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Methodological exemplar of integrating quantitative and qualitative evidence – supportive care for men with prostate cancer: what are the most important components?

Alyson L. Huntley, Anna J.L. King, Theresa H.M. Moore, Charlotte Paterson, Raj Persad, Debbie Sharp & Maggie Evans

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Abstract

Aims. To present a methodological exemplar of integrating findings from a quantitative and qualitative review on the same topic to provide insight into components of care that contribute to supportive care that is acceptable to men with prostate cancer.

Background. Men with prostate cancer are likely to live a long time with the disease, experience side effects from treatment and therefore have ongoing supportive care needs. Quantitative and qualitative reviews have been published but the findings have yet to be integrated.

Design. Integration of quantitative and qualitative synthesized evidence.

Review methods. Synthesized evidence on supportive care for men with prostate cancer was integrated from two previously published systematic reviews: a narrative quantitative review and a qualitative review with thematic synthesis. These two streams of synthesized evidence were synthesized using concurrent narrative summary. Data from both reviews were used to develop a set of propositions from which a summary of components of care that likely to contribute to supportive care acceptable to men with prostate cancer were identified.

Results. Nine propositions were developed which covered men’s supportive care focusing on the role of health professionals. These propositions were used to compose nine components of care likely to lead to supportive care that is acceptable to men with prostate cancer. Some of these components are no/low cost such as developing a more empathic personalized approach, but more specific approaches need further investigation in randomized controlled trials, for example, online support.

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Conclusion. This methodological exemplar demonstrates the integration of quantitative and qualitative synthesized data to determine components of care likely to lead to provision of supportive care acceptable to men with prostate cancer.

Keywords: health professional, methodology, mixed-method, nursing, prostate cancer, supportive care, systematic review

Background

Prostate cancer (PC) is the second most common cancer worldwide for men, with an estimated 900,000 new cases diagnosed annually (Ferlay et al. 2010). A large increase in incidence has been reported in recent years with much of this increase being attributed to increased prostate-specific antigen (PSA) testing (Hsing et al. 2000, Bray et al. 2010).

Men with PC are likely to have a long illness pathway with the greater part being supported by family, friends and family doctors. The National Cancer Institute defines the goal of supportive care for cancer patients as ‘to prevent or treat as early as possible the symptoms of a disease, side effects caused by treatment of a disease and psychological, social and spiritual problems related to a disease or its treatment’ (National Cancer Institute).

In a recent survey covering seven European countries and involving over 1000 men, 81% of the respondents had some unmet supportive care needs including psychological, sexual and health system and information needs (Cockle-Hearne et al. 2013).

We have recently completed a systematic review investigating the effectiveness of supportive care interventions for men with PC and a qualitative systematic review and thematic synthesis of men’s experiences of and needs for supportive care (King et al. 2015, Moore et al. 2015). In using these qualitative data in combination with the quantitative data, this paper reports the first mixed-method synthesis of supportive care evidence for men with PC.

The review

Aim

To present a methodological exemplar of integrating findings from a quantitative and qualitative review on the same
topic to provide insight into components of care that contribute to supportive care that is acceptable to men with prostate cancer by combining data.

Design

Two previous systematic reviews on supportive care for men with PC, one quantitative and one qualitative has enabled us to address the following objectives previously:

- To review the evidence for the effectiveness and cost effectiveness of supportive care interventions for men with PC.
- To review men’s experiences of supportive care for PC.

In this current paper, these two streams of evidence have been synthesized to answer objective c) (Figure 1):

- To identify the components of care likely to lead to supportive care acceptable to men with PC.

Source systematic review methodology

The two individual published systematic reviews describe the details of the methodology outlined below (King et al. 2015, Moore et al. 2015).

Eligibility criteria

These criteria are presented in supplementary Appendix S1.

Information sources and searches

Custom-designed parent search strategies which combined terms of PC, supportive care and study type were developed individually for the quantitative and qualitative review. All searches were from the inception of the database – July 2013. Details and dates of searches are in supplementary Appendix S2.

Study selection

All titles and abstracts from the searches were screened using the eligibility criteria and any studies selected were obtained in full. The reference lists of all the included studies were screened for additional relevant papers and key authors were contacted about any unpublished studies.

Data extraction

Data from quantitative studies were extracted on study details, participant characteristics, outcome measures and results. Data extracted from qualitative studies were study details, participant characteristics and primary (participants) and secondary (authors) order quotes (constructs).

Quality appraisal of included studies

Risk of bias of the quantitative studies was conducted using the Cochrane Collaboration’s risk of bias tool (Higgins et al. 2011). Qualitative papers were appraised using the CASP qualitative checklist which comprises 10 questions relating to rigour, credibility and relevance of qualitative studies (Critical Appraisal Skills Programme (CASP) 2014). All the screening, data extraction and quality assessment of both reviews were conducted independently by two reviewers, disagreements were resolved by consensus and where necessary recourse to a third reviewer.

Synthesis of results

Quantitative studies

While the plan was to perform a formal analysis, the clinical heterogeneity of the studies was too great for meta-analysis to be considered so a narrative synthesis was prepared.

Qualitative studies

A thematic synthesis of the evidence was conducted, taking an interpretive approach, which combines and adapts approaches from both meta-ethnography and grounded theory. A thematic synthesis was conducted using primary and secondary constructs (Thomas et al. 2004) where ‘descriptive themes’ were drawn out of the data followed by the development of ‘analytic themes’. A team of four researchers worked to identify and agree consensus on the naming of fourteen themes across the 20 papers. This process constituted the reciprocal translation of concepts across papers (Melendez-Torres et al. 2015). Following the identification of these ‘descriptive themes’, ‘analytic themes’ (overarching themes) were developed across papers.

Reporting tools

The conduct of the quantitative review followed PRISMA guidelines and the qualitative review followed ENTREQ guidelines (Moher et al. 2009, Tong et al. 2012).

Integration of quantitative and qualitative data

The robustness of the mixed-data systematic review methodology is still being examined and refined (Petticrew et al. 2013). However, there is agreement that complex
Aim of review
To provide insight into the components of care that influence supportive care experiences of men with prostate cancer.

Mapping and quality screening exercise
1. Comprehensive systematic searches identified citations
2. Retrieval, screening of studies from both intervention studies and qualitative studies

Consultation with key stakeholders
Focus of review was determined with consultation with an advisory group of clinical, patient and commissioning expertise

Intervention studies
RCTs & CCTs of supportive care interventions for men with prostate cancer

Qualitative studies
Studies examining the experiences of supportive care by men

In-depth review
Conducted within each study type

Intervention studies
1. Application of inclusion criteria
   Methodological quality of trials was assessed, & trial characteristics & outcome data extracted
2. Findings were presented both narratively and numerically although no formal meta-analysis was performed to answer the sub-question-What is the evidence for the effectiveness and cost-effectiveness of supportive care interventions for men with prostate cancer?

Qualitative studies
1. Application of inclusion criteria
2. Methodological quality of trials was assessed & trial characteristics & themes were determined
3. Findings were synthesised- to answer the sub-question- what are men with prostate cancer’s experiences of supportive care?

Synthesis by development of propositions
Summary of components of care likely to lead to supportive care acceptable to men with prostate cancer

Figure 1 Main steps in the mixed method review.
health questions addressed in systematic reviews need to be examined in a more complex way to ensure the outcomes are meaningful (Noyes et al. 2013). This review uses methodology described by Dixon-Woods et al. (2005). We have used the approach of narrative summary. In addition, we have informed our methods from previously published mixed-method reviews (Thomas et al. 2004, Lewis et al. 2010, Glenton et al. 2013, Puts et al. 2015).

Narrative summary is the selection, chronicling and ordering of evidence to produce an account of the evidence and can integrate quantitative and qualitative evidence through narrative juxtaposition (Dixon-Woods et al. 2005). We followed the example of the methods of Lewis (Lewis et al. 2010). Using the analysed data from both reviews, we developed a set of propositions to explore supportive care for men with PC. The propositions were ideas or statements derived from the initial data which have not necessarily been subjected to empirical research but are amenable to testing, for example, in a RCT. To ensure there was transparency as to which papers contributed to each of the propositions, a table was composed cross-referencing the propositions and the relevant original papers in a similar manner used by a previous mixed-method review (Puts et al. 2015).

In practice, the above methodology was applied by individual- and group-work. Initially, the four core systematic review authors (AH, AK, TM, MS) comprising of two quantitative and two qualitative researchers used the data from the two published systematic reviews to draft propositions individually, using both data sets. These mixed-data propositions were discussed as a group to reduce redundancy and to produce one set of propositions which were drafted by AH and recirculated. After individual consideration, the group met again to further refine the propositions. These were then circulated to all the co-authors of the paper.

The propositions and their supporting content were discussed and redrafted until all authors were in agreement. The propositions were then summarized by two authors (AK, AH) into a user-friendly format which describe the components of care likely to lead to supportive care provision acceptable to men with PC (Lewis et al. 2010). This summary was also circulated to co-authors until a consensus on the content was agreed. In the absence of a mixed-method reporting tool, the Mixed Methods Appraisal Tool (MMAT) while not applied formally was used to help the authors to ensure clarity and accurate reporting (Pluye et al. 2011).

Results


Systematic review of quantitative (intervention studies) (Supplementary Appendix S4)

Overall there was a lack of evidence of effectiveness or cost effectiveness from the quantitative studies. The majority of trials measuring quality of life (15/22 trials) and depression (11/14 trials) found no effect. Relatively few trials measured anxiety, coping skills and self-efficacy and most of them found no effect (0/3, 2/4, 3/4 trials respectively). No cost data were available. Overall trials were rated unclear for risk of bias. Interventions were delivered before and during primary treatment, short term after primary treatment (within 6 months) and in the longer term post primary treatment. Intervention components included information, education, health professional discussion, homework, peer discussion, formal buddy support, cognitive behavioural therapy, cognitive restructuring, psychoeducation, reiki and relaxation. Most interventions were given for 5–10 weeks.

Synthesis of qualitative studies (Supplementary Appendix S5)

Most qualitative studies were predominantly about men’s experiences of (supportive) care but we also included studies which were more generally about men’s experiences but only used the proportion of the study focusing on
(supportive) care. All qualitative studies were of high quality as assessed by CASP checklist (CASP 2014). The thematic synthesis drew out eight descriptive themes from the data: peer support, support from partner, online support, cancer specialist nurse support, self-care, communication with health professionals, unmet needs (emotional support, information needs, support for treatment induced side effects of incontinence and erectile dysfunction) and men’s suggestions for improved delivery of supportive care.

Synthesis of mixed data from both quantitative and qualitative studies (Table 1)

Nine propositions (P1–9) were developed across the studies. Seven were formed from both the quantitative and qualitative data and two from the qualitative data only (P5 and 8). Most of the propositions (P1–7) were based both on current evidence and the acknowledgement that further research is needed, P8 was based on current evidence and P9 acknowledged that further research is needed:

P1: The ‘care burden’ on partners or trusted others in providing emotional support and help with information seeking, provision and interpretation should be acknowledged by health professionals when talking to patients and incorporated into care planning.

This proposition was based on data by the qualitative review as the studies are the principal vehicle for integration. Nine qualitative studies described wives, partners, friends and families as significant sources of support and some of these also highlighted the additional need for spouses to receive support (Matsunaga & Gotay Cook 2004, Boehmer & Babayan 2005, Milne et al. 2008, Ervik et al. 2010, Nanton & Dale 2011, O’Brien et al. 2011, Rivers et al. 2012, O’Shaughnessy et al. 2013, Thomas 2013). In light of this, it is disappointing that just seven of the 26 intervention studies were delivered to couples with only two of these reporting outcomes specific to partners or spouses (Lepore & Helgeson 1999, Lepore et al. 2003, Giesler et al. 2005, Campbell et al. 2007, Northouse et al. 2007, Manne et al. 2011 Walker et al. 2013).

In the Northouse trial of supportive educative intervention, spouses reported higher quality of life, more self-efficacy, better communication and less negative appraisal of caregiving, uncertainty, hopelessness and symptom distress at 4 months compared with controls and some effects were sustained to 8 months and 12 months (Northouse et al. 2007). In the intimacy-enhancing psychological intervention trial by Manne, partners beginning the intervention with higher cancer specific distress, lower marital satisfaction, lower intimacy and poorer communication, the intervention improved these outcomes (Manne et al. 2011):

P2: Men strongly express the need for information following diagnosis and prior to any treatment but may have difficulty in absorbing facts at this time and so there is a need for reinforcement. Information, educational and stress-management interventions will benefit men with PC around this time and in the short-term preceding primary treatment.

This proposition was based on data from both the quantitative and qualitative review.


In addition, interventions delivered around the time of primary treatment included approaches such as relaxation and acute coping skills components. Twenty-two of the 26 trials measured QoL with only eight reporting an improvement in the intervention compared with the control group (Lepore & Helgeson 1999, Lepore et al. 2003, Bailey et al. 2004, Weber et al. 2004, 2007, Giesler et al. 2005, Parker et al. 2009).

Fourteen of the 26 trials used depressive symptoms as an outcome and three trials measured anxiety. In the 14 trials, only three showed an improvement in the intervention group compared with the control group (Weber et al. 2004, 2007, Parker et al. 2009). There were no trials that showed...
**Table 1** Propositions derived from both the quantitative and qualitative data correlated with the individual papers.

<table>
<thead>
<tr>
<th>Proposition</th>
<th>Qualitative (20 studies)</th>
<th>Quantitative studies (26 studies)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1: The ‘care burden’ on partners or trusted others in providing emotional</td>
<td>Trusted other/partner support</td>
<td>Interventions delivered to couples</td>
</tr>
<tr>
<td>should be acknowledged by health professionals when talking to patients and</td>
<td>Boehmer and Babayan (2005)</td>
<td>Giesler <em>et al.</em> (2005)</td>
</tr>
<tr>
<td></td>
<td>O’Shaughnessy <em>et al.</em> (2013)</td>
<td></td>
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<tr>
<td></td>
<td>Rivers <em>et al.</em> (2012)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thomas (2013)</td>
<td></td>
</tr>
<tr>
<td>P2: Men strongly express the need for information following diagnosis and</td>
<td>Men’s experience of information</td>
<td>Trials involving information and or education</td>
</tr>
<tr>
<td>prior to any treatment but may have difficulty in absorbing facts at this</td>
<td>Boehmer and Babayan (2005)</td>
<td>Beard <em>et al.</em> (2011)</td>
</tr>
<tr>
<td>time and so there is a need for reinforcement. Information, educational and</td>
<td>Wallace and Storms (2007)</td>
<td>Carmack Taylor <em>et al.</em> (2006)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scura <em>et al.</em> (2004)</td>
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<tr>
<td></td>
<td></td>
<td>Walker <em>et al.</em> (2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Berglund <em>et al.</em> (2003)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Giesler <em>et al.</em> (2005)</td>
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<tr>
<td></td>
<td></td>
<td>Lepore and Helgeson 1999</td>
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<td></td>
<td></td>
<td>Lepore <em>et al.</em> (2003)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manne <em>et al.</em> (2011)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Campbell <em>et al.</em> (2007)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provision of CD-ROM &amp; list of reputable prostate cancer information websites</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loiselle <em>et al.</em> (2010)</td>
</tr>
<tr>
<td>P3: Healthcare providers need to be aware that men with prostate cancer may</td>
<td>Internet support</td>
<td></td>
</tr>
<tr>
<td>have different preferences regarding delivery of support, for example, face-</td>
<td>Broom (2005)</td>
<td></td>
</tr>
<tr>
<td>to-face contact, by Internet, by telephone.</td>
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Table 1 (Continued).

<table>
<thead>
<tr>
<th>Proposition</th>
<th>Qualitative (20 studies)</th>
<th>Quantitative studies (26 studies)</th>
</tr>
</thead>
</table>
| P4: There is need for realistic appraisal and discussion of potential side effects with patients as part of the health professional-patient communication prior to treatment, especially concerning erectile dysfunction and urinary incontinence. | Lack of communication about side effects  
Broom (2005)  
Ream et al. (2009)  
Ervik et al. (2010)  
Galbraith et al. (2012)  
Thomas (2013)  
Need for information and practical support on side effects  
Walsh and Hegarty (2010)  
Milne et al. (2008)  
Carter et al. (2011)  
Nanton and Dale (2011)  
O’Brien et al. (2011)  
Trials measuring prostate cancer QoL  
Parker et al. (2009)  
Templeton and Coates (2004)  
Giesler et al. (2005)  
Manne et al. (2011)  
Weber et al. (2004)  
Weber et al. (2007)  
Molton et al. (2008)  
Northouse et al. (2007) | |
| P5: Some men need referral to psychological support which may also include specialist psychosexual support. | Men’s experience of psychological needs & support  
Wallace and Storms (2007)  
Ervik et al. (2010)  
Carter et al. (2011)  
Trials focusing on psychosexual support  
Walker et al. (2013)  
Molton et al. (2008) |
| P6: Men need individual and flexible access to a specialist nurse. If supportive care is of an appropriate duration and intensity that matches men’s needs it will maximize its potential effectiveness. | Men’s relationship with specialist nurses  
Tarrant et al. (2008)  
Ream et al. (2009)  
Interventions delivered by nurses  
Beard et al. (2011)  
Mishel et al. (2002)  
Templeton and Coates (2004)  
Bayley et al. (2004)  
Berglund et al. (2003)  
Giesler et al. (2005)  
Northouse et al. (2007) |
| P7: Men value the opportunity to talk to other men about their experiences of living with prostate cancer and may need signposting to peer support. | Men’s experiences of peer support  
Matsunaga and Gotay Cook (2004)  
Walsh and Hegarty (2010)  
Broom (2005)  
Wallace and Storms (2007)  
Milne et al. (2008)  
Ream et al. (2009)  
Nanton et al. (2009)  
Ervik et al. (2010)  
O’Brien et al. (2010)  
Carter et al. (2011)  
Nanton and Dale (2011)  
Chambers et al. (2012)  
Galbraith et al. (2012)  
Trials with components of peer support.  
Parker et al. (2009)  
Lepore and Helgeson (1999)  
Lepore et al. (2003)  
Weber et al. (2004)  
Weber et al. (2007)  
Molton et al. (2008)  
Penedo et al. (2004)  
Penedo et al. (2006)  
Traeger et al. (2013) |
| P8: Men experience some health professionals particularly consultants as showing a lack of understanding of the emotional impact of prostate cancer. There is a need for a more empathetic, personalized approach. | Lack of understanding & empathy by health professionals  
Matsunaga and Gotay Cook (2004)  
Boehmer and Babayan (2005)  
Oliffe et al. (2009)  
O’Brien et al. (2010)  
Thomas (2013)  
Differences between different health professionals  
Galbraith et al. (2012)  
Thomas (2013)  
No relevant studies |
a positive intervention effect on anxiety. A forest plot of standardized mean differences indicated that although many of the studies found no effect on depressive symptoms, mood or anxiety and the confidence intervals were generally wide they are tending towards a positive effect:

P3: Healthcare providers need to be aware that men with PC may have different preferences regarding delivery of support, for example, face-to-face contact, by Internet, by telephone.

This proposition was based on data from both the quantitative and qualitative review.

The studies predominantly described face-to-face interaction with both health professionals and peers. However, several of the qualitative studies reported that the Internet was a source of information, with some men citing that online contact reduced their inhibition to talk about PC (Broom 2005, Carter et al. 2011). There were no Internet-based interventions in the quantitative review although one intervention which reduced anxiety for men during the study period comprised of an informational CD-ROM and a list of reputable PC support websites (Loiselle et al. 2010). Numerous intervention studies used the telephone as a mode of providing ongoing support, with four interventions being exclusively delivered by telephone (Mishel et al. 2002, Campbell et al. 2007, Parker et al. 2009). Of these four interventions, only one study aimed at reducing uncertainty showed an improvement in quality of life for men (Bailey et al. 2004):

P4: There is a need for realistic appraisal and discussion of potential side effects with patients as part of the health professional-patient communication prior to treatment, especially concerning erectile dysfunction and urinary incontinence.

This proposition was based on data from both the quantitative and qualitative review.


There was some evidence from individual trials to suggest a positive effect of supportive care on men’s urinary and sexual functioning:

P5: Some men need referral to psychological support which may also include specialist psychosexual support.

This proposition was based on data from the qualitative review as the studies are the principal vehicle for integration.

Several of the qualitative papers highlighted the need for emotional and psychological support for treatment side effects (Wallace & Storms 2007, Ervik et al. 2010, Carter et al. 2011). These papers proposed that assessment of psychosexual needs should take place throughout the follow-up period, not only at the time of initial treatment. Many of the interventions in the trials included components of
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psychological support and psycho-education but only two trials specifically addressed physical relationships between men and their partners (Molton et al. 2008 Walker et al. 2013). These two trials did not yield any positive outcomes for the couples:

P6: Men need individual and flexible access to a specialist nurse according to their needs. If supportive care is of an appropriate duration and intensity that matches men’s needs it will maximize its potential effectiveness.

This proposition was based on data from both the quantitative and qualitative review.

Men’s experiences of care from a cancer specialist nurse were described almost entirely as a positive experience (Tarrant et al. 2008, Ream et al. 2009). This relationship enabled them to discuss the non-medical aspects of their illness. The role of the specialist nurse in ongoing and long-term care was valued as was the fact that contact could be initiated by men.

The interventions investigated in the trials were all delivered within 2 years of primary treatment. The majority of interventions were delivered or facilitated by health professionals with seven of the interventions being exclusively delivered by nurses although not all were specified as urology/specialist nurses (Mishel et al. 2002, Berglund et al. 2003, Bailey et al. 2004, Templeton & Coates 2004, Giesler et al. 2005, Northouse et al. 2007, Beard et al. 2011).

Most of the interventions were short in duration and intensity lasting between 5 and 10 weeks with weekly meetings of 1–2 hours. Men’s supportive care needs continue throughout their lives and therefore we need more studies conducted that focus on the longer term care of men to determine which approaches are likely to be most effective:

P7: Men value the opportunity to talk to other men about their experiences of living with PC and may need signposting to peer support.

This proposition was based on data from both the quantitative and qualitative review.


Most peer support interventions were delivered in discussion groups for which there was limited data. Lepore 1999 reported that a psycho-educational support group with peer discussion had improved mental health scores compared with controls two weeks post intervention. Two RCTs by Weber (pilot and main trial) investigated one-to-one support (Weber et al. 2004, 2007). The pilot trial showed significant improvement in depressive symptoms at four weeks with the intervention compared with controls (Weber et al. 2004). In the full trial, the intervention group had significantly lower depressive symptoms at eight weeks compared with controls:

P8: Men experience some health professionals particularly consultants as showing a lack of understanding of the emotional impact of PC. There is a need for a more empathetic, personalized approach.

This proposition was based on data from the qualitative review as the studies are the principal vehicle for integration. The qualitative studies described men feeling that there was a lack of understanding by health professionals in both primary and secondary care of the emotional impact of PC particularly in the longer term (Matsunaga & Gotay Cook 2004, Boehmer & Babayan 2005, Oliffe et al. 2009, O’Brien et al. 2010, Thomas 2013). Men said that there was a lack of empathy shown by health professionals, leaving them feeling depersonalized. Some of the qualitative studies suggest that participants perceived specialist nurses and GPs to be more empathetic than urologists (Galbraith et al. 2012, Thomas 2013):

P9: Health professionals need to more fully understand the potential different needs of men without partners or trusted others, men in same sex relationships and men from different ethnic backgrounds.

This proposition was based on data from both quantitative and qualitative review. The majority of the studies were limited in their patient groups with few studies recruiting ethnic minorities, younger, un-partnered men or men in same sex relationships. Only a third of the studies in the mixed-method review included men from ethnic minorities and one qualitative study addressed the supportive care needs of men in same sex relationships (Thomas 2013). Men with different ethnic and or socio-demographic backgrounds are likely to have different supportive care
needs. Appropriate tailoring of interventions is not possible without evidence from studies including or focusing on these groups of men.

**Summary of components of care are likely to contribute to supportive care acceptable to men with PC (Table 2)**

The above propositions based on patient experiences and trial data were used to produce a list of nine care components probably to lead to supportive care acceptable to men with PC with health professionals in mind. These criteria cover components of supportive care for men with PC which can be influenced by health professionals either by providing the care or signposting to alternative care or support services.

**Discussion**

To the best of our knowledge, this is the first mixed-data synthesis investigating supportive care for men with PC. Propositions were developed by applying the emerging methodology for integration of quantitative and qualitative data. From these propositions, care components were identified that are likely to contribute to acceptable supportive care for men with PC either provided or signposted to by health professionals.

While there was evidence about carer involvement in this synthesis, there appeared to be little appreciation of carer burden. A recent study of spouses of PC survivors showed that they continued to experience negative appraisal of caregiving, which affected their quality of life at 36 months after their husband’s initial treatment (Harden et al. 2013). Our current synthesis supports the need for focus on caregiver burden in the future.

While it was not possible to determine the unique contribution of education in the multi-component interventions, the qualitative studies made it clear that sufficient and timely information and education was needed by men. Most of the studies described face-to-face interaction with health professionals; however, evidence from survey data supports our data that some men prefer to access information and be educated via online sources (Børøsund et al. 2013). Different demographic factors such as age, education, income, time after treatment, degrees of distress and social support are likely to influence this preference (Børøsund et al. 2013, Jansen et al. 2014). Our data suggested that telephone-only support was not helpful to men with PC and a more recent telephone-based study targeted at couples also failed to improve sexual relationship outcomes (Chambers et al. 2014).

Targeted information provision to cancer patients suggests that information priorities were related to prognosis, diagnosis and treatment options and that being able to prioritize the most-needed information can make patient encounters more meaningful and useful (Tariman et al. 2014). Our current synthesis supports this, with evidence from men that the most important side effects of erectile dysfunction and urinary incontinence were not discussed sufficiently prior to treatment. The qualitative studies suggest that there are few referrals to psychological and psychosexual services for men with PC and few of the intervention studies addressed these needs. This provision is, however, likely to be influenced by local availability of such services.

The criticism of health professionals was a lack of empathy and the need for them to take the initiative in opening up to a realistic discussion of potential side effects particularly in relation to erectile dysfunction and urinary incontinence. The qualitative data also suggest that continuity of care plays a role in this (Carter et al. 2011). The benefit of shared care between secondary and primary care to maintain continuity of care of cancer patients is realized (Cooper et al. 2010 Lund et al. 2013).

Formal psychosocial support was mostly provided by nurses and studies suggest this is appreciated. However, most men appear not to receive this care in the longer term. In a 2014 evaluation study of a follow-up assessment after radical treatment for PC, the majority of patients said that it was important to have easy face-to-face access with specialist nurses and doctors and that this should happen every 6 months (Cockle-Hearne et al. 2013).

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**Table 2 Components of care likely to contribute to effective supportive care for men with prostate cancer.**

| Health professionals need to provide empathic, personalized care | Continuity of care is likely to enhance men’s care by building rapport |
| Health professionals need to appreciate men’s background and relationship status | Health professionals need to acknowledge the ‘care burden’ on partners/significant others and provide access to support |
| Patients need timely and accurate information to help manage daily living impacted by treatment side effects. This information might need to be repeated more than once | Patients need timely and appropriate supportive care to help manage daily living impacted by treatment side effects |
| Patients need access to timely and appropriate specialist nurses throughout the care pathway: on diagnosis, during treatment decision-making and post-treatment to support patients’ treatment side effects | Patients may need referral to local peer support groups |
| Patients may need access to psychological and psycho-sexual support | |

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This synthesis suggests that the most important element of informal support is peer support. While the intervention studies might suggest this can be facilitated by health professionals, the qualitative studies suggest a more informal, organic process of peer support is optimum. However, it is possible that men prefer speaking to their peers as such support is not forthcoming from health professionals.

This synthesis highlights that supportive care is unlikely to have been tailored to men’s domestic, cultural and socioeconomic background. There is some evidence in the literature suggesting that there are moves to reach out to different ethnic groups and patients with lower literacy skills (Odedina et al. 2014, Wang et al. 2015). While there is the acknowledgement that care and advice for gay men needs to be appropriate, this support is still lacking (Hart et al. 2014). A recent study suggests that unmarried status is an independent predictor of PC-specific mortality and overall mortality in men with PC (Tyson et al. 2013). It is therefore important that healthcare professionals are aware of the partnership status of their patients and are aware that un-partnered men may need extra support.

Strengths

The strengths of this paper are that the individual systematic reviews were conducted to rigorous standards. By integrating quantitative and qualitative data on supportive care for men with PC it presents a comprehensive and robust view of the topic and provides practical and research recommendations. The resultant synthesis draws on recent examples of approaches to mixed-method synthesis and thus reinforces the potential utility of this emerging methodology. In the absence of a reporting tool for mixed-method papers we used the MMAT tool of appraisal but acknowledge that this is not adequate, but uses the best methods available to date. We have provided the details of both the synthesis methods and the actual process we took as a research team as we have felt this has been lacking in previous mixed-method papers.

Limitations

While we have been meticulous in the description of our integration of mixed data, the narrative summary approach we have used is an informal process and it is possible the data could be interpreted in a different way by different authors (Dixon-Woods et al. 2005). The use of propositions in this type of review is relatively novel. To ensure transparency as to which papers were contributing to the propositions, we composed a table with this detail; however, this was not a formal content analysis. Content analysis is a more robust approach with established use and would apply frequencies and thus weighting as to the contribution of individual studies. This, we believe, could be a useful tool in mixed-method synthesis, although it can be criticized for its reductive nature and its tendency to diminish complexity and context (Dixon-Woods et al. 2005). However, both the supporting text for the propositions and the individually published quantitative and qualitative systematic reviews counteract this effect to a greater extent.

Summary and recommendations

Men with PC are likely to live for a long time with the disease, experience side effects from treatment and therefore have ongoing supportive care needs. The results of this mixed-method synthesis has produced components of care likely to lead to supportive care acceptable for men with PC specially aimed at health professional provision. Some of these factors are cost free (empathic approach) and low cost (ensuring information is understood) but more specific approaches which may have costs associated with them still need further investigation in randomized controlled trials.

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All authors have agreed on the final version and meet at least one of the following criteria [recommended by the ICMJE (http://www.icmje.org/recommendations/)]:
• substantial contributions to conception and design, acquisition of data or analysis and interpretation of data;
• drafting the article or revising it critically for important intellectual content.

Supporting Information
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Methodological exemplar: integrating quantitative and qualitative evidence


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