



A comparative study on the clinical decision making processes of nurse practitioners versus medical doctors using scenarios within a secondary care environment

Journal:	<i>Journal of Advanced Nursing</i>
Manuscript ID	JAN-2015-0967.R2
Manuscript Type:	Original Research: Empirical research - qualitative
Keywords:	Nurse Practitioners, Decision-making
Category:	Nurses

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Impact statement

The potential impact this study may have to:

- Patient compliance. Evidence suggests that patients are more compliant with nurses compared to doctors. This study reinforces this evidence through comparison of consultation styles. The nurses were holistic and took longer in their consultations, this has been known to improve patient satisfaction and compliance, whereas the doctors were more paternalistic and took less time with their consultations.
- Clinical practice. This study found that nurse practitioners' consultation was comparable to that of medical doctors within secondary care. This is in terms of models of decision making. Both groups reached the same diagnosis, investigations and management.
- Experience. This study found nurse practitioners who had less than 2 years' experience and may also be lacking in clinical experience. They benefitted from the use of descriptive models of diagnostic processes. This may also contribute to the improvement of decision making training that the nurse practitioners require.
- Education. This study highlighted recommendations on examining on-going training and related issues of nurse practitioners already established. Perhaps nationally and include nurse practitioners who have not followed a nurse practitioner degree programme. Aiming to provide a model of training which could be adopted by nurse practitioners within primary/secondary care.
- Social & Economic issues. Areas influenced by medical doctors and multi-disciplinary teams affect the selection of patients a nurse practitioner gets to review. This study may encourage more variety of patients to be reviewed. More need for the nurse practitioner to have clarity in their role.

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Review Copy

ABSTRACT

Subjects

This study was conducted from May 2012 to January 2013.

Aim

To investigate the decision-making skills of secondary care nurse practitioners compared to those of medical doctors.

Background

A literature review was conducted, searching for articles published from 1990 to 2012. The review found that nurse practitioners are key to the modernisation of the National Health Service. Studies have shown that compared to doctors, nurse practitioners can be efficient and cost-effective in consultations.

Design

Qualitative research design.

Methods

The information processing theory and think-aloud approach were used to understand the cognitive processes of 10 participants (5 doctors and 5 nurse practitioners). One nurse practitioner was paired with one doctor from the same speciality, and they were compared using a structured scenario-based interview. To ensure that all critical and relevant cues were covered by the individual participating in the scenario, a reference model was used to measure the degree of successful diagnosis, management and treatment.

Results

The data were processed for 5 months, from July to November 2012. The two groups of practitioners differed in the number of cue acquisitions obtained in the scenarios. In our study, nurse practitioners took three minutes longer to complete the scenarios.

Conclusion

This study suggests that nurse practitioner consultations are comparable to those of medical doctors within a secondary care environment in terms of correct diagnoses and therapeutic treatments. The information processing theory highlighted that both groups of professionals had similar models for decision-making processes.

SUMMARY STATEMENT

Why is this research or review needed?

- The purpose of this research was to highlight the similarities in decision-making skills between nurse practitioners and doctors during consultations.
- To highlight to other multi-disciplinary teams that nurse practitioners are equally as capable as doctors in making diagnoses and prescribing further studies or treatment.
- To help provide clarity on the role of the nurse practitioner.

What are the key findings?

- Nurse practitioners and medical doctors used similar cognitive decision-making skills. However, medical doctors were able to chunk more information and used less cue

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3 acquisition (history taking) to reach a diagnosis and thus finished their consultations
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5 quicker than nurse practitioners.
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- The more experienced (> 2 years) nurse practitioners were comparable to medical
10 doctors in their consultations.
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 - The two professions showed different consultation styles; nurse practitioners were
12 more holistic, whilst medical doctors were more paternalistic.
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22 **How should the findings be used to influence policy/practice/research/education?**
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- This study may influence government policy, as it provides more clarity regarding the
26 nurse practitioner's role and responsibilities.
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 - This study may affect caring practices, as multi-disciplinary teams may acknowledge
28 the nurse practitioner's abilities, assign them a variety of patients and organize
29 opportunities for further training.
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 - This study contributes to the number of studies that have confirmed that consultations
32 performed by nurse practitioners are comparable to medical doctors' consultations.
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43 **Key words**
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45 Nurse practitioners, decision making, medical doctors vs nurse practitioners, consultations,
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47 scenario interviews
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INTRODUCTION

The role of the nurse practitioner (NP) within the United Kingdom (UK) has expanded and advanced in the past 10 – 15 years into roles traditionally held and practiced by medical doctors. Indeed, evidence suggests that NPs within primary care are now engaging in nurse consultations and performing advanced physical examination skills with patients, similar to those performed by general practitioners (Venning et al., 2000; Royal College of Nursing 2002).

This advance in nursing roles is becoming more evident within secondary care, in which specialist nurses have become NPs through education and training and are now able to conduct nurse consultations and practice physical examination skills similar to those of their medical counterparts (Crumbie, 2008). A consultation is a single interview in which the patient presents a problem that is diagnosed and managed by the practitioner (Pendleton et al., 2003). In a consultation, practitioners work with an unstructured problem in the beginning and arrive at diagnostic classification or treatment decision (Offredy, 1998).

In particular, the author was accustomed to being a specialist nurse and had evolved his role to NP within a secondary care environment through education and training. **In the UK, secondary care is mostly delivered in hospital wards, clinics or departments, and patients are usually referred to secondary care services by primary care professionals (NHS Choices 2016).** For the author, the transition to the NP role seemed to be a mixture of an opportunity and uncertainty. The opportunity was being able to provide effective management and treatment for patients. However, there was uncertainty in whether this new role met the needs of the patient, who may be at a disadvantage from being examined by a nurse rather than a doctor. This topic required further research, and a literature review was thus conducted.

BACKGROUND

A literature review was conducted, searching publications from 1990 to 2012. This review found that the majority of research was conducted within primary care, with little or no research conducted within secondary care. However, two interesting findings emerged from this literature review. The first finding was that several studies investigated NPs' nurse-led consultations within primary care and concluded that they are comparable to those of doctor-led consultations in terms of cost effectiveness, clinical benefits and quality of care provided. This was reassuring, to know that nurse-led consultations and physical examinations are able to meet patients' needs and that patients are not disadvantaged by being examined by a nurse.

Secondly, the literature review found that the research methods used by these studies could be replicated within a secondary care environment to establish possibly similar findings.

Therefore, the following literature review provides an initial overview of the supporting literature on the role of the NP within primary care, followed by literature that may be replicated within the secondary care environment.

Supportive literature on the advanced NP role

A study by Everitt et al. (1990) found differences in the consultations between nurse practitioners and general practitioners. They interviewed 501 general physicians and 298 nurse practitioners with a case study of a patient presenting with insomnia. The results indicate that nurse practitioners were more likely to take an in-depth history and consider non-pharmacologic treatment for insomnia. In contrast, general practitioners were less likely (40%) to take a sleep history, and almost half (46%) would consider drug therapy for insomnia.

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3 Munding et al. (2000) conducted a 2-year randomised study comparing the outcomes of
4 patients assigned to a nurse practitioner or a physician. Their study concluded that in a
5 sample of 406 patients, no differences were found between the two groups in terms of
6 consultations, services or satisfaction. Kinnersley et al., (2000) in a randomised trial of nurse
7 practitioners versus general practitioner's care for patients requesting "same day"
8 consultations in primary care, found that the majority of patients were more satisfied with the
9 nurse's consultations; their study included 1386 patients. They attributed their findings to
10 patients receiving more information from the nurses. In terms of services provided, both
11 groups had similar investigations and referrals.
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24 Venning et al. (2000) compared nurse practitioners to general practitioners in terms of cost
25 effectiveness. From 20 general practices within England and Wales, 1292 patients were
26 recruited. They concluded that although the consultations between the groups were very
27 similar, nurse practitioners took a longer time to examine the patients and requested more
28 tests and more patients to return.
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35 Grant et al. (2002) investigated nurse practitioners' clinical care in walk-in centres versus the
36 care provided in general practice centres. Five scenarios were observed in 297 consultations.
37 They found that walk-in centres, which had a majority of nurses, performed significantly
38 better and safer than general practices, which had a majority of doctors.
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45 In a systematic review of the current literature (11 trials and 23 observational studies) related
46 to nurse practitioners and whether they provide care equivalent to that of doctors, Horrocks et
47 al. (2002) found that nurse practitioners had better patient satisfaction and provided
48 equivalent care to doctors. However, NPs requested more studies and had longer
49 consultations.
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3 Patients have expressed high levels of satisfaction with and acceptance of NP consultations,
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5 in some cases exceeding those of doctor-led consultations. Pritchard and Kendrick (2001)
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7 conducted a study to evaluate practice nurse's and health visitor's management of acute
8
9 minor illnesses in a sample of 1900 patients in a clinic in Nottingham. The authors used a
10
11 questionnaire to determine whether patients were more satisfied with the care from practice
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13 nurses and health visitors than the care from general practitioners. They concluded that with
14
15 appropriate training, nurses and health visitors can have an impact on waiting times, reducing
16
17 the waiting times of patients visiting general practitioners. Another study that could
18
19 contribute to the understanding of patient satisfaction examined how nurses prepare for
20
21 consultations. White et al. (1992) developed a clinical decision-making framework using
22
23 elements from hypothetical-deductive reasoning. The NPs' process of inquiry is guided by
24
25 the hypotheses they form (i.e., decisions about what to focus on in the history, how to carry
26
27 out the examination, and what diagnostic tests to request). The framework proposed by
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29 White et al. translates this process to nurses' clinical decision making, namely, reviewing
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31 data prior to meeting the patient, making early hypotheses, using clinical inquiries,
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33 identifying a working hypothesis, implementing diagnostic testing, testing the final
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35 hypothesis, making a definitive diagnosis, deciding on the patient's management plan, and
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37 evaluating the entire clinical situation.
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45 The decision-making styles of NPs and doctors differ (Offredy, 1998; Malone, 2003).
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47 Williams and Jones (2006) found in their study that NPs favoured a holistic style in their
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49 consultations, requiring a longer time with patients to achieve compliance and understanding.
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51 Skills such as the consultation process and techniques used to make decisions are very
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53 important and provide the NP with credibility and respect within their work environment.
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56 **Literature that can be replicated within a secondary care environment**
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3 Maxine Offredy (2002) conducted a study that compared general practitioners' and nurse
4 practitioners' decision-making processes within a primary care setting, using patient scenarios both
5 parties would be likely to review. Her study included 22 participants, 11 general practitioners and 11
6 nurse practitioners, who were selected using purposeful sampling and set criteria. To measure and
7 compare the clinical decision-making processes between both groups, the scenarios included a
8 reference model that the participants had to achieve in order to successfully diagnose, manage
9 and treat/refer the patient. The scenarios were conducted using an interview approach, and the
10 participants were encouraged to discuss their thoughts throughout the interview. This approach is
11 called "think aloud" and provides the researcher insight into the thought processes and clinical
12 decisions the participants may be considering throughout the scenario. The study found that there
13 were more similarities than differences in the decision-making processes of the two groups. Through
14 the "think-aloud" approach, participants in both groups were found to use hypothesis evaluation as
15 a critical component in their decision-making process and as justification for their diagnoses and
16 treatment/management plans.

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32 The study described was able to successfully compare the decision-making processes of the two
33 groups (general practitioners and NPs) using a reference model, the "think-aloud" approach and an
34 information processing theory framework.

35 36 37 38 39 **A brief overview of decision-making theories**

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42 There are three main approaches to studying the cognitive process of decision making,
43 namely the normative approach, behavioural decision theory and information processing
44 theory (IPT). The normative approach uses decision analysis and Bayes' theorem. This type
45 of approach is best explained by Bell et al. (1995), who suggested that the focus is on giving
46 subjects a choice or an option and analysing why they made that choice. Behavioural decision
47 theory overlaps with the normative approach in that it uses mathematical logic and clinical
48 data to arrive at a final decision. Models by Hammond (1978) and Thompson (1999) suggest
49 that individuals solve problems through a continuum that has intuition on the one hand and
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3 analytical cognition on the other, moving back and forth along the continuum until a problem
4 is resolved. However, as these two approaches focus on the individual's choice and
5 descriptive decisions of the individual's behaviour, we considered a third approach, the IPT.
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10 The IPT has been successful in identifying cognitive responses to healthcare professionals'
11 decision-making processes for problem solving (Tschikota, 1993; Fowler, 1997) and in
12 comparing healthcare professionals' decision-making processes (Offredy, 2002; Di Giulio
13 and Crow, 1997).

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19 We considered other theories such as Benner & Tanner's (1987) intuitive humanistic model,
20 which suggests that as clinicians become more experienced, they are able to use fewer
21 guidelines and procedures to reach a quick and appropriate decision. We felt that our study
22 could have difficulty facilitating the different stages of experiences amongst the group of
23 nurses and doctors. Perhaps in a future study we may be able to have a larger group of
24 subjects (nurses and doctors) with similar training and years of experience for comparisons.
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33 The cognitive continuum theory proposed by Hammond (1981) was also considered and is a
34 descriptive theory that studies how judgement situations or tasks relate to cognition.
35 Hammond (2000, page 83) further explains that this judgement relies on task and cognitive
36 functions. Reviews by Cader et al. (2005) suggest that this theory has been integrated in
37 nursing studies successfully. However, the success of using this theory is attributed to using
38 quantitative methods and ensuring that the environment is as realistic as possible. Therefore,
39 this approach was not as suitable for this study.
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52 Examining the process of NP consultations within secondary care is essential for
53 understanding the development of extended nursing roles. The use of NPs within the
54 secondary care sector is a relatively new concept in the United Kingdom, with some areas
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3 having a number of NPs using advanced skills in a variety of clinical settings and other areas
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5 having no NPs (Crumbie, 2008). There are three major factors that need to be considered
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7 when conducting research on the decision-making skills of NP and MD during consultations
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9 within secondary care. Firstly, there are limited studies comparing the cognitive processes of
10
11 NPs and MDs during consultations in secondary care. Secondly, strong evidence in primary
12
13 care shows that the diagnosis, management and treatment conducted by NPs are comparable
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15 to those of general practitioners, although the NPs take longer and request more studies and
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17 follow-up in their consultations. Lastly, there are differences in the consultations between NP
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19 and MD in decision-making styles, experiences and duration.
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27 **THE STUDY**

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29 This study was conducted from May 2012 to January 2013.
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32 **Aims**

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35 This research aimed to investigate the decision-making skills of secondary care NPs. It
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37 sought to **explore the** styles, processes and experiences with decision making **in** NP-patient
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39 consultations in comparison to MD-led consultations in **a** secondary care **setting**.
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42 **Ethical consideration**

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45 Ethical approval was granted by the Local Research Ethics Committee (LREC) and by the
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47 University. Informed consent was obtained by the chief investigator through initial telephone
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49 and face-to-face conversations and then by a formal letter sent to potential participants to
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51 explain the study and ask them to sign that they agree to participate. The anonymity of
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53 participants was maintained.
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56 **Research setting**

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3 This study was conducted in a **secondary care setting in a** district general hospital in the
4 Southeast of England. The 5 specialist areas of NP-led secondary care were the respiratory,
5 dermatology, gynaecology, oncology and A&E departments, all within the same hospital.
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9 10 **Design**

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12 This study used a qualitative research design. **Talk-aloud** interviews were conducted in two
13 parts. The first part commenced with a scenario in the participants' chosen speciality and then
14 included a series of open-ended questions about how they would proceed, formulate a
15 diagnosis, and produce a management and treatment plan. There was no restriction to the
16 number of questions that the participants could ask, but they had to explain their rationale and
17 decision-making process. The participants were required to verbalise (or **talk aloud**) their
18 decisions and were prompted after any delay longer than 15 seconds by being asked, "what
19 are you thinking now?" Interviews lasted 20 to 30 minutes.
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31 **Sampling**

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33 A convenience sample with purposive sampling for pairs was used in this research. The
34 inclusion criteria included NPs who held an NP degree from a programme acknowledged by
35 the Royal College of Nursing or had a National Organisation of Nurse Practitioners Faculties
36 qualification within a secondary care setting.
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44 The inclusion criteria for doctors were completing at least the basics of foundation year one
45 (house officer) and being in any career stage from foundation year two (senior house officer)
46 to consultant; having an NP as part of the team; both working in the same speciality and
47 sharing the same consultations with patients. These criteria facilitated the pairing of doctors
48 and NPs and ability to make comparisons. **We used a multiple-approach strategy for**
49 **recruitment. One strategy involved face-to-face** discussion of the project **with NPs and**
50 **doctors who worked in the hospital.** Other opportunities for recruiting **participants** included
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3 attending monthly meetings held by NPs and discussing the project with them informally.

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5 Recruitment also involved posting electronic and paper adverts on hospital notice boards.

6 7 8 Rigour

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10 This study used the Guba (1981) framework for credibility through trustworthiness of
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12 qualitative research, which proposes four criteria:

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14 a) credibility (instead of internal validity);

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16 b) transferability (instead of external validity/generalisability);

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18 c) dependability (instead of reliability); and

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20 d) confirmability (instead of objectivity).

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27 Throughout the study, rigour was maintained; for example, all participants were given a copy
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29 of the study information sheet to read and keep, and this sheet provided information on the
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31 project's aims, what to expect, how the information collected would be managed and who to
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33 contact if they had concerns about the study. Rigour was further maintained by obtaining
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35 informed consent from the participants, storing data in a secure area and granting only the
36
37 principal investigator access to study data. We shared the initial findings with the participants
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39 to receive feedback, which helped validate our findings (Moorley, Cahill and Corcoran
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41 2016). ST had sole responsibility for the data collection and thus interviewed all cases,
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43 ensuring that all data were collected in the same manner as per the study protocol. We
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45 recognise that the scenarios and pairings could be considered to be biased, as they were
46
47 specific to a speciality and the practitioners were knowledgeable in the field. In terms of the
48
49 reliability and validity of our scenarios, they had been used in previous studies including in
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51 Offredy (2002) and were validated for her doctoral research. Barratt and Ward (2009) used
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53 observed structured clinical examinations (OSCE) scenarios that were validated by one of the
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3 authors, JB. However, we did alter the scenarios slightly, for example to suit the secondary
4 care setting, but the main contents remained the same. The scenarios overall reflected the
5 clinical manifestations that patients would present, as well as the confirmed diagnosis. A pilot
6 study was conducted, and the presenting complaints were adjusted to better relate to the
7 person's speciality. Finally, prior to the study, we ensured that the participants had the
8 opportunity to undergo a test run with a mock scenario first, to help them prepare and ask
9 questions.
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19 **Insert table 1 here**

20 **DATA COLLECTION**

21 **Scenarios**

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28 The collection of data took 5 months, from July to November 2012, and was based on five
29 different scenarios that were used for the five speciality areas; an example of one of the
30 scenarios is provided in table 2. The scenarios were adapted from the works of Offredy
31 (2002) and Ward and Barratt (2009). The participants in the pair were given one scenario
32 within their speciality until both completed the scenario. This was conducted through talk-
33 aloud semi-structured interviews. The scenarios targeted the respiratory, dermatology,
34 gynaecology, oncology and accident and emergency fields.
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44 **Insert table 2 here**

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47 The second part of the data collection process asked closed-ended questions such as the
48 practitioners' length of time working in the speciality area, other areas of experience, and
49 their level of education.
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53 **Data analysis**

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3 Data were analysed using protocol analysis. Protocol analysis originated in psychology as a
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5 method for eliciting verbal reports of thought sequences as a valid source of data on thinking
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7 (Ericson and Simon 1993). It is the study of thought processes, in which subjects are asked to
8
9 **talk aloud.**

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12 The strength of protocol analysis includes its use as a reflection of the actual processes people
13
14 use as they perform a task. Protocol analysis can provide insight into the aspects of
15
16 performance that might otherwise remain inside a “black box,” accessible only by
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18 speculation.

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21 As described by Ericsson and Simon (1993), protocol analysis is divided into two stages of
22
23 cognitive processes. The first stage can be considered diagnostic decision making (Elstein et
24
25 al., 1978), and the second stage, therapeutic decision making, as adapted by Offredy (2002).
26
27 Altogether, there are nine discrete phases of cognitive processes in clinician consultations.
28
29 The phases or components are the four major stages of clinical reasoning identified by Elstein
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31 et al. (1978)

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34 Five additional stages were identified by Offredy (2002) for the second type of clinical
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36 inference, therapeutic decision making (treatment or management outcomes), as shown in
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38 table 3.
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42 43 **Insert Table 3 here**

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46 Data analysis involved a review of all of the data collected: transcripts, demographic
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48 characteristics of the participants and summaries of the cognitive processes used in the
49
50 clinical consultation scenarios. This was followed by a further review of the interview
51
52 transcripts, a field contact summary and any other relevant journal field entries, which were
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54 reviewed more than once. General themes began to emerge and were noted using memos and
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56 text highlighting. The text data were coded within the nine stages of cognitive processes for
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3 decision making during consultations, which involved the two themes, diagnostic and
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5 therapeutic. Pattern coding was used to create similar categories, which were reduced to
6
7 smaller categories to create a wider category field, in which comparisons and contrasts were
8
9 made.
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11 12 13 14 15 **Reference model**

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18 Throughout the data analysis, reference models were included for each scenario, see **table 4**
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20 **below.**

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23 **Insert table 4 here**

24 25 26 **RESULTS**

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29 There were **dissimilarities** between the two groups of practitioners in the number of cue
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31 acquisitions obtained for the scenarios. In our study, NPs took three minutes longer to
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33 complete the scenarios. **We present the results within the two main themes, diagnostic and**
34
35 **therapeutic, with each scenario forming a sub-part of the theme.**

36 37 38 **Theme 1 Diagnostic**

39 40 41 **Respiratory scenario**

42
43 Both practitioners agreed that a cardiovascular and respiratory examination would help
44
45 confirm and narrow the differential. Cue acquisition was the noticeable difference between
46
47 the two practitioners; NP3 missed a few critical cues such as exploring symptoms and red
48
49 flags. **“The field notes and recordings indicate that NP3 did not elucidate the following**
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51 **symptoms of the patient’s personal history or concerns that would be considered relevant for**
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53 **history taking. One of the red flags that had been missed by NP3 was asking the patient if**
54
55 **they had night sweats”.**
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3 NP3: *“I would quickly go through the red flag symptoms, such as um... are they coughing up*
4 *blood or sputum, and eh... swelling or swollen ankles, any weight gain or loss, have they lost*
5 *their appetite. Then, depending on what they said, I would either.”*
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10 *Gynaecological scenario*

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12 Both practitioners agreed that an abdominal and pelvic examination would help with the
13 differential. NP4 confirmed the (field) notes by gaining rapport and questioning the cause for
14 unprotected sex, including financial reasons such as being a sex worker, and considered
15 infertility as another possibility for serial partners. MD4 established good rapport but did not
16 pursue the reason for unprotected sex.
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25 NP 4: *“discussing sexually transmitted diseases and sex with women can be a very sensitive*
26 *subject, and I find that establishing a good rapport from the start allows them to feel*
27 *comfortable enough to open up and talk more to you about what is going on and what they*
28 *are worried about”*. Further quotes from the recordings of NP4: *“there are risks of having*
29 *unprotected sex and many partners; it’s important for me to find that out. I would gently*
30 *probe for an answer. It could be financial reasons, and there is a risk of them getting an*
31 *unwanted pregnancy”*.
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44 *Dermatology scenario*

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46 Both practitioners identified the root cause as cleaning agents used for work and gloves. NP5
47 verbalised her thoughts, and more differentials were made as a result of writing the scenario
48 history. The field notes indicate that she reached the correct diagnosis soon after taking the
49 history and performing the skin exam but continued to write all of her findings.
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56 NP5: *“...I have specialised in dermatology and skin disease for some time now. When I see a*
57 *patient and see their skin, I have a knack of knowing what’s happening with them.”*
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3 *Field notes and recordings note that NP5 went further by stating the following:*

4 *NP5: "I am sure that this is contact dermatitis, but to be thorough, I am going to go through*
5 *a list of differentials, write them down and start checking them off."*

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8 Both practitioners felt that a skin examination would support or disprove the diagnosis.
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10 11 12 13 *Oncology and Accident & Emergency scenario*

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16 Both practitioners agreed that a rectal and abdominal examination would support or disprove
17
18 the diagnosis.
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21 *NPI: "of course, before I pursue any action, I want to check physically that the patient is*
22 *actively bleeding. I would consider doing a PR and abdominal exam".*

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27 *MD1: "I am thinking that this man is 79 and is presenting with abdominal pain, diarrhoea*
28 *and rectal bleeding. It would be good to know how long this patient has been suffering from*
29 *this condition. I would be able to determine whether this was an acute or chronic condition;*
30 *however, an abdominal examination followed by a rectal examination should be able to*
31 *confirm the possible diagnosis".*
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44 **Theme 2 Therapeutic**

45 46 *Respiratory scenario*

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48
49 Both practitioners advised the patient on the findings for the confirmed diagnosis. The initial
50
51 treatment for a respiratory speciality setting was treatment with a bronchodilator. MD3
52
53 suggested considering an urgent referral to A&E for heart failure management with diuretics
54
55 depending on the clinical urgency. The NP's treatment was justified in the following excerpt.
56
57
58
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60

1
2
3 NP 3: "... for respiratory, we are treating you for COPD, and this responds well with a
4 bronchodilator... I would like to do a peak flow... you may also have some cardiac
5 symptoms, and I will need to refer you to a cardiologist".
6
7
8

9
10 NP3 explained this decision as follows:
11

12
13 *I would look at my patient... this patient, and if they were very symptomatic, I would get my*
14 *doctor to confirm my concerns and plans and send this patient to accident and emergency*
15 *with a query for heart failure... I would not be able to address him here, but I believe he will*
16 *need treatment. He will need a diuretic of some sort".*
17
18
19
20

21
22 NP3's treatment included an emergency admission at signs of patient deterioration,
23 confirming that the treatment for heart failure is a diuretic, considered an urgent referral to
24 the heart failure team and made a respiratory referral to monitor the patient.
25
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28

29 30 *Gynaecological* 31

32
33 To advise on the treatment, NP4 highlighted the importance of establishing a good rapport
34 with the patients, making them feel comfortable with the advice, and gaining further
35 information and compliance. NP 4: "*discussing sexually transmitted diseases and sex with*
36 *women can be a very sensitive subject, and I find that establishing a good rapport from the*
37 *start allows them to feel comfortable enough to open up and talk more to you about what is*
38 *going on and what they are worried about".*
39
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46 47 *Dermatology* 48

49
50 Both clinicians would refer the patient to a general practitioner or Dermatology department,
51 and they also advised that a history of hay fever and mild asthma, parent history and allergies
52 were very common atopic conditions. NP5 explained the importance of gaining the patients'
53
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1
2
3 trust by sharing experiences and information on the treatment and educating them about their
4
5 condition.
6
7

8 NP 5: *"It is very important to gain the patient's trust. I do this by sharing with them my*
9
10 *experiences with other patients with similar problems. They need to be able to understand*
11
12 *that skin conditions can flare up and can take a while to clear up, and they can be honest*
13
14 *with me about how they are feeling and whether they feel that the treatment is working"*.
15
16

17 NP5 discovered that the patient had financial worries and recommended government-funded
18
19 agencies to help with debt. The MD was very effective and friendly, explaining that rapport is
20
21 very important and that patients expect to be seen and treated quickly and are relieved when
22
23 they know what is happening.
24
25

26 27 *Oncology*

28
29 Both practitioners' initial treatment plan for bowel cancer was stabilisation of the patient and
30
31 immediate referral to A&E. MD 1: *"I can quickly see that this man is deteriorating. He needs*
32
33 *fluid resuscitation, then once stabilised, look to see if he is actively bleeding; this may require*
34
35 *surgery. In the meantime, he needs a line access and fluids. I will put that in myself. Take*
36
37 *bloods. Tell the patient that he is clinically unwell and needs to go to accident and*
38
39 *emergency. I would quickly write down a referral to A/E, call A/E about the situation and be*
40
41 *ready to admit this patient to Majors or resuscitation. I would get my nurse to go down with*
42
43 *him, and once I had finished here, I would follow up with what's happening"*.
44
45
46
47

48 NP 1: *"we don't normally get patients to our clinic who are so unwell. Occasionally, but not*
49
50 *always, and this chap is very ill. Before we can even look at the cancer and treatments, he*
51
52 *needs to be stabilised. He needs intravenous fluids and bloods... once my examinations*
53
54 *confirm this. I would just send him. I would let everyone know what is happening. Then, I*
55
56 *would just tell him, 'we are taking you over to accident and emergency'. I would take him*
57
58
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60

1
2
3 *myself and speak to the nurse in charge and the doctors and make sure he has been seen”.*
4
5 NP1 justified her action of not telling the patient about the cancer diagnosis: NP 1: *“this*
6
7 *patient is going through a whole new life event. They may need help coping with the impact.*
8
9 *Referral to the multi-disciplinary team can take any form such as occupation therapy, even*
10
11 *palliative care and district nursing. We need to be there for him from the beginning and even*
12
13 *at the end”.*
14

15 16 17 *Accident & Emergency*

18
19
20 Both practitioners’ initial treatment for bowel cancer was to stabilise the patient with an
21
22 immediate transfer to A&E for fluid resuscitation. NP 2: *“this patient has been compensating*
23
24 *for a while; he is losing a lot of output through diarrhoea and through blood loss; we can see*
25
26 *this through the increase in heart rate, the blood pressure and other clinical signs such as*
27
28 *sallow features... giving this patient fluids... possible immediate transfusion... then we can*
29
30 *see where this bleed is coming from”.* Additionally, MD 2 said, *“this patient will not do well*
31
32 *until we restore his balance...he needs one to one resuscitation. Fluid rescue. Bloods; CVP*
33
34 *monitoring...”* Both practitioners agreed on an urgent referral to the surgeons or gastric team
35
36 for immediate stabilisation and then to consider cancer treatment.
37
38

39 40 **DISCUSSION**

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42
43 This study involved ten practitioners (five NPs and five MDs) who achieved the correct
44
45 diagnosis, management, treatment and referral of the scenarios presented to them. Our
46
47 findings differ from those of Offredy (2002), whose sample of twenty practitioners (ten NPs
48
49 and ten General Practitioners) made both correct and incorrect responses.
50

51
52
53 Marshall’s (1995) schema theory suggests that participants reach correct decisions to similar
54
55 situations, events or experiences in which familiar patterns or cues are encountered. Patterns
56
57 include anything that is visual, auditory or olfactory and can be referred to as forceful
58
59
60

1
2
3 features (Marshall, 1995; Offredy, 2002). Forceful features are keys to memory and provide a
4
5 mechanism to gain access to stored information (Gale and Marsden, 1985: 69).
6
7

8 Criticisms of forceful features include their dependence on how individuals organise and
9
10 store memory. The respiratory scenario is used as an example in which two respiratory
11
12 practitioners have to provide two diagnoses, initially identifying a familiar respiratory
13
14 diagnosis of chronic obstructive pulmonary disease followed by an unfamiliar cardiac
15
16 diagnosis of heart failure. NP3 missed the relevant and critical cues of exploring symptoms
17
18 and red flags. Our field notes confirm that NP3 admitted she had not expected a cardiac
19
20 problem. However, NP3 identified a cardiac issue by taking the past medical history, current
21
22 history and social history.
23
24
25
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29 Forceful features direct practitioners toward new interpretations based on the available
30
31 information. The NP and MD scenario was a patient complaining of breathlessness; this
32
33 forceful feature suggests chronic obstructive pulmonary disease. The presentation of new
34
35 information forced the participants to revise the original information to obtain a different
36
37 interpretation: cardiac problems.
38
39
40

41 Offredy (2002) explains the two forms of reinterpretation seen in our participants. Firstly,
42
43 reinterpretation of the same information occurs by associating information with different
44
45 memory structures; secondly, reinterpretation due to additional information (i.e., physical
46
47 examination and investigation findings) occurs because this information can provide new
48
49 forceful features and lead to the use of different memory structures and thus a new
50
51 interpretation. This repetitive or iterative process of transforming a vague somewhat
52
53 incomplete schema into an identifiable one is part of problem solving (Offredy 2002).
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3 Our study found that MDs had shorter consultations times and different styles of eliciting
4 information than NPs. However, both NPs and MDs reached the same diagnosis and
5 therapeutic treatment. Offredy (2002) and Bergus and Hamm (1995) believe that this contrast
6 is due to the fact that MDs are taught to attach significance to changes in a patient's
7 presenting condition that could be suggestive of a particular disease. This relies on pattern
8 recognition or heuristics as a tool for diagnosis. Relying on this method can fail to identify
9 unusual or mild cases of a particular disease due to their diminished characteristic patterns
10 (Bergus and Hamm 1995).
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21 The NP education may contribute to the successful outcomes, i.e., reaching a correct
22 diagnosis and therapeutic treatment. NP education focuses on clinical decisions that are
23 knowledge-based and uses a problem-centred approach. They are encouraged to develop
24 reflective skills for critical analysis and to utilise skills learned during health assessments and
25 communication modules.
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32

33 NP4 (scenario 2 gynaecological) and NP5 (dermatology scenario) demonstrate this difference
34 in eliciting information when taking the patient's history. The NPs in both these scenarios
35 conducted communication modules for their NP pathway/programmes and described the
36 importance of good rapport and trust in achieving compliance and discovery of real root
37 causes. This supports the findings of Offredy (1998) and Malone (2003), which state that NPs
38 prefer holistic styles of consultation and require a longer time with their patients for effective
39 understanding and compliance; furthermore, a longer time spent on the initial consultation
40 saves time on further consultations (Williams and Jones, 2006). In contrast, the perspective of
41 MD5 (dermatology scenario) was to see the patient quickly and within an allotted time
42 period. MDs with extensive experience and formal education, which enhances the doctor's
43 schema and pattern recognition skills in identifying and categorising a relevant disease
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1
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3 process, process this information quicker (Elstein et al., 1978; Groen and Patel, 1985;
4
5 Marshall, 1995; Gwyn and Elwyn, 1999; Gwyn, 2002; Heritage and Maynard, 2006).
6
7

8 NPs elicited more information when history taking and requested more studies (cue
9
10 acquisition). The NP consultation times averaged sixteen minutes compared to the thirteen
11
12 minutes needed by MDs. Hinchliff and Rogers (2008) found that NPs within primary care
13
14 had increased consultation times and requested extra investigations.
15
16

17 Experienced NPs have similar abilities of “chunking” information to reach a diagnosis
18
19 (Groen and Patel 1985), suggesting that experience and education lead to requiring fewer
20
21 critical cues. Analysing the statements of NP5 may support this idea. NP5 (dermatology
22
23 scenario) had twenty-eight years of nursing experience, with ten years as an NP, and showed
24
25 slightly more cue acquisition than MD5. However, MD5 was a consultant with thirty-five
26
27 years of experience as a physician and thirteen years of experience within dermatology. The
28
29 level of consultants among the MDs was more experienced and had an advanced level of
30
31 training to chunk information at a greater efficiency than the dermatology NP.
32
33
34
35

36 The dermatology scenario transcripts show that both participants engaged in knowledge
37
38 elaboration (Offredy, 2002) and analogical reasoning, and as individuals acquire information
39
40 via cue acquisition (history taking, investigations and physical examinations), the probability
41
42 of each hypothesis or diagnosis was re-evaluated in light of the new information (Parrino and
43
44 Mitchell 1989). This is called hypothetical-deductive reasoning and is the reasoning process
45
46 behind the Bayesian approach to decision making. As novices gain experience, they become
47
48 more adept at identifying solutions to analogous problems that may also be used in new
49
50 situations (Parrino and Mitchell 1989).
51
52
53

54 In all the scenarios, knowledge elaboration was observed in both NPs and MDs. Both
55
56 practitioners used knowledge elaboration in the form of history taking, physical examinations
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1
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3 and investigations. This result contrasted from Offredy's (2002) findings, in which only a few
4
5 participants showed evidence of knowledge elaboration, and a potential reason for this
6
7 difference may be experience. Experienced practitioners may appear to bypass this process
8
9 due to the repetitive use of skill, as this could lead to less effort required and the development
10
11 of an automatic process.
12
13

14
15 Successful problem solving for practitioners depended on knowledge elaboration and
16
17 memory retrieval (Offredy, 2002). This process includes the identification of knowledge and
18
19 a heuristic method used to recall a problem from memory in relation to the present cues.
20
21 Examples can be seen in the A&E scenario and in the conversations expressing both the NP's
22
23 and MD's concern, based on their memory, about the patients' severity. Primary care NPs are
24
25 equally effective in consultations and comparable to general practitioners in terms of cost
26
27 effectiveness, clinical benefits and quality of care provided (kinnersley et al., 2000; Venning
28
29 et al., 2000; Grant et al., 2002; Horrocks et al., 2002). NPs within secondary care are equally
30
31 as effective as doctors in secondary care. In our study, the cognitive components used by both
32
33 practitioners led to the correct diagnosis, therapeutic treatment and management. This
34
35 suggests that secondary care NPs compare well with MDs when conducting consultations
36
37 within their speciality.
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42
43 A mental flowchart can inform practitioners about what actions to take when a particular
44
45 complaint or finding requires careful evaluation; therefore, when elaborating on knowledge
46
47 and planning the course of action, practitioners must think through each situation. Depending
48
49 on the information gathered, a mental flowchart can be created from the repeated use of an
50
51 established practice protocol or of national guidelines (Offredy, 2002). An example of this is
52
53 scenario 2 (pelvic inflammatory disease), in which practice protocols and national guidelines
54
55 advise prescribing antibiotics and relieving pain as the initial treatment. This quick
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1
2
3 recognition of the pattern of the condition and the practitioner's response becomes automatic
4
5 over time, and the delay between diagnosis and initiation of therapy is decreased.
6
7
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9

10
11 The IPT and **talk-aloud** protocols were very useful in providing insight into the cognitive
12
13 processes of decision making, establishing the cognitive stages used for problem solving
14
15 (forming a diagnosis) in both groups of practitioners, and making comparisons between the
16
17 NPs and MDs.
18
19

20
21 This study was able to identify the cues being used as forceful features for some practitioners,
22
23 which can be observed in scenario 1. The IPT shed light on the iterative process of problem
24
25 solving and diagnosing, as well as the stages of uncertainty.
26
27

28
29 The use of pattern recognition could be observed by applying the IPT and can be seen in
30
31 scenario 5 (accident and emergency). Both practitioners recognised the pattern based on
32
33 memory and identified that the patient was deteriorating and needed intravenous fluid
34
35 resuscitation.
36

37
38 Algorithms could also be identified by using the IPT. Scenario 2 (pelvic inflammatory
39
40 disease) provides an example of therapeutic treatment and management, and through **talk-**
41
42 **aloud** protocols, both practitioners (the pair within the gynaecological scenario) used national
43
44 guidelines to treat pelvic inflammatory disease. This study suggests that clinical experience
45
46 and the confidence of the NP in decision making are determined by the amount of exposure
47
48 to a variety of patient conditions over time.
49
50

51
52 The IPT and **talk-aloud** protocol analysis in this study were appropriate methodological
53
54 approaches for understanding the complex thought process of practitioners. The use of the
55
56 IPT and talk-aloud semi-structured interviews with participants identified NPs' cognitive
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2
3 errors, which can then be resolved through teaching tailored to address these errors. This
4
5 approach can therefore be used as a teaching tool (Offredy, 2002).
6
7

8 CONCLUSION

9
10 This research suggests that NP consultations are comparable to those of MDs within a
11
12 secondary care environment in terms of identifying the correct diagnosis and therapeutic
13
14 treatment. The IPT highlighted that the decision-making processes of both types of
15
16 professionals were similar.
17
18

19 LIMITATIONS

20
21 We did not triangulate the data in this study; a series of observations could be included and
22
23 implemented as another method for triangulation. We could have video-recorded the
24
25 participants' consultations and then played the recordings to the participant and asked them to
26
27 **talk through** their responses aloud. This method would have been useful for determining the
28
29 participants' cognitive processes during problem solving, consultation styles and non-verbal
30
31 communication within their natural environment and for determining whether the participants
32
33 were acting during the scenario. Our study was conducted in one hospital in the East End of
34
35 London and does not represent other secondary care fields.
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45 RECOMMENDATIONS AND IMPLICATIONS FOR NURSING PRACTICE

- 46
47 • The education of newly qualified NPs should include computer simulations and a
48
49 focus on different perspectives of NP decision making to improve their education and
50
51 experience. This would help new NPs respond similarly to experienced NPs when
52
53 problem solving a situation during consultations.
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- On-going training and related topics for established nurse practitioners could be examined to provide a model of training that could be adopted by nurse practitioners within primary/secondary care.
- Nurse practitioners should be allowed to assume a wider role in the assessment and treatment of patients in secondary care.

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A Brief outline of a chosen scenario that has been adapted from the works of Offredy (2002); Ward and Barratt (2009):

Respiratory scenario

Consultation		Explored	Not explored
History	68-year-old Afro-Caribbean male with shortness of breath and tiredness.		
Additional information	Breathless on exercise for over 3 months. Difficulty sleeping flat at night. No chest pain.		
Lack of energy symptoms	No energy, sleeping during the day.		
Cough symptoms	Productive cough in the morning, slowly improves. Sputum white and frothy. OTC no improvement.		
Current health	Weight gain, swollen ankles/fingers.		
Past medical history	High blood pressure, no known allergies		
Personal and social history	Retired, smokes 10-20 cigarettes a day. Pub 3 times a week and drinks 2/3 pints. No exercise.		
Fears/concerns	Worried it may be cancer.		
Possible diagnosis	Lists 6/7 possible diagnosis such as: Asthma, pneumonia, heart failure		
Respiratory examination	For example: <i>hands for clubbing.</i>		
Cardiovascular examination	For example: <i>oedema</i>		
Investigations considered	For example: <i>Bloods, x-ray, peak flow</i>		
Management considered	For example: <i>Treatment for Asthma</i>		
Advice given	For example: <i>Safety netting</i>		
Possible referrals	For example: <i>Respiratory physician</i>		

Table 2 Description of codes

Table 2 Description of codes	
Cue acquisition (component one)	Participant gathers information about the patient in a variety of ways such as history taking, physical examinations and investigations.
Hypothesis generation (component two)	Participant makes a list of differential diagnosis based on the gathering of information.
Cue interpretation (component three)	Participant demonstrates evidence of refuting or supporting differentials based on interpretation of old and new information.
Hypothesis evaluation (component four)	The participant makes a diagnosis based on all relevant and new information gathered.
Diagnosis (component five)	Participants have reached a decision on diagnosis for therapeutic treatment and overlaps with the hypothesis evaluation component. Hypothesis evaluation is the cognitive work up by the participant to form a diagnosis based on information gathered whereas the confirmed diagnosis signals the start of therapeutic treatment
Treatment (component six)	Participant demonstrates appropriate treatment required for the confirmed diagnosis.
Advice (component seven)	Participant demonstrates appropriate advice to the patient.
Further treatment/advice/refer to outside agency(component eight)	Participant demonstrates that the patient within the scenario may require further treatment, advice or a referral to an outside agency.
Referral (component nine)	Final component in which the participant considers the patient needs an urgent referral or follow up with another speciality

Table 3 Reference models

Reference model for Respiratory scenario								
Chronic obstructive pulmonary disease/Heart failure								
Relevant History taking	Critical Red Flags	Relevant/critical differentials	Critical Advice	Critical: Treatment	Critical Referrals	Relevant/critical Diagnoses	Relevant/critical Investigations	Critical Physical
Symptoms explored PMH; current health; medications, family history; personal and social history; concerns	Blood stained sputum; weight loss; weight gain; ankle oedema; changes in appetite; night sweats	TB; Bronchiectasis; Acute Bronchitis; Asthma; Chronic obstructive pulmonary disease; Allergy; Pneumonia; Neoplasm; Heart failure; Pulmonary Embolism	Advice to Patient	Initial treatment + follow up. Considers Bronco dilators and considers heart failure management depending on urgency.	Referral to cardiology +Salpingitis/-accident and emergency depending on condition of	Based on confirmed/supporte d evidence from physical findings	Bloods; chest x-ray; echo; electrocardiogram; urinalysis; bronchoscopy; 24 hour tape; exercise Test.	Respiratory; cardiovascular
Reference model for gynaecological scenario								
Symptoms explored; PMH; current health; medications, family history; personal and social history; concerns	History of Pain; Any blood with discharge; last menstrual period;	Appendicitis; Colitis; IBS; Crohns disease ; Peritonitis; Neoplasm; Pelvic inflammatory disease; Gonorrhoea; Chlamydia;	Advice given to patient	Antibiotics Pain relief	G.P Gynae Team A&E Sexual Health clinic	Based on confirmed/supported evidence from physical findings	Bloods; Urinalysis; Pregnancy test; Speculum; Swab	Abdominal; PV

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	recent sexual intercourse; use of condom; length of history; weight loss; weight gain; change in appetite; any fevers; any sickness	Vaginitis; Urine tract infection; Salpingitis; Ectopic; Endometriosis; Pregnancy; Fibroid; Polycystic ovaries						
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Reference model for Dermatology scenario

Symptoms explored; PMH; current health; medications, family history; personal and social history; concerns	Fevers; unwellness; associated symptoms; unexplained bruising	Contact dermatitis; infected eczema; scabies; chemical burns; trauma; insect bite; allergic reaction	Advice given to patient	Steroid cream; investigate hand protection.	Dermatology; G.P.	Based on confirmed/supported evidence from physical findings	Allergy testing/skin patching	Physical examinations Skin exam
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Reference model for Oncology and A&E scenario

Symptoms explored; PMH; current health; medications, family history;	Loss of weight; loss of appetite; difficulty	ulcerative colitis; ulcer; colon/bowel cancer; anal fissure; haemorrhoids;	Advice given to patient	initial fluid resuscitation; surgery + consider oncology.	Based on confirmed/supported evidence from physical	bloods; stool; urinalysis; abdominal Ultrasound; abdominal X-ray;	Physical examinations: Abdominal; PR exam	
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