a declaration of any interests and any subsequent comment from the author, may be published in the Journal and/or on the website.

Please submit your correspondence to the Correspondence Editor (correspondence@jmedopt.com).

PUBLISHING YOUR WORK

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The JoMO aims to follow the 'Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals' published by the International Committee of Medical Journal Editors (ICMJE) and known as 'The Uniform Requirements' and the Committee on Publication Ethics (COPE) 'Code of Conduct'.

Guidance for Authors is available at http://www.jmedopt.com.

All material should be sent electronically to the Editor-in-Chief (alex.bower@pharman.co.uk).

Editorial

Medicines optimisation (MO) moves the emphasis away from a system and service focus to a patient-focused approach. The way this is being taken forward in Northern Ireland is outlined in an article in the 'Developments in Practice' section. This outlines the three strands of a Medicines Optimisation Quality Framework that has been developed, namely a model for MO, quality standards and an innovation plan. A key component of the initiative is the establishment of a regional Medicines Optimisation Innovation Centre (MOIC). This provides a coherent and focused approach to developing and implementing best practice. The approach taken will be of much help and interest to those in other areas of the UK and it will be good to hear about how the MOIC develops over time.

Staying up to date with published work is a daunting task - using systematic reviews and identifying good quality randomised trials is essential. The need for critical appraisal is a key requirement but since this can also appear to be a significant challenge the article that provides some helpful guidance will be of interest. The paper outlines a hierarchy of evidence and explains how a Patient Intervention Comparison Outcome (PICO) can help by framing questions into a clinically relevant and answerable form. It also covers how to handle results and provides some useful tools in the form of questionnaires to help assess reviews and clinical trials. This is a 'must read' for all who wish to improve or refresh their critical appraisal skills.

In the Patient Perspective section, patients tell their stories about how they cope in their daily lives and what sort of experiences they have had in their interactions with healthcare professionals.

In this edition we get to know 'first-hand' what it is like for a patient when they await biopsy results and then get a diagnosis of breast cancer. Fortunately, the early detection and subsequent care proved effective in the case in question but the possibility of a recurrence has been a constant, but fortunately unfounded, concern. One of the learning points to be aware of is that an illness to a patient can also affect their family and friends:

> *"People often forget how this affects the rest of the family. My husband was in worse state then me. I had 3 children - my daughter who was 24 then, my eldest son 23 and my youngest son was 13. I remember thinking that I had to get better for the younger one but really I had to get better for them all. I was quite open with my family and all my friends and work colleagues. It made it better for them as we were all able to talk about it and it helped me."*

Another patient shares their experience of living with cervical osteoarthritis (spondylitis). This is difficult enough but the patient also has to cope with other medical conditions. The outcome is that the care involves taking 20 different tablets every day, using fentanyl patches, two asthma inhalers, an antihistamine and 'top up' pain relief. This is quite a task

> *"Because a patient does not keep returning to the surgery does not mean they feel better. It may be due to depression caused by feeling worse."*

> *"Because osteoarthritis is a part of growing older it does not mean that the person with it just requires pain relief and nothing* else."

Medicines optimisation is about ensuring that maximum value is derived from medicines at the individual patient level. The patient perspectives provide an insight into how individual health issues and circumstances can vary. Taking account of these is clearly important if medicines use is to to be fully optimised.

HYPERLINKS

References and other resource material as appropriate can be accessed directly via hyperlinks in the Journal.

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Critical Appraisal - a tool to make sense of research papers

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Abstract

Title
Critical Appraisal - a tool to make sense of research papers

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Summary
In spite of the specialisms now common among clinical pharmacists, it is increasingly difficult to stay up to date with published work. This requires us to read smartly and to carefully choose what we read. Our interaction with patients and the medical round will raise questions which need to be converted into clinically relevant, answerable questions to inform our searching. Papers identified then need to be appraised to assure us of their validity or not and to extract useful results which can then be applied in practice.

This paper covers some of the knowledge required in the appraisal process but also points to useful tools that are available to pharmacists to promote the skilful evaluation of potentially relevant clinical papers in day-to-day practice. In particular, appraisal tools for systematic reviews and randomised controlled trials are presented in full.

Keywords: evidence-based medicine, formulary, GRADE, medicines management, systematic review.

Background

Pharmacists play an important role in medicines management and are called upon to make key decisions affecting the care of patients. As practitioners, we have a duty to stay up to date and to practice using current best evidence. Both aspects present challenges for busy professionals. I remember talking to a professor of medicine. He would state that, for him to stay up to date with his particular medical speciality, he needed to read around 20-25 papers every day of the year. He recognised that this was impossible and we know from other research that the amount of reading professionals undertake tends to fall off as they go through their careers. He used the challenge to suggest that we focus on systematic reviews and randomised trials to inform practice as these are likely to be the most reliable papers.

The trend towards specialisation in clinical pharmacy makes good sense in the light of the volume of literature we have to deal with. The major bibliographic databases list over 20 million papers and they only cover a proportion of the world's medical literature. Material relevant to pharmacy practice is often hidden in less well-known databases such as International Pharmaceutical Abstracts (IPA) and the Cumulative Index to Nursing and Allied Health Literature (CINAHL).

Some time ago I happened to be travelling to an event with a consultant liver specialist. We got to chatting about keeping up to date. I asked if he knew all the key literature on hepatitis. He responded by stating that he was confident he knew the key papers around hepatitis B but not hepatitis C. Even a specialist consultant understood that he not could keep up to date with all the literature on liver disease.

Muir Gray, in his book on Evidence-Based Health Care and Public Health,[1] postulates that around a half of medical interventions do more good than harm, around a fifth probably do more harm than good and for the rest we don't really know. If true, that is worrying, though I suspect many of us hold beliefs based on what we were taught that have little in the way of underpinning evidence.

We live in a world that often seeks to define quality in terms of personal experience and feedback. Many retail websites and booking sites rely on customers to provide feedback on purchases and bookings as a guide to (hopefully) encourage

others to purchase. However, many do not take a similar approach to the research that underpins the choices and decisions they make in day-to-day practice. Many either believe what is stated by others or maybe assume the abstract is a good summary of the findings. Both approaches can be misleading. On the other hand, many pharmacists have expressed concerns about tackling what they see as complex papers and see critical appraisal as a specialist technique. Common objections include a sense of it being too time consuming, too difficult, needing expert knowledge or requiring expertise in medical statistics. In reality, critical appraisal can be a mechanism to get us to examine papers in a greater depth and come out with some firm conclusions. In practice, it is not as difficult as we might fear.

Quoting Sackett,[2] Muir argues the need to:

- convert the need for information into clinically relevant, answerable questions (see section on Patient Intervention Comparison Outcome (PICO) below)
- find, in the most efficient way, the best evidence with which to answer these questions (whether this evidence comes from clinical examination, laboratory tests, published research, or other sources)
- critically appraise the evidence for its validity (closeness to the truth) and usefulness (clinical applicability)
- integrate the appraisal with clinical expertise and apply the results to clinical practice
- evaluate your performance.

The development of evidence-based practice over the past 25 years or so have provided us with some useful tools to help us focus on what is reliable and how to interpret what we find. Also, concerns about the quality of published reports have stimulated a raft of reporting guidelines, which journal editors are encouraged to impose. They all seem to have unusual acronyms such as CONSORT, PRISMA, RAMASES and CHEERS!

Hierarchy of evidence

A number of hierarchies of evidence now exist, all of which have merit but demonstrate minor variations. An organisation called GRADE (Grading of Recommendations Assessment, Development and Evaluation) has grown up to inform thinking. One of the most useful hierarchies was from the Scottish Intercollegiate Guideline Network (SIGN),[3] as outlined in Table 1.

Ideally, we should look for the highest level of evidence that can be found. For major decisions such as additions to formularies, type 1 or type 2 evidence is important. However, for rare conditions, there may only be level 3 or 4. That is fine providing the elements of possible bias are understood. I was recently asked for evidence in managing treatment resistant Lennox-Gastaut syndrome, which is a rare condition in children. The few citations on Medline may give a steer on how to approach treatment but would not be classified as type 1 or 2 evidence.

The key point about levels of hierarchy is to identify the study designs that display the least bias. Bias is a common problem and it seems that all forms of bias in medical research make things look better that they really are. The Cochrane Collaboration has invested effort into examining these biases and this is incorporated into every Cochrane review. The following issues are commonly covered (from Moore et al[4]):

Random sequence generation (checking for possible selection bias)

Method used to generate the allocation sequence is assessed as: low risk of bias (any truly random process such as random number table or computer random number generator); unclear risk of bias (method used to generate sequence not clearly stated). Studies using a non-random process (so called quasi randomisation) are excluded (odd or even date of birth; hospital or clinic record number). We know that studies which are not randomised considerably overestimate treatment effects.

1++	High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1+	Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias
1-	Meta-analyses, systematic reviews, or RCTs with a high risk of bias
2++	High quality systematic reviews of case control or cohort or studies High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2+	Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2-	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Non-analytic studies e.g. case reports, case series
4	Expert opinion

Table 1: SIGN hierarchy of evidence

Allocation concealment (checking for possible selection bias)

The method used to conceal allocation to interventions prior to assignment determines whether intervention allocation could have been foreseen in advance of, or during recruitment, or changed after assignment. Methods used to assess are as follows: low risk of bias (telephone or central randomisation; consecutively numbered sealed opaque envelopes); unclear risk of bias (method not clearly stated).

Blinding (checking for possible detection bias)

Method used to blind study participants and outcome assessors from knowledge of which intervention a participant received are assessed as: low risk of bias (study stated that it was blinded and described the method used to achieve blinding e.g. identical tablets; matched in appearance and smell); unclear risk of bias (study stated that it was blinded but did not provide an adequate description of how it was achieved). Again, research shows that studies which are not blinded overestimate treatment effects.

Incomplete outcome data (checking for possible attrition bias due to the amount, nature, and handling of incomplete outcome data)

Methods used to deal with incomplete data are assessed as: low risk (less than 10% of participants did not complete the study or used 'baseline observation carried forward' (BOCF) analysis, or both); unclear risk of bias (used 'last observation carried forward' (LOCF) analysis); high risk of bias (used 'completer' analysis). BOCF goes back to the level at the start of a study and is a more conservative approach. LOCF (common in registration studies) uses the last report by the patient even if they could not tolerate the treatments).

Sample size (checking for possible biases confounded by small sample size)

Small studies have been shown to overestimate treatment effects, probably because the conduct of small studies is more likely to be less rigorous, allowing critical criteria to be compromised. Studies were considered to be at low risk of bias if they had 200 participants or more, at unclear risk if they had 50 to 200 participants, and at high risk if they had fewer than 50 participants. These numbers are somewhat arbitrary and may be too small. This is the subject of on-going work. The concept of size as a bias is not accepted by all statisticians.

Working up a Patient Intervention Comparison Outcome (PICO)

Sackett reminded us of the need to generate questions into a clinically relevant, answerable form.[2] Developing a PICO is a great way to do this. The acronym stands for:

P : patients or problem

I : intervention

C : comparison - if relevant

O : outcomes.

Taking a clinical question such as 'is pregabalin effective in neuropathic pain?', the PICO may look like this:

P : Adults with neuropathic pain of at least three months duration who report their pain as moderate or worse.

I : Pregabalin given orally in any dose for any duration of time.

C : Other treatments for neuropathic pain or possibly placebo.

O : Patient reported pain relief using validated scales for either pain intensity or pain relief recorded over time. Adverse effects would also be part of the outcome assessment.

There are a few variations to PICO. Some add 'S' for 'studies' to define the study type being sought. In the example above, randomised controlled trials would be a good study type. Others add 'T' for 'time' so, again using the example above, it would be sensible to assess the effect of pregabalin over at least twelve weeks as this is a chronic condition. The other advantage of a PICO is that it greatly facilitates any searching that you want to carry out to find evidence.

Handling results

Meta-analysis is an optional part of a systematic review and is usually displayed as a forest plot. The power of a meta-analysis is in the increase of the sample size and a number of individual RCTs that are not statistically significant singly can provide a robust significant result.

The forest plot in Figure 1 shows the comparison of diclofenac potassium (fast acting) versus placebo to provide at least 50% pain relief at 6 hours.[4] While the confidence intervals on the individual studies are quite wide (due to size) the summary statistics (diamonds) have much narrower confidence intervals.

Turning statistics into meaningful numbers

Statistics seem to have the ability to turn the legs of some pharmacists to jelly! It is important to get to grips with some of the simpler concepts as these will help in interpretation. Generally, odds ratios are difficult to interpret so many results are presented as relative risk (also called relative benefit). These are somewhat easier to understand, though are frequently misused (especially by the BBC!). Results presented as relative risks can be easily converted to number need to treat (NNTs) which are much more widely understood. A good explanation of these terms can be found in 'Bandolier'.[6]

Using critical appraisal tools

- **10 questions to make sense of a review**
  The temptation on finding a paper of interest is to read it right through. A 'ten question' approach of critical appraisal tools takes the focus on to the key elements of a paper. For example, while the background might be interesting it is unlikely to inform decision making. The important aspects will be in the methods section (occasionally, the abstract may be sufficient) and in the results. The critical appraisal tools all use a similar

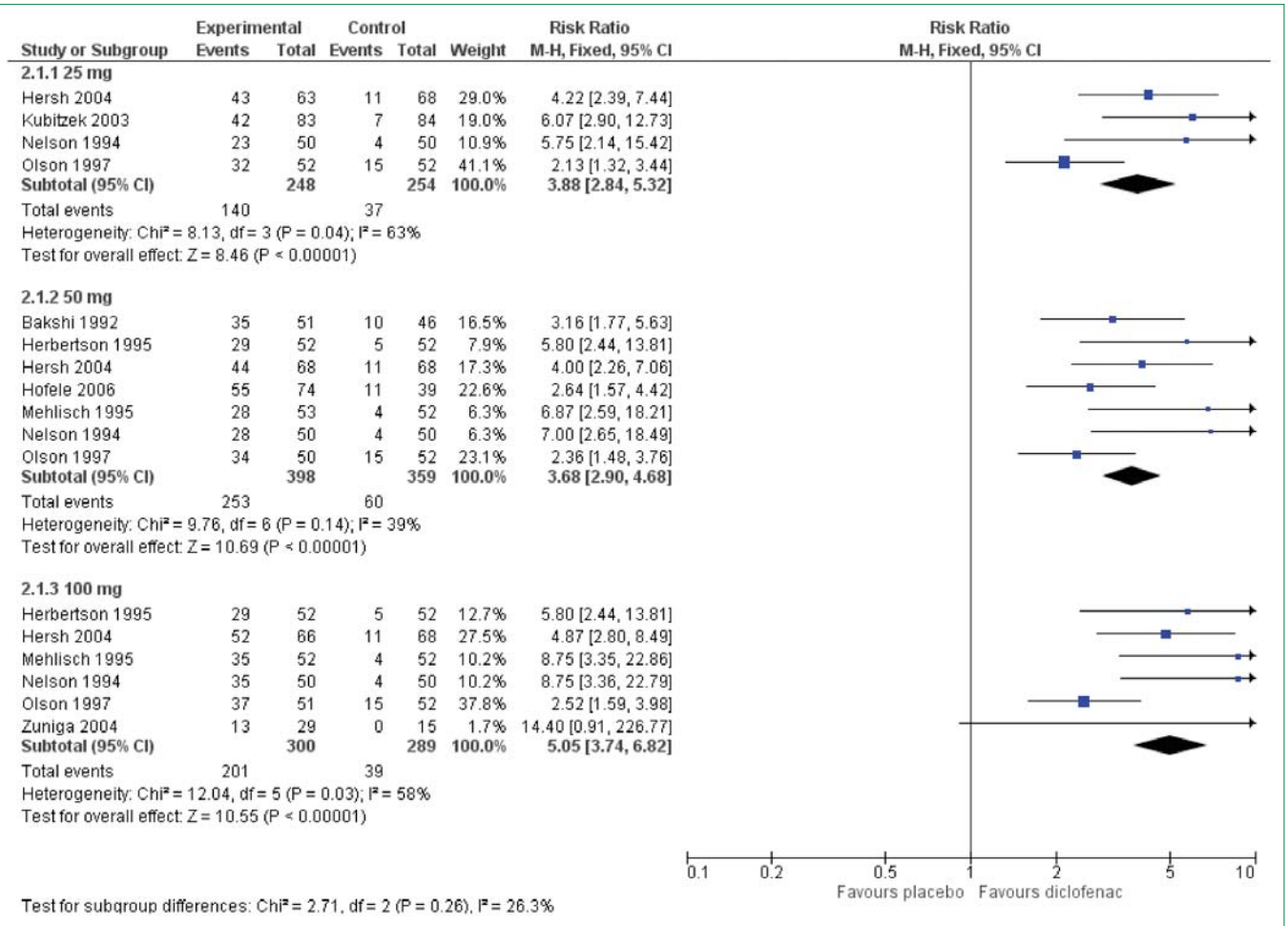

Figure 1: Forest plot for diclofenac potassium versus placebo

For each question answer 'Yes', 'Can't tell' or 'No'.

A. Are the results of the review valid?

1. Did the review address a clearly focused question?
   e.g. the population, intervention and or outcomes
2. Did the authors look for the appropriate sort of papers?
   Did they deal with the issues and have appropriate study design?

Is it worth continuing?

3. Do you think the important relevant studies were included?
   Look for search methods, reference list use, unpublished studies and non-English language
4. Did the authors do enough to assess the quality of included studies?
5. If the results of studies have been combined, was it reasonable to do so?

B. What are the results?

6. What is the overall result of the review?
   Is there a clear numerical expression?
7. How precise are the results?
   Are confidence intervals provided and are they reasonable?

C. Can I use the results?

8. Are the results likely to be useful in practice?
9. Were all the important outcomes considered?
10. Are the benefits worth the harms and costs?

Table 2: 10 questions to make sense of a review (adapted from CASP Systematic Review Checklist)

approach. The first point is to ensure that research methods reported are appropriate. If they are not, there is no point in wasting time on the paper - best to move on to something useful. Assuming that the methods are fine, then the appraisal tool asks key questions about the results. The final section is around deciding if the results have a local application in practice. Obviously this requires a value judgement and a balancing of the positive effects and adverse effects of any intervention. Cost may have a role but pharmacists need to think wider than the acquisition cost of a particular therapy. For example, the cost of antibiotic prophylaxis for elderly catheterised patients should also consider the morbidity, mortality and cost of a serious urinary tract infection. For the novice user the tool is likely to take around 30 minutes to complete but in that time a useful overview of the paper will be achieved. With use, that time commonly falls to around 10-15 minutes.

The ten questions to help you make sense of a review have been adapted for Table 2 but can be found in full on the Critical Appraisal Skills Programme (CASP) website.[8]

- **11 questions to make sense of a randomised controlled trial**
  Eleven questions to help you make sense of a randomised controlled trial have been adapted for Table 3 but can be found in full on the on the Critical Appraisal Skills Programme (CASP) website.[9]

Conclusion

This paper has set out to describe some of the key elements needed by pharmacists to evaluate papers that may be relevant to their practice. Issues such as the reputation of the publishing journal have not been discussed as these are largely irrelevant. All journals publish good and bad material. The tools outlined are designed to help us reject the bad ones and make good use of the good ones.

Critical appraisal is a skill owned by many physicians and nurses but is not widely used by pharmacists. Such skills should be a part of every clinical pharmacist toolkit and not confined to medicine information services.

For each question answer: YES, NO or DON'T KNOW

A. Are the results of the trial valid?

1. Did the trial address a clearly focused question?
   e.g. the population, intervention and or outcomes (PICO)
2. Was the assignment of participants to treatments randomised?
   How was this carried out? Was the allocation concealed from investigators?

Is it worth continuing?

3. Were participants, health workers and study personnel blinded?
   Was blinding possible but not done. Were outcome assessors blinded?
4. Were groups similar at the start of the trial?
   Think about age, gender, also severity of illness
5. Apart from the experimental intervention, were groups treated equally?
6. Were all of the participants who entered the trial properly accounted for at its conclusion?
   Was the trail stopped early? Are withdrawals fully described?

B. What are the results?

7. How large was the treatment effect?
   What outcomes were measured? Is the primary outcome clearly specified and reported in results? Were results reported for every outcome even if not significant? Is there evidence of selective reporting?
8. How precise was the estimate of the treatment effect?
   Are confidence intervals provided and are they reasonable? Were results statistically significant? Were the results clinically significant?

C. Can I use the results?

9. Are the results likely to be useful in your practice?
   Are the people you treat similar to those in the trial?
10. Were all the important outcomes considered?
    Is there information which you would have liked to have seen?
11. Are the benefits worth the harms and costs?
    Important even if not addressed by in the trial report

Table 3: 11 questions to make sense of a randomised controlled trial (adapted from CASP Randomised Controlled Trial Checklist)

Declaration of interests

The author reports personal fees from Pharman Ltd during the writing of this paper.

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Abstract

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Summary
Medicines are the most common medical interventions within our population and, at any one time, 70% of the population is taking prescribed and over-the-counter medicines to treat or prevent ill-health In simple financial terms, expenditure on medicines in Health and Social Care (HSC) in Northern Ireland is of the order of £550 million per annum. In addition, there is significant sub-optimal use of medicines resulting in sub-standard patient care and waste of healthcare resources. In order to address these issues a new approach is needed that moves the emphasis away from a system and service focus to a patient-focused medicines optimisation (MO) methodology. To this end the Department of Health launched its policy document the Medicines Optimisation Quality Framework (MOQF).

The MOQF has three strands; namely a regional MO model, quality standards, and a regional innovation plan. A key component of the policy was the establishment of a regional Medicines Optimisation Innovation Centre (MOIC). The MOIC will provide a focus for delivering a systematic approach to finding and testing solutions for the HSC in Northern Ireland.

In order to achieve its key aim of 'smarter medicines, better outcomes' the MOIC utilises the 'quadruple helix' approach as identified in the European Innovation Partnership on Active and Healthy Ageing, namely involvement of civil society, academia, healthcare and industry. This approach enables comprehensive inclusive solutions to be developed that meet the needs of the population but with robust academic input as well as industry in the broadest sense in this regard.

Keywords: quality framework, academic practice unit, quadruple helix, European

Medicines Management in Northern Ireland (2000-2014)

Medicines are the most common medical interventions within our population and, at any one time, 70% of the population is taking prescribed and over-the-counter medicines to treat or prevent ill-health. In simple financial terms expenditure on medicines in Health and Social Care (HSC) in Northern Ireland is of the order of £550 million per annum. In comparison with other UK countries the volume and cost of medicines prescribed per head of population in Northern Ireland in primary care is much higher and, with both an ageing population and a rising number of people with long term conditions, demand will only increase.

In 2000, the high prescribing costs, particularly in primary care, were highlighted in the Comprehensive Spending Review. In response, the Department of Health, Social Services and Public Safety (DHSSPS) established a Pharmaceutical Services Improvement Plan (PSIP) which, for the first time, considered a whole system approach encompassing both primary and secondary care. The work utilised the Audit Commission's definition of medicines management, namely 'encompassing the entire way that medicines are selected, procured, delivered, prescribed, administered and reviewed, to optimise the contribution that medicines make to producing informed and desired outcomes of patient care',[1] to scope the requirement.

This approach, which was initiated in 2000, evolved and was enhanced, developing into the subsequent Pharmaceutical Clinical Effectiveness (PCE) programmes up to the present time. Further, the DHSSPS also initiated an Innovation and Medicines Management Programme based on an 'invest to save' ethos which still continues today.

As a result of work carried out under these schemes, Northern Ireland was formally identified as a reference site with the European Innovation Partnership for Active and Healthy Ageing (EIPAHA). The region was awarded '3 star' status in April 2013 for the level of innovation, scalability and outcomes demonstrated in medicines management. This recognised Northern Ireland as one of the leading regions in Europe in addressing the health and social care needs of the older population through innovation in medicines management. Building upon this recognition, Northern Ireland was one of the seven regions in Europe to be awarded '4 star' status in 2016.

Need for change – the DHSSPS Medicines Optimisation Quality Framework

A significant degree of improvement has been achieved in modifying and developing systems and services to attain the aim of safe and effective use of medicines. However, there is still a considerable degree of sub-optimal medicines use with patients failing to gain the expected benefits for their health and with services coming under increasing presence as care needs escalate their treatment (Table 1).

In order to address these issues a new approach is needed that moves the emphasis away from a system and service focus to a patient-focused medicines optimisation (MO) methodology.

MO has been defined by the National Institute for Health and Care Excellence (NICE) as 'a person centred approach to safe and effective medicines use to ensure that people obtain the best possible outcomes from their medicines'.[2] This resonates with the four principles of MO developed by the Royal Pharmaceutical Society (RPS) in 2013, namely:

1. Aim to understand the patient's experience.
2. Evidence-based choice of medicines.
3. Ensure medicines use is as safe as possible.
4. Make MO part of routine practice.[3]

However, to deliver sustainable and measurable improvements at a regional level, a strategic approach is necessary and the DHSSPS Medicines Optimisation Quality Framework has been developed to provide the necessary arrangements to support this aim.[4] The framework is illustrated diagrammatically in Figure 1.

The Framework is a 'living document' that can be modified and adapted as innovation, service enhancement and improvement occurs. The whole system approach with key components is shown in Figure 2.

The framework has three key standards:

1) A regional Medicines Optimisation Model.
2) Quality Standards.
3) A Regional Innovation Plan.

In terms of innovation, there will be a strategic approach as follows:

- Prioritised work plan for MO
- Regional Centre for Innovation
- Network supporting collaboration and knowledge transfer.

Medicine Optimisation and Innovation Centre (MOIC)

A key element of the regional action plan will involve projects that seek new solutions to address gaps in best practices for the quality standards, which are developed and tested with the HSC prior to commissioning for scale-up and implementation regionally. In this regard, for example, work has been undertaken in both the nursing/residential home and intermediate care settings in terms of models of care that deliver MO and, based on successful outcomes, these are being rolled out regionally. One of the areas of work currently being tested is post-discharge follow-up based on a successful small pilot. These projects will be undertaken in collaboration with the newly established MOIC. The overall aim of the MOIC is to work towards better patient outcomes by initiating, developing and sharing best practice with regards to medicines use and is, in essence, a 'test bed' for Northern Ireland. This will be achieved by using a combination of research, innovation, quality improvement and knowledge transfer.

The MOIC will provide a focus for delivering a systematic approach to finding and testing solutions for the HSC in Northern Ireland and further afield by undertaking the following functions:

- Project manage an innovative programme of research and service development projects.
- Develop, test and evaluate solutions to pre-commissioning stage.
- Support successful translation into HSC service delivery and commissioning.
- Assist projects to access and utilise available funding streams.
- Provide a regional centre of expertise for research and service development in MO and post-implementation review of service delivery.
- Build local expertise and competence in developing and transferring research into practice.
- Facilitate a continuous cycle of improvement within the HSC in the area of medicines optimisation.

The MOIC also has wider benefits combining pharmaceutical and research and development (R&D) skills with technology and business acumen to:

- provide evidence-based solutions for medicines

- Ten days after starting a new medicine, 61% of patients feel they are lacking information and only 16% of patients who are prescribed a new medicine are taking it as prescribed experiencing no problems and receiving as much information as they believe they need.
- One in 15 hospital admissions are medication related, with two-thirds of these being preventable.
- One in 20 prescriptions in General Practice contains an error, with a higher prevalence associated with prescriptions for the elderly and those taking 10 or more medications.
- Prescribing errors in hospital in-patients affect 7% of medication orders, 2% of patient days and 50% of hospital admissions.
- An estimated £18m of medicines are wasted annually in Northern Ireland.

Table 1: Example of sub-optimal medicines use

Figure 1: The Quality Framework

optimisation which could be developed commercially, marketed, and sold to other countries with HSC as a beneficiary

- attract inward investment into a Northern Ireland Medicines Optimisation Innovation Fund/Programme
- increase collaborative work with other established networks in UK, Europe and internationally.

Medicine Optimisation Network

The work of the MOIC will lead to the development of a medicines optimisation network linking the HSC with other health and life science networks and innovation centres in Northern Ireland, UK and internationally. It will also support knowledge-sharing within the HSC and with wider networks and the development of collaborative working partnerships and joint working arrangements between partnerships that may include:

- community organisations
- policy (DHSSPS)
- patients and their representative bodies
- Independent Contractors (GPs, Community Pharmacists and domiciliary care providers)
- independent domiciliary care providers
- academia (including post graduate education providers)

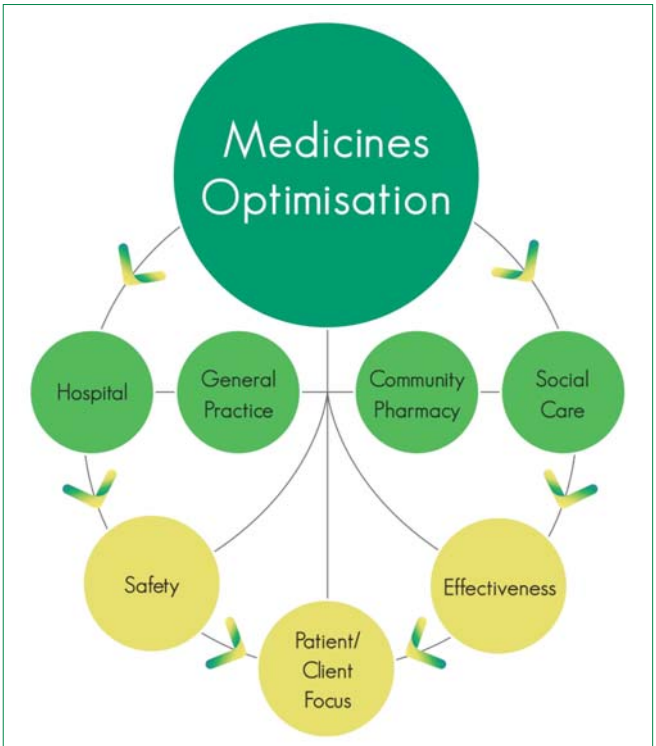

Figure 2: The Northern Ireland Medicines Optimisation Model

- pharmaceutical and technology industries
- voluntary sector and charities
- experts with research skills including other innovation centres and translational research groups.

MOIC Launch

The MOIC has been established and is based at Antrim Area Hospital site in the Northern Health and Social Care Trust. It was officially launched on 15th October 2015.

The work of the MOIC will build upon a significant track record of research and service development undertaken by the Academic Hospital Clinical Pharmacy Practice Unit, which was established between the Northern Health and Social Care Trust and the School of Pharmacy at The Queen's University of Belfast in 1994. The Academic Practice Unit (APU) was based at the Antrim Area Hospital and focused on the areas of medicines management and healthcare acquired infection. Staff at the APU have worked with a wider range of collaborators, including commercial partners. A range of outputs have been achieved, including over 60 published papers, 13 PhD students supervised and in excess of 50 MSc and diplomas completed.

A key area of work has been the development of a number of enabling technologies for use in the clinical setting. These include an electronic solution for medicines reconciliation, a programme for antimicrobial surveillance and a novel tool to aid the procurement of medicines and medical devices.

The value of the historical work undertaken in the APU can be seen in the publications with regard to initially medicines management and, subsequently, MO. This is now enabling solutions to other gaps in the process to be evaluated. Exemplar publications include those on Integrated Medicines Management,[5,6] health care acquired infection[7] and new models of care for the elderly.[8,9]

The establishment of MOIC gives an even greater impetus to the work commenced by the APU. Research and service development will continue to focus on improving patient outcomes. Since the launch of the centre in October 2015, there has been an increase in the number of collaborations formed in the UK and Europe. This has included development of further relationships with both the pharmaceutical industry and technology companies. This has consequently enabled and enhanced the capability to apply for funding bids and has led to the submission of a number of applications to EU funding programmes.

Knowledge translation both within and outside of Northern Ireland is another key aim for the MOIC. A hosting programme that facilitates knowledge transfer with regards to medicines optimisation has been developed. The MOIC team currently welcomes visitors from a number of countries. The visitors, who range in their level of experience in pharmacy/medicines optimisation, visit for periods of between 1 day and 5 months depending on their particular needs. In addition, a new bespoke programme was put in place in 2016 for visitors from Egypt and another is being developed for Jordan for this year. The programmes are undertaken in conjunction with Ulster University and Queen's University Belfast respectively.

Conclusion

The MOIC has been established to identify gaps and improve patient care in relation to optimising medicines use. The MOIC utilises the 'quadruple helix' approach as identified in the European Innovation Partnership on Active and Healthy Ageing,[10] namely involvement of civil society, academia, healthcare and industry. This approach enables comprehensive inclusive solutions to be developed that meet the needs of the population but with robust academic input as well as industry in the broadest sense in this regard.

Declaration of interests

The authors have nothing to disclose.

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Patient Perspectives

The process of medicines optimisation places patients at the heart of the process. It seems only right, then, to seek the views of patients about their experiences with medicines, their medical condition in general and their contacts with health professionals. Understanding what it is really like for a patient to live with a particular clinical condition will hopefully assist healthcare professionals to become more effective with their interactions and communications with patients and improve the healthcare services provided.

This has been done by providing patients identified through healthcare contacts with a template of questions to be completed anonymously by the patient on the basis that no individual be named or identifiable from the content. What some people have to cope with and the way they do it will amaze you.

Cervical Osteoarthritis (Spondylosis)

Abstract

Title
Patient Perspective: Cervical Osteoarthritis (Spondylosis)

Summary
A patient's experience of living with Cervical Osteoarthritis (Spondylosis) is outlined. The way contacts with healthcare professionals could have been better are described. The medicines that are being taken, the elements of service provision that have been found to be most helpful and the steps needed to improve the ongoing management of the condition are identified. Key messages for healthcare professionals that have arisen from the patient experience are indicated.

Keywords: medical condition, medicines, locked up.

About your medical condition

What is the medical condition most important to you that is being presented here?

Cervical Osteoarthritis (Spondylosis) is my main medical condition.

Can you please explain the problems you experience with the medical condition?

- Muscle spasms in my legs.
- Problems moving my arms and legs.
- 'Locking up' so that it is difficult to move at all.
- The feeling throughout my body from the bottom lip down has progressively gone.
- I have been having operations on my right leg to shorten my tendons - four operations to date. I was told recently that they cannot do anything more for it. The same problem is appearing on the left leg but the surgeons are a little frightened to operate again.
- I am now losing height, having lost over 2 inches in the last 2 years.

Can you please say how the medical condition was first diagnosed?

It was diagnosed in 1996 after I broke both my wrists following a fall when I put both my arms out to save myself only to find that they were under me when I landed and had both broken. My local hospital was unable to find a way to straighten them so I was in plaster from under my arms to my fingers for three months.

When I eventually decided to go privately to an orthopaedic surgeon I had both wrists plated and pinned straight. It was then that the surgeon suggested that I go and have a MRI scan and see a neurologist. He told me I had some osteoarthritis in my spine. The only suggestion to help this was to change my

pillows so that I could rest my neck at a right angle to the bed.

In falls before and since, I have also broken my knee cap, an ankle and a finger.

Can you please say when the medical condition was first diagnosed?

In 2006, while travelling for my employer, I was in a traffic collision. This led to my complaining about my neck, arms and legs. When I went to see a specialist neurologist in 2008, I was told that I had the spine of an 80 year old, although I was only 40 years old. I would complain of pain down my spine, which led to my 'locking up' so that it was difficult to move at all and problems moving my arms and legs.

During the years that have past I have been diagnosed with muscle spasms in my legs causing me to have trial medications to help my problems. I have had Botox in the calf muscles of one leg and an anaesthetic injection in the other leg, which shows no improvement.

If you look back, what would you have liked to have been different in terms of contact with health professionals, etc?

Looking back over the years I have had the spondylosis I wish I could have been diagnosed quicker and perhaps this would not have led to my having been taken to hospitals where they thought I had been suffering TIAs down my left side and cramping sensations in my arms and legs causing such pain.

About your medicines

Please list the medicines you taking for your medical condition.

Before the car accident I simply took 1 x 2.5mg Ramipril tablet for my blood pressure.

Since the car accident in 2006 I now take up to 20 tablets a day (3 antibiotics and 6 steroid tablets when required for my asthma as well as the 11 tablets for things like blood thinners, muscle relaxants, blood pressure, ramipril 1 x 5mg, reflux medication, anti-depressant, quinine tablet and sleeping tablets).

These, together with fentanyl patches 25mg and 12mg over three days which, on occasions, has been increased to 50mg over 3 days and two asthma inhalers.

I also need to take very high doses of antihistamine to stop irritation caused by the patches.

I also use Oromorph on a regular basis to top up the pain relief.

Have you had any particularly bad experiences with regard to your medication? If so, explain and indicate how this could have been avoided in the future.

My GP has prescribed anti-inflammatory tablets for me but they had the effect of making my stomach bleed. When an injection of anti-inflammatory was tried I had an anaphylactic shock, which required me to be ambulanced to the local Accident and Emergency department where I drained the local hospital of adrenaline. I believe that if I had been allergic to the tablets then maybe the injection should not have been tried.

Have you any good experiences of your medications? If so, please explain.

Trying different tablets to be used on a regular basis throughout the day, and sometimes being on up to 20 tablets per day, led to me constantly have to get them from the pharmacy. Changing to the fentanyl patches cut down my intake of tablets and meant that I could just attach them and forget about them for 3 days at a time, which improved my life.

About the services you received

To what extent have health professionals you have come into contact with appreciated what it was like from your position as a patient.

I am pleased that my GP is not beyond trying different medications and has tried his best to understand my condition, reading up about it so that he could help me to understand what can and cannot be done for it. I have found losing my job stressful and have been given an antidepressant and, because of the possibility of TIAs, I am on a blood thinner.

To what extent did the health professionals you came into contact with communicate effectively

I am sorry to say that the best diagnosis I have received has been when I have paid to go to local and a national specialist hospitals. My neurologist at the private specialist hospital explained to me how surgery advances had made it possible to replace almost all of the joints in the human body except the spine and as such, apart from pain relief, nothing further could be done for my osteoarthritis.

What have been the best experiences you have had with the services you have received.

I have a surgery of mostly very helpful GPs who have found very helpful consultants who have tried different treatments on me to improve the 'side effects' of my osteoarthritis, such as my calf muscles being in constant spasm. They have tried anaesthetic injections and Botox injections to release the spasms in the calf muscles.

I have been to a number of physiotherapists but this has not resulted in very much change in symptoms. My GP also sent me to a physiotherapist-led light exercise class twice a week for six weeks but I found that I 'locked up'. I did carry on to try the local gym but had to make sure that a member of my family came with me and the staff knew what to do in my 'locked up' state to release me.

About other medical conditions

Do you have any other medical conditions that make life problematic for you? If so, please list them and explain the main problems you experience with each one:

Dystonia: severe pain in joints and 'locking up'.

Asthma: I have spent time in hospital due to this.

Possible TIAs: face, arm and leg on left side drooping and speaking difficult. Can last between 2 minutes and 6 weeks.

Depression: since losing my employment due to the car accident in 2006.

About going forward

What would you like to happen at this stage that would make living with your condition easier for you?

I wish I could have found a nurse who deals with osteoarthritis in my area. There seems to be a lot of help for those suffering with rheumatoid arthritis but no one specialising in osteoarthritis. It seems that as osteoarthritis is a condition of the elderly but no one wants to know about it from a patient perspective. Those with the condition are of an age that they do not explain about how they feel.

I use a stick although I have at times used double crutches, a zimmer frame and an electronic wheelchair. I do try to do without help I have but I have 'flare ups'. I did not know about the possibility of 'flare ups' and have liked these to have been explained to me by my doctors.

If you could give a brief message to healthcare professionals, what would it be?

If I had asked medical professionals about my condition when I was first diagnosed I would have known what to expect and what could happen as the condition progresses but then the depression I suffer might have been far worse. So, I guess it is a little like life - if you knew what was in the future you would not want to live it but perhaps you would try to avoid doing things that might make it worse, such as not eating properly when a child.

Please add any other comments or observations that would be helpful to health professionals who are responsible for providing services for you.

I have been on my way to visit my GP but 'locked up' on my way into the surgery. Due to time constraints for GPs, who only get 10 minutes at most to see people, I had to be placed in a room to wait for my son to come and 'release' my neck. This involves putting one hand under my chin and the other at the back of my head and gently pulling as in traction until movement comes back. This may not seem scientifically correct but seems to work.

Unfortunately, since my accident my feeling throughout my body from the bottom lip down has progressively gone. Meaning that I have been able to have a bottom tooth filled without anaesthetic, and neurologists have tried with pins to find the sensations.

I would have liked my health professionals to know more about my condition and been able to help me more as I deteriorated. Knowing that I may 'lock up' and how to 'release' me would be good as would knowing why my feeling sensation has gone and if it will ever return.

What are the three most important things that health professionals should learn from your experiences?

- Because a patient does not keep returning to the surgery does not mean they feel better. It may be due to depression caused by feeling worse.
- Because osteoarthritis is a part of growing older it does not mean that the person with it just requires pain relief and nothing else.
- A named GP should be assigned to those people with a long term health condition. It should be this GP who sees them regularly.

Declaration of interests

You will have been offered a fee for your contribution to be submitted within a specific timescale. In the spirit of being open and transparent, would you please disclose any other payments, interests or activities that could be perceived as influencing what you have written or state 'none'.

None. I shall be giving the fee split between four different local charities.

KEY LEARNING POINTS FOR HEALTH PROFESSIONALS AS IDENTIFIED AT THE EDITING/PEER REVIEW STAGES

- Early diagnosis is very important.
- Patients wish to learn more about their conditions, understand their symptoms and what to expect as their condition progresses. They look to healthcare professionals as a source of information so healthcare professionals need to be up-to-date to offer advice.
- Medicines can have a great impact (positive or negative) so getting the type, dose and use correct can affect someone's quality of life for the better against a backdrop of coping with a condition they can do little to improve.

Breast cancer

Abstract

Title
Breast Cancer

Summary
A patient's experience after a diagnosis of breast cancer) is outlined. The importance of contact with healthcare professionals, the medicines taken and an intention to stop anastrozole are described. The elements of service provision that have been found to be most helpful are summarised.

Keywords: medical condition, medicines, anastrozole, chemotherapy

About your medical condition

What is the medical condition most important to you that is being presented here?

My experience with breast cancer.

Can you please explain the problems you experience with this medical condition?

I now have a mammogram and chest x-ray every two years and CT and MRI scans when necessary. I know these are there to help me but they can cause anxiety whilst waiting for the results.

Can you please say how the medical condition was first diagnosed?

It was a Saturday in June 1997 when I was 50 years that I suddenly felt an uneven lump in my left breast. I momentarily panicked and phoned my daughter who had qualified as a doctor in 1996. She was reassuring and told me to go to my GP. Deep down I knew it wasn't right, as it was uneven.

I went to the doctor the following Monday. It was a locum doctor who didn't seem too concerned but, as I was in BUPA, I went to the hospital the following morning. I had a mammogram, which showed straight away that it was highly likely to be cancer. I also had an ultrasound scan and a biopsy. I can still remember saying to the consultant when he told me that he suspected breast cancer that I had planned to live to 80. He said 'you might well'. I'm 70 now so getting there. I felt frightened but just said, "What can you do?" I was told that I would have to have a mastectomy as I also had another small lump. He arranged for me to have a chest x-ray and bone scan to check that there had been no spread to other organs. I remember thinking, "Let's just hope these are okay", which they were.

The following week I went into hospital and had a left mastectomy and had eight lymph nodes removed. I didn't look forward to having a mastectomy but if it was to save my life I could cope with it. I thought there was no point in having my breast if I'm dead. My only hope was to hear that that there would be no spread to my lymph nodes. Going down to surgery was a bit unnerving but I just placed myself into the hands of the experts.

After my operation I was okay. Not any horrible pain. I've had other operations that have been more painful.

The worst part was waiting for the biopsy results. It took about five days. My consultant knew this. I remember sitting on the bed when he had them and saying, "Is there any spread to my glands?" He laughed and said "Hold on". He then told me that I had a high-risk tumour and several pre-cancerous tumours that a mammogram would not have picked up on. The good news was that I had no spread to my glands. His recommendation was that I had chemotherapy as he was thinking about me in 20 years time. Now it's nearly that I'm so glad that I had it.

If you look back, what would you say be the main things you would have liked to have been different in terms of contact with health professionals?

At first I felt a little abandoned, as I was not seeing my Oncologist on a weekly basis. I saw him and my surgeon every 3 months. I was prescribed tamoxifen as my cancer was oestrogen receptive. The problem is with cancer every ache and pain you are frightened that it's the cancer again. That has now gone other than very occasionally.

About your medicines

Please list the medicines you taking for your medical condition.

I took tamoxifen for 5 years and since then I've taken anastrozole. I also receive treatment for bone density.

What have your experiences with regard to your medicines been like?

The chemotherapy wasn't as bad as I had expected it to be. I was quite apprehensive at first but my Oncologist was reassuring. He always made sure that I had the correct drugs to help me. It might sound silly but losing my hair was upsetting but I had a fantastic wig. I had really good support from my Oncologist, surgeon and my GP. It was so good when my chemotherapy finished and I didn't have to have any more. That's when my life continued.

Just recently the anastrozole has started to affect my bone density. I've always had a bone density younger than my years. It has been a big decision but next June I'm going to stop taking it after 20 years of treatment. I do have a slight worry about coming off the anastrozole. Just hope my cancer doesn't come back. I have been told that is unlikely. I'm also receiving treatment for my bone density.

About the services you received

What have you found to be most helpful to you in terms of the services you have received?

I've been lucky. Early treatment, skilful surgeon, knowledgeable Oncologist, my hard working lovely GP and the support of my family. These things are all vital to anyone's recovery.

To what extent have the health professionals you have come in contact with appreciated what it was like from your position as a patient?

People often forget how this affects the rest of the family. My husband was in worse state then me. I had 3 children - my daughter who was 24 then, my eldest son 23 and my youngest son was 13. I remember thinking that I had to get better for the younger one but really I had to get better for them all. I was quite open with my family and all my friends and work colleagues. It made it better for them as we were all able to talk about it and it helped me.

To what extent was the information you were given about your medical condition sufficient for you?

Once I had got past the hurdle presented by the locum I was given good information which was clear and unambiguous setting out all the possibilities. This I found reassuring.

To what extent did the health professionals you came in contact with communicate effectively with you?

I received particularly good advice from the breast cancer nurse:

- Don't compare your treatment and diagnosis with those of other patients as there are many different types of breast cancer.
- Be prepared for some people's odd reactions to you - they probably feel uncomfortable and don't know what to say.

About going forward

If you could give a brief message to healthcare professionals, what would it be?

An excess of medical terminology can cause problems and misunderstanding by the patient who should never feel they are just a statistic.

Declaration of interests

You will have been offered a fee for your contribution to be submitted within a specific timescale. In the spirit of being open and transparent, would you please disclose any other payments, interests or activities that could be perceived as influencing what you have written or state 'none'.

None.

KEY LEARNING POINTS FOR HEALTH PROFESSIONALS IDENTIFIED AT THE EDITING/PEER REVIEW STAGES

- Patients need to be fully informed about their medication and any implications of changing it or stopping it.
- Patients who are not able to discuss their condition with a health professional on a regular basis can feel isolated - be aware and ready to fill that gap.
- It may not just be the patient who needs some support - that can also apply to family and friends.

WOULD YOU LIKE TO COMMENT ON CONTENT IN THIS EDITION OF THE JoMO?

CORRESPONDENCE

Constructive comment to further understanding and debate about a topic is encouraged and welcomed.

Guidance on submitting correspondence appears at the front of the journal.

Please submit your correspondence to the Correspondence Editor: (**correspondence@jmedopt.com**)

LINKEDIN

There is a JoMO LinkedIn Group. It is a closed group but everyone who requests the JoMO will be permitted to join. Readers are encouraged to comment upon and discuss items about medicines optimisation.

TWITTER

Readers are encouraged to follow Pharmacy Management on @pharman to use our dedicated Twitter hashtag (#jmedopt) to draw attention to and debate topical issues having to do with medicines optimisation.

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